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**LIQUIDITY MANAGEMENT: AN EMPIRICAL STUDY OF U.K. COMPANIES**

**Maria Manuela Farelo Athayde Marques**

Thesis submitted in fulfilment of the requirements for the  
degree of Doctor of Philosophy

**DEPARTMENT OF ACCOUNTING AND FINANCE**

**GLASGOW BUSINESS SCHOOL**

**UNIVERSITY OF GLASGOW**

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To

the memory of my father  
my mother

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## ABSTRACT

In a world of uncertainty, performing in accordance with the normative principles of finance means, among other things, providing for financial mobility at minimum cost. This should be the objective of liquidity management. In order to fulfil this objective, companies should develop proper planning processes, specifically cash flow planning, implementation of early warning systems and resource planning for financial mobility. This should constitute the content of liquidity management.

The present study is an empirically based analysis of liquidity management. The study contributes to the understanding of how U.K.-based companies handle the problem of unexpected events which have major negative implications for the expected funds flow equilibrium of the firm. In particular, the study was aimed at discovering the kind of liquidity management being implemented in practice, and the relationship between specific liquidity management practices and certain characteristics of the firm, and of its (headquarters) finance department. Evidence of the subject in the U.K. is very thin. It is therefore important to collect information on the state of the art in the practice of liquidity management in the U.K., particularly since for the last decade, companies have been so negatively affected by the instability and unpredictability of the business environment. The study also contributes to the identification of differences between theory and practice. In this respect, it is expected that the recognition of actual differences will challenge not only the level at which companies practice liquidity management but also the teaching of the subject in current corporate finance courses.

In a different direction, the study leads to the isolation of the central propositions of the theory (both normative and positive) relating to the business problem at the core of the investigation. As far as normative theory is concerned, the literature search



revealed that despite its importance, not only has relatively little been written in the field of liquidity management but also most of the existing writings treat the subject in an unsatisfactory, piecemeal manner. Hence the attempt by the author to consolidate and integrate the several scattered pieces of theoretical research available in the field, in order to devise a rational solution to the problem and a related implementation methodology, in every respect consistent with the principles of normative finance theory. The result was the development of a new unit of integrated theory, which draws on a systemic view of the financial management problem. It is hoped that this may contribute to normative theory in the field of liquidity management, and towards a better understanding of the several meanings of liquidity.

As far as positive theory is concerned, only one empirical work providing specific evidence of the subject was found. The use of case analysis as the adopted research approach gave that work an inductive character, geared to the generation of non-predetermined relationships. Furthermore, the reported evidence dates from the late sixties and refers to American experience only. The present study, although comparable to the former, provides evidence of the subject at a different time and in a different environment. It was also designed to provide broader and more generalized conclusions than the former. In this respect, it is expected that the study will make some contribution to the development of positive theory in the field of liquidity management.

Survey analysis was the strategy adopted in the study. Questionnaire and analysis of sample companies' annual financial reports were the two methods used for data collection purposes. The conclusions of the study allow two major implications to be drawn, namely that liquidity management, as it is currently most commonly practised in the U.K., cannot achieve its objective of providing for financial mobility at minimum cost; and that in order to reach a higher level of liquidity management, management education is in urgent need of improvement.

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## Chapter 1 INTRODUCTION

1.1 Purpose and Importance of the Study

1.2 Previous Research

1.3 Research Questions and Methodology

1.4 Limitations of the Study and Expected Contributions

1.5 Outline of the Thesis

1.1 Purpose and Importance of the Study

As understood in the study, liquidity is perceived as the debt-paying ability of a going concern. The assumption of a going concern implies that for any planning period ahead, the total amount of cash outflows anticipated to be required under expected conditions will have to equal the total amount of cash inflows expected to be internally and externally generated by the company. In most circumstances, this is less than the maximum cash potential capable of being generated under expected conditions during the same time span. The difference between the latter and the former identifies the liquidity of the firm for the planning period.

Since actual cash flows invariably deviate from expected cash flows, liquidity represents the firm's safety margin or buffer against unexpected cash shortages or financial needs. Furthermore, these may be the result of either favourable or unfavourable change in the external or internal environment of the company. Liquidity, therefore, is as much an opportunity buffer that allows the firm to take advantage of unexpected profitable investment opportunities, as an emergency buffer that allows the firm to withstand unexpected crises.

The resources which constitute this buffer are the instrument of management's capacity to act in response to such financial needs. They are the resources of liquidity. Moreover, they indicate to the firm the margin of technical solvency. This means that only those resources which the firm can deploy without incurring abnormally high and competitively prohibitive costs are taken into account in the evaluation of the margin. Resources proceeding from forgoing unexpected profitable investment opportunities, disrupting corporate objectives, or violating the boundaries set by the established financial policies of the firm are consequently excluded. Resources such as these are theoretically resorted to only when no other



alternative is left available to the firm. They set the margin of technical insolvency.

The fact that a company has liquidity for a given future time span does not imply that it has the capacity to redirect resources in response to unexpected financial needs that may arise at any point within that time span. The availability of the resources which constitute the liquidity of the firm may be unadjusted to the nature, timing, magnitude and duration of the needs. More important, therefore, than providing for the optimal level of liquidity for a certain period of time, is providing for financial mobility. This is defined as the capacity to redirect the necessary resources to restore funds flow equilibrium, that is, to restore balance in funds flows within the limits of technical solvency and with an acceptable risk exposure. Insofar as there is an opportunity cost associated with such a capacity, providing for financial mobility at minimum cost should be the main objective of liquidity management. This opportunity cost as much includes the implicit cost of holding financial mobility, as the explicit cost associated with the particular form in which financial mobility resides.

In this context, the development of planning processes allowing the firm to provide for financial mobility at minimum cost is of crucial importance. If liquidity management is to fulfil its objective, it should include two other basic activities besides cash flow planning: implementation of early warning systems and resource planning for financial mobility.

The objective of the implementation of early warning systems, and consequently of an organized information search into the future, is to achieve an understanding, at the earliest possible moment, of the potential financial implications of unexpected events. These are those events not contemplated in the corporate plan because they are unknown, uncertain or less likely at the time of its preparation. Clearly, unexpected events that are relevant for liquidity management are those implying major negative deviations from the expected cash flows of the firm, due to an increase in expected cash outflows, or a decrease in expected cash inflows, or both. In addition, unexpected events material to liquidity management are those whose financial

implications cannot be minimized or neutralized by insuring for losses. Early warning systems comprise traditional methods, such as cash flow plan revisions and cash flow updates or forecasts, as well as contingency planning - a more recent and elaborate method.

At the same time, the objective of resource planning for financial mobility is to guarantee, at the earliest possible moment, the resource availability necessary to restore funds flow equilibrium at minimum cost. A crucial feature is the preparation, at the planning stage, of an inventory of the resources of liquidity.

The theoretical formulation just described follows the trend in finance literature to attempt to bridge the gap between two rather disparate bodies of knowledge - normative finance theory and organization theory. The former provides a framework, in a rational cognitive mode, for approaching the definition of a managerial decision structure with regard to three principal components, namely the demand for funds, the supply of funds, and the criterion by which demand and supply are to be brought into a consistent relationship with one another. This criterion is generally extracted from a model of shareholder utility, justified in terms of the maximization of the utility to shareholders of an expected stream of dividends through time. The purpose of the criterion is to permit a unique, optimal solution, which can be continuously derived in real time.

In attempting to operationalize this framework, the finance literature over the past 20 years has followed two different paths [McInnes and Carleton, 1982]. One is characterized by a predominantly static representation of the problem. Decision-making is treated as a discrete activity (investment and financing decisions being logically separable; investment decisions being additive rather than interdependent), largely dissociated from both the dynamics involved in the treatment of uncertainty and the measurement of performance over time. The organizational context and managerial motives within which information is developed, communicated and used in the decision-making process are kept apart. The literature in this approach has produced powerful insights and models for analysing particular issues of the financial planning and decision process. Yet, not surprisingly, the extraction of particular issues from the



totality of the problem provides incomplete descriptions for a strategic planning process which is basically integrative.

The second path, on the other hand, is characterized by a formulation of the problem which allows corporate modelling applications. Decision-making is guided by the principles of economic optimization, but is seen as an activity deeply affected by the interdependencies and complexities of the world of corporate financial management. As a result, organization theory is called to provide a useful insight about the process. The approach has a systemic view of the financial management problem as opposed to the traditional analytic view based on functional separatism. McInnes and Carleton [1982] take further the systemic view of the problem by suggesting that it should be based on a dynamic systems conceptualization. They state:

"Because a central feature of the practice of financial management is the continual formation and revision of expectations, an implication is that financial managers have to concern themselves with the underlying physical phenomena which cause cash-flows and the creation of economic value - both in the external environment and within the firm itself. Essentially, the financial management problem has to be concerned with an ongoing flow of decisions about real events, an interpretation of these in the language of cash flows and funds flows, and the changing composition of the assets, liabilities and equity of the firm." [p.962]

At the same time, they insist on the proposition that decision-making should be guided by a continual effort to achieve optimality defined in relation to shareholder utility.

The conceptual construction which was presented earlier in the section draws on the principles of the systemic view approach. It is an attempt at integration in respect to relevant theory, pragmatic in its orientation to derive a solution to a significant business problem. This conceptual construction provided the inspiration for the study. Specifically, it was the purpose of the study to discover how companies, and in particular U.K.-based companies, handle the problem of unexpected events which have major negative implications for the expected funds flow equilibrium of the firm. The short-term was the planning period adopted, since it is within a one year horizon that the problem of these events is more acute and

the existence of financial mobility is really critical.

Empirical studies of this kind are not very common in an area strongly dominated by theoretical research yet they are extremely relevant. Firstly, they force the isolation of the central propositions of the theory (both normative and positive) to provide a basis of comparison for the practice, as observed through field research. Secondly, they contribute to a greater understanding of the problem involved. Thirdly, they lead to the identification of differences between theory and practice with a view to suggesting improvements for the latter and directions for future theoretical and empirical research. Moreover, as far as the study in question is concerned, evidence of the subject in the U.K. is very thin. It is therefore important to collect information on the state of the art in the practice of liquidity management in the U.K., particularly since for the last decade, companies have been so negatively affected by the instability and unpredictability of the business environment.

## 1.2 Previous Research

Little evidence of the particular liquidity management practices actually being implemented, their features, and their effectiveness in handling unexpected events is provided by the literature. Evidence of cash management practices is available from empirical studies of cash management, but this is scarce and focused exclusively on traditional early warning systems. Also, some evidence is available from surveys of the practice of corporate and financial planning. This evidence, however, does no more than suggest possible developments in liquidity management practices. In fact, the literature search only produced one empirical study providing specific evidence of the subject. This consists of a major field work conducted by Donaldson [1969b] in 15 American companies from 1966 to 1969. No replication of Donaldson's work was found in the American Ph.D. thesis literature. Similarly, no comparable work investigating British experience was found.



Donaldson [1969b, p.5] formulated a single research question: "How does ... a business respond to the knowledge that future funds flows are not precisely known and that from time to time major needs will arise that have not been fully anticipated?". In order to answer this question, he decided to examine the recent past of business firms as a means of collecting information on managerial expectations, and of reconstructing decisions concerning financial action in the face of uncertainty. Case analysis was the adopted research approach. Given the nature of the data relevant to the research, the use of multiple sources of evidence for the sake of data validity was crucial. Data collection methods comprised archival analysis and personal interview.

The selection of companies for the sample of the business population to be researched took into account several considerations, first among which was access to the kinds of archival data required. The eventual result was the selection of three or four companies from the same industry responding at about the same period of time to the same kind of financial problem. Ideally, these companies would each represent one of the four sectors of a matrix involving the combination of two characteristics - need for funds (low/high) and capacity to respond (low/high). Overall, fewer than two dozen companies were chosen, corresponding to a wide range of size. Ultimately, this model of company selection was only partially implemented due to certain observations which emerged from the pilot study. One of these observations was that those companies whose recent experience placed them in the sectors of the matrix involving low need or high capacity to respond, had given little thought to a strategy of financial mobility. As a result, the composition of the research sample was changed in order to place a much heavier emphasis on companies falling in the high need/low capacity sector.

Donaldson's findings fall into three main categories:

. Financial planning and the unexpected need for funds - Information collected from the sample indicated a wide range of practices regarding the extent to which expectations of funds flows were systematically recorded and analysed. Despite this variety, the research was able to identify throughout the sample, three zones

in the business horizon with significantly different characteristics.

Zone 1 is the immediate future, which is almost universally limited to the period one year hence. This is the period which receives all the attention of detailed business planning. Zone 2 is a time period usually between three and five years hence. Zone 2 is largely perceived in terms of trends rather than specific changes. These trends are a function more of goals than of known constraints. Here, the forecasts have real meaning only to the extent that trend lines based on the momentum of the past are relevant. Furthermore, forecasts are not designed to set specific operating targets by specified dates, and are not normally used as a yardstick for evaluating or compensating management. The financial implications of the zone 2 forecast are therefore necessarily different from those of the zone 1 forecast. Instead of a very detailed cash flow budget which is taken as a "certainty", the financial implications of zone 2 translate themselves in the estimate of an imprecise need for funds. Finally, zone 3 covers the period extending into the future beyond the range of significant trend data for the company. Preparation of an expected funds flow requirement for the zone 3 horizon is not possible.

Donaldson observed that in zone 1 the usual response to uncertainty about future funds requirements was to repeat the forecasting exercise several times, in the general belief that as significant dates become closer, the forecast would become more accurate. In zone 1, therefore, traditional early warning systems dominated. The problem of uncertainty about the future was recognized in the forecasting methodology of zone 2 in a different way. Here, formal contingency planning was vaguely carried out by testing some variations in the forecasts. The difference in dealing with uncertainty between the two zones was largely the result of distinctly different purposes behind the two levels of planning.

. The unexpected need and the resources of mobility - As far as the resources for meeting unexpected financial needs - the resources of mobility - are concerned, Donaldson observed that:



- in resource planning up to one year, the available short-term bank borrowing was widely regarded as the primary defence against the unexpected;
- the option of modifying the inflow stream by accelerating the timing of inflows was seldom evident;
- in contrast, the ability to avoid cash flow deficits by manipulating the expenditure horizon for various categories of expenditure was a widely and continuously used resource of mobility. Specifically, financial and scale-related outflows played the most important role in a strategy of financial mobility;
- the liquidation of assets was widely accepted as an action which could not and should not be a significant part of a strategy of financial mobility;
- the medium and long-term capital contract did not play an important role in a strategy of mobility although the medium and long-term debt contract was looked on with more favour than equity for the purpose of dealing with uncertainty;

. The evidence relating to strategy - Donaldson was able to identify common characteristics in the response by sample firms to unexpected needs for funds. On the basis of those characteristics, he portrayed a model of typical behaviour. Donaldson refers to it as "the strategy of least resistance". Based on a primary concern for ease of negotiation, this strategy first consumes reserves directly controlled by the finance officer, then proceeds to negotiate funds from familiar and friendly sources, and lastly negotiates with unfamiliar or hostile sources, external or internal. Closely related to the concern for ease of negotiation is the factor of predictability and certainty of the source.

In view of the fact that Donaldson's work is the only available piece of positive theory on the subject, the results of the study can be compared only to those of Donaldson. It is fully recognized that there is a difference both in time and environment between the two researches, and that divergences in results may be due to both factors. However, identification of these factors is beyond the scope of any comparison, since the necessary controls for temporal and environmental differences were not introduced in the study.



Furthermore, it is important to emphasize that although the study is comparable to Donaldson's, it was designed to provide broader and more generalized conclusions than the latter. Not only is the range of topics covered in the study wider than in Donaldson's, but the methodology used is also distinctly different and further-reaching.

### 1.3 Research Questions and Methodology

Following the definition of the research problem, two major research questions were posed in the study:

- \* What kind of liquidity management is being practised?
- \* What particular characteristics of the firm, and of its (headquarters) finance department, are associated with specific liquidity management practices?

These two questions are fundamentally different in nature. The first is descriptive - aimed at identifying the planning processes actually being implemented in companies, the reasons for their implementation or non-implementation, their major features, and their effectiveness in handling uncertainty. In so doing, this question opened the way to inductive research insofar as it provided the basis for the generation of non-predetermined relationships. The second research question relates to hypotheses testing of anticipated relationships, and in this sense led to deductive research.

Given the nature of these research questions, survey research was the strategy adopted in the study. In selecting the population, the companies making up the Financial Times Actuaries Equity Index for both Capital and Consumer Goods groups as at January 1, 1982 were used. Eventually, 313 companies belonging to the five and seven largest clusters respectively in the Capital and Consumer Goods groups, comprised the population of the study.

Two methods were used to collect information in the study: questionnaire and analysis of sample companies' annual financial reports. After the questionnaire was planned and a first draft was prepared, it was tested in a pilot study. The objective was to improve questionnaire content, structure and presentation. On the basis of the feed-back received from the pilot study, the final version of the questionnaire was constructed. The administration of the questionnaire involved mailing it to the study population and controlling the returns. Overall, 122 companies completed and returned the questionnaire which corresponded to a response rate of 39 percent. These companies made up the research sample of the study.

#### 1.4 Limitations of the Study and Expected Contributions

Most of the study limitations proceed from the research methodology adopted. Firstly, inferences regarding the sequential response of companies to unexpected events were beyond the reach of the study. The manner in which research questions were posed led the study to be restricted to the analysis of observed relationships at a particular moment in time. Secondly, the use of survey analysis as the research strategy of the study meant that the possibility of making causal inferences was denied to the study. Thirdly, the use of a questionnaire as the main data collection method meant that in-depth analysis could never be undertaken. Finally, the use of averages rather than tendencies to describe the financial and non-financial profile of the companies participating in the study gave the latter an essentially static character, and prevented it from providing a complete view of the picture associated with the implementation of particular liquidity management practices.

As to the expected contributions of the study, these are of both a theoretical and a practical nature. On the one hand, it is hoped that the study may contribute to normative theory in the field of liquidity management. In effect, the attempt to devise a rational solution to the problem which is at the core of the investigation, as well as the attempt to formulate a proper implementation methodology,



consistent with the normative principles of finance, led to the development of a new piece of integrated theory in the field. Furthermore, given the study's attempt to generalize observed relationships in practice, it is expected that it will make some contribution to the development of positive theory. On the other hand, it is also expected that the study will contribute to a greater awareness of the state of the art in the practice of liquidity management in the U.K., and challenge the level at which companies practice liquidity management and the teaching of the subject in current corporate finance courses.

### 1.5 Outline of the Thesis

Three distinct parts, each one comprising several chapters, form the structure of the thesis.

#### Part I THEORETICAL FRAMEWORK

This part reviews the theoretical background of the research problem of the study. Despite its importance, relatively little has been written in the field of liquidity management and furthermore most of the existing writings treat the subject in a disjointed manner. The scarcity of references and the widespread lack of systematization in the field were a source of difficulty in the construction of the theoretical framework. Consequently, much of the structure and terminology used in Part I had to be developed by the author and are her responsibility.

#### Chapter 2 MEANING OF LIQUIDITY

A substantial amount of confusion and imprecision exists concerning liquidity, thus any attempt towards studying the subject should start by identifying and distinguishing the several meanings of

liquidity commonly employed. This is the purpose of this chapter. Liquidity is first identified as a quality - reflecting the nearness to money - of the assets and liabilities of a company. In a different perspective, liquidity is next identified as a business characteristic, being associated with the cash resources of the firm. Finally, liquidity is defined as the debt-paying ability of a going concern. Of the three meanings presented, the last was the one adopted in the study.

### Chapter 3 MEASUREMENT OF LIQUIDITY

This chapter deals with the major approaches to the measurement of liquidity. In the balance-sheet approach, the relationship between a company's current assets and current liabilities is typically used to measure liquidity. Thus, emphasis is placed on a balance-sheet indicator - the current ratio - as the measure of the firm's debt-paying ability. In the flow approach, the dynamic nature of the debt-paying process of the firm is recognized. Therefore, the proposed measure of liquidity takes into consideration all types of funds likely to be available to the firm, as well as all the various obligations likely to mature during the period of time concerned.

### Chapter 4 OBJECTIVE AND CONTENT OF LIQUIDITY MANAGEMENT

This chapter discusses the objective and content of liquidity management. In the balance-sheet approach, the objective of liquidity management is to provide for the optimal level of liquidity. However, providing for financial mobility at minimum cost should gain priority as the main objective of liquidity management in the flow approach. As a result, three basic activities - cash flow planning, implementation of early warning systems and resource planning for financial mobility - should constitute the content of liquidity management in the same approach.



## Part II RESEARCH METHODOLOGY

This part discusses the research methodology used in the study. Setting up research consists of defining the research problem, formulating the hypotheses to be investigated (where the research mode is primarily deductive), choosing the research strategy, and selecting and designing the data collection methods.

### Chapter 5 RESEARCH PROBLEM AND STRATEGY

This chapter introduces the research problem of the study and presents the empirical evidence available on the subject. Particular attention is paid to Donaldson's work on financial mobility. The chapter further presents the research hypotheses formulated in the study, and discusses the choice of survey research as the strategy adopted in the study. The procedure used for selecting the population is also described here.

### Chapter 6 DATA COLLECTION METHODS

This chapter describes the methods used to collect data in the study: questionnaire and analysis of sample companies' annual financial reports. It further analyses the research sample, the response rate obtained in the study and the possible response bias.

## Part III ANALYSIS AND INTERPRETATION OF THE DATA

This part describes the processing of the data, and shows the statistical computation involved in the characterization of the sample and in the production of the results of the study. At the same time, it undertakes the interpretation of such results in the context of the existing knowledge. It is important to emphasize that the reporting of the conclusions of the study follows a pattern which diverges from the traditional manner, in which each successive chapter

of conclusions takes the reader through a progressive build-up process. Given the specific characteristics of the research problem of the study, such an approach to the reporting of conclusions is not feasible. The reporting pattern actually followed consists of drawing intermediate conclusions at the end of each chapter, each set of these conclusions covering a separate aspect of the problem. It is only in the final chapter that the results and intermediate conclusions are brought together and interrelated in a pyramidal process to draw the final conclusions of the study.

## Chapter 7 DATA PROCESSING

Data processing is the first stage of data analysis. Its purpose is to convert the information obtained through data collection methods into numerical form, and then to arrange it in an appropriate format, most frequently a data matrix. Statistical computation constitutes the second stage of data analysis. A basic problem in social sciences is that often the choice of a particular statistical technique is far from straightforward, requiring some arbitrary decision. Statistical computation, therefore, should always be based on generic, pre-defined decision rules. Following this distinction, the chapter provides first a characterization of the data matrix of the study and a description of the several steps involved in its preparation. Next, it presents the statistical model adopted in the study.

## Chapter 8 CHARACTERISTICS OF THE SAMPLE

It is the purpose of this chapter to examine sample firms according to major characteristics. The objective is to draw a picture of these companies to provide a better understanding of the results obtained in the study, and to feature the type of firm to which those same results can be extended.

**Chapter 9 RESULTS AND CONCLUSIONS I**

This chapter initiates the reporting of the results and conclusions of the study. It deals specifically with short-term cash flow planning systems where short-term applies to any period of time up to one year.

**Chapter 10 RESULTS AND CONCLUSIONS II**

This chapter reports the results and conclusions on the contingency planning aspect of the study.

**Chapter 11 RESULTS AND CONCLUSIONS III**

The results and conclusions of the study on resource planning for financial mobility are reported in this chapter.

**Chapter 12 FINAL CONCLUSIONS AND MAJOR IMPLICATIONS OF THE STUDY**

The main purpose of this chapter is to report the final conclusions and major implications of the study. The evidence presented is the result of bringing together the several conclusions contained in the previous three chapters, and organizing them into a coherent and rational structure. The chapter further presents the limitations of the study, its expected contributions and a few suggestions for further research on the subject.



Part I THEORETICAL FRAMEWORK

Chapter 2 MEANING OF LIQUIDITY

Chapter 3 MEASUREMENT OF LIQUIDITY

Chapter 4 OBJECTIVE AND CONTENT OF LIQUIDITY MANAGEMENT

## Part I THEORETICAL FRAMEWORK

Part I reviews the theoretical background of the research problem of the study. It starts by examining (Chapter 2) several meanings of liquidity, one of which - liquidity as the debt-paying ability of a going concern - was the one adopted in the study. Part I follows by presenting (Chapter 3) the major approaches to the measurement of liquidity, and by describing (Chapter 4) the objective and content of liquidity management.

Despite its importance, relatively little has been written in the field of liquidity management and furthermore most of the existing writings treat the subject in a disjointed manner. The scarcity of references and the widespread lack of systematization in the field were a source of difficulty in the construction of the theoretical framework. Consequently, much of the structure and terminology used in Part I had to be developed by the author and are her responsibility.

## Chapter 2 MEANING OF LIQUIDITY

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## Chapter 2      MEANING OF LIQUIDITY

### 2.1    Introduction

In broad terms, financial analysis centres upon the evaluation of firms on the basis of two main attributes: profitability and liquidity [Walter, 1957; Heath, 1978; Gombola and Ketz, 1981a]. Yet a substantial amount of confusion and imprecision exists concerning liquidity. The fact that liquidity is not defined in the authoritative literature [FASB, 1980] has significantly contributed to this state of affairs. Therefore, any attempt towards studying the subject should start by identifying and distinguishing the several meanings of liquidity commonly employed. This is the purpose of the present chapter.

In Section 2.2, liquidity is identified as a quality - reflecting the nearness to money - of the assets and liabilities of a company. In a different perspective, Section 2.3 identifies liquidity as a business characteristic, and associates it with the cash resources of the firm. The section follows by exploring two views - the static and the dynamic view - on the measurement of the firm's cash resources. Section 2.4 also identifies liquidity as a business characteristic but defines it as the debt-paying ability of a going concern. Of the three meanings presented, the last was the one adopted in the study. Finally, Section 2.5 summarizes the chapter.

### 2.2    Liquidity as Nearness to Money

Liquidity is often identified in the literature as a characteristic - reflecting the nearness to money - of a company's asset and liability holdings [Heath, 1978; FASB, 1980; Van Horne, 1986]. As nearness to money, information about liquidity is useful in assessing the timing of future cash flows associated with existing

assets and liabilities. The extent to which this information leads to a reliable assessment of the timing of future cash flows depends on the nature of the individual assets and liabilities [FASB, 1980].

For purposes of reporting liquidity in the balance sheet, assets and liabilities have been traditionally grouped into two categories - current assets v. non-current assets / current liabilities v. non-current liabilities - of which current assets and current liabilities are supposed to identify "... the relatively liquid portion of total enterprise capital" [AICPA, 1953, ch.3, sect.A, par.3]. The argument behind classification of balance-sheet items is that many users of financial reporting have neither the skill nor the time to analyse and interpret detailed financial information. Classification enables them, therefore, to focus on representative group totals and on summary indicators based on those group totals [FASB, 1980]. The classification above, however, presents a major difficulty insofar as there are two alternative criteria for defining current assets and current liabilities [IASB, 1978].

According to the first criterion, the classification of certain assets and liabilities as current items depends on whether they will be realized or liquidated in the near future, usually within one year. This maturity-date approach is contested nevertheless, on the basis that no arbitrary period should be applied to businesses without regard to the type of operations engaged in, and without regard to the time required to convert assets into money or the time permitted to pay liabilities [Herrick, 1944].

According to the second criterion, the distinction between current and non-current items depends not on the maturity date but on whether the items are consumed or settled in the production of revenue within the normal operating cycle of the business. The concept of operating cycle, which was introduced by Herrick [1944], is described by the AICPA [1953, ch.3, sect.A, par.5] as follows:

"The ordinary operations of a business involve a circulation of capital within the current asset group. Cash is expended for materials, finished parts, operating supplies, labor, and other factory services, and such expenditures are accumulated as inventory cost. Inventory costs, upon sale of the products to which such costs attach, are converted into trade



receivables and ultimately into cash again. The average time intervening between the acquisition of materials or services entering this process and the final cash realization constitutes an operating cycle."

A comprehensive discussion of the operating-cycle concept can be found in Coughlan [1960]. From this author's point of view, the determination of a company's operating cycle involves many conceptual problems which arise from the complexity and diversity of modern business operations. As Coughlan [1960, p.49] points out:

"... there is not one operating cycle but a myriad of cycles for the typical business depending on such things as the line of goods used to measure the cycle (department stores hold refrigerators for a very different period of time than they hold hosiery) and the type of sale made (cash, credit or installment). Which is the operating cycle?"

Two possible solutions are suggested to this question [FASB, 1980]. The first implies the determination of an operating cycle for each company segment. However, a new difficulty sets in - which of these operating cycles should be applied in order to classify as current or non-current those assets and liabilities not specifically associated with a particular segment of the company? The second solution involves the calculation of a composite operating cycle for the whole business weighing the various product lines or segments by volume of activity. Although the latter solution seems more reasonable than the former, the fact is that it makes it difficult, if not impossible, to identify the concept of operating cycle with anything concrete in the operations of the company.

More important still, perhaps, is the problem involved in the definition itself of operating cycle. For Coughlan [1960], a circular reasoning is imbedded in the concept - the operating cycle is defined as the length of time money is retained in current assets, while these are simultaneously defined as those assets that will be converted into money within the operating cycle of the business.

Despite its faults, the operating-cycle approach has been widely adopted. The American Institute of Certified Public Accountants' committee on accounting procedure, for instance, clearly accepted this approach [AICPA, 1947; 1953]. Yet, none of its statements can be



singled out as requiring universal application of the operating-cycle concept. Room is left for the use of the maturity-date approach whenever a particular business has no clearly defined operating cycle, or its operating cycle is shorter than one year. The main drawback of this position, however, is that the range of maturities within current assets and current liabilities becomes too broad to supply any useful indication of liquidity.

Meanwhile, two proposals have been suggested which provide an alternative to the conventional balance-sheet classification for the reporting of liquidity. The first involves the adoption of a different classification scheme, whereby more information is expected to be conveyed by simply increasing the number of categories among assets and liabilities, and by listing them in order of their relative liquidity [FASB, 1980]. The second proposal involves the provision of supplementary information to the balance sheet on the expected maturities of assets and liabilities. A major problem with this proposal is the uncertainty regarding the liquidity of certain items, particularly certain types of assets [FASB, 1980].

### 2.3 Liquidity as Cash Resources

In a different perspective, liquidity has been identified in the literature as a business characteristic. In this context, one viewpoint has been to associate liquidity with the cash resources of the firm, and to set its measurement either in reference to a certain moment in time (static view) or to a certain time span (dynamic view).

#### 2.3.1 The Static View

The static view relates the measurement of liquidity to a certain moment in time. As such, the amount of cash held by the firm at that particular moment is the suggested measure of the firm's liquidity.

Studies embracing the static view represent a large part of the literature on cash management. They comprise two groups. The first group, in the field of economics, adopts a positive approach and tries to determine empirically whether the traditional monetary theory or the Baumol-Tobin hypotheses provide a better description of cash management behaviour. The second group, in the field of corporate finance, adopts a normative approach and attempts to determine the amount of cash a firm should maintain as well as the amount of adjustment to be made when deviations from the target level occur. Both groups, however, evolved from the early work of Baumol [1952] and Tobin [1956] on firms' transactions demand for cash, as a result of which they share common ground, namely acceptance of: the trichotomy of motives for holding cash [Keynes, 1936; Dernburg and McDougall, 1960; Friedland, 1966; Weston and Brigham, 1985; Van Horne, 1986], and the trade-off between cash holdings and profitability [Prather and Wert, 1971; De Salvo, 1972; Weston and Brigham, 1985; Brealey and Myers, 1984].

### 2.3.1.1 The positive approach

Do transactions cash balances of non-financial business corporations vary proportionately or less than proportionately in relation to changes in the value of their transactions? Studies of the positive approach use a macroeconomic point of view to answer this question. They stress such issues as the relationship between the firm's transactions demand for cash and the firm's sales value<sup>(1)</sup>, the existence of economies of scale in the demand for money, the extent and pattern of substitution between cash and marketable securities, and the magnitude of interest rates elasticity. Included in this group are studies by Friedman [1959], Selden [1961], Meltzer [1963a; 1963b], Frazer [1964], Maddala and Vogel [1965], Whalen [1965a; 1965b], Brunner and Meltzer [1967], Vogel and Maddala [1967], Budin and Van Handel [1975]<sup>(2)</sup>, among others.

According to Friedman [1959], real money balances are highly elastic with respect to changes in real permanent income, the former increasing more than proportionately in response to the latter. Specifically, he found that a 100 percent increase in real permanent



income led entities to increase their real money balances by 180 percent on average. Friedman's investigation of interest rates showed, furthermore, that their effect on the velocity of money was in the expected direction but was "... too small to be statistically significant" [Friedman, 1959, p.329].

In a cross-section study, Selden [1961] examined the velocity of circulation of money (measured by the ratio of sales to cash) in non-financial corporate sectors, and found that velocity fell as firm size increased. He attributed this result to the fast decline of sales relative to total assets rather than to the decline of cash as a share of total assets. In fact, he could not find any evidence of economies of scale in the demand for money. Selden also observed that substitution of other assets (namely, government securities) for cash occurred as firm size increased. Despite its conclusions, Selden's study fails to refute the Baumol-Tobin hypotheses, as Whalen [1965b, p.438] explains:

"... since measured cash balances include not only cash held for transactions and precautionary purposes but also investment cash balances, the finding is not conclusive evidence that economies of scale are absent in the management of transactions and precautionary cash balances. If - for some reason - investment cash balances increase more than proportionately as firm size increases, a less-than-proportionate increase in transactions and precautionary cash balances may be offset."

Frazer [1964], in a cross-section study of manufacturing corporations over a period of six years, observed that the ratio of cash and government securities to current liabilities rose with the size of the firm while the cash balance fell relative to total assets. His assertions, based on these findings, were that economies of scale exist in cash holdings, thus placing himself in an opposite field in relation to Friedman and Selden. Yet, the finding that the cash balance falls relative to total assets cannot support the Baumol-Tobin hypotheses since Frazer, like Selden, analyses global cash balances whilst Baumol and Tobin deal with transactions cash balances alone. Other criticisms of Frazer's work concern the methodological aspect of the study. Frazer not only ignores the problems surrounding cross-section estimates in a dynamic context, but also fails to recognize some basic statistical limitations to his results, such as biases in



the use of ratios arising from "window dressing" of year-end financial statements, and the problem of the regression fallacy [Vogel and Maddala, 1967].

The first major contribution in the field of cross-section studies of business demand for money is provided by Meltzer [1963b]. In an earlier time-series study, Meltzer [1963a] had concluded that, if money is held as part of a portfolio of assets, the decision about the aggregate amount of money to be held may be regarded as subject to a wealth constraint and dependent on the yields of a variety of alternative assets. In the cross-section study of the demand for cash by non-financial business firms, Meltzer [1963b] extends his previous ideas, setting a relationship of the form:

$$M_{ij} = [k \cdot r^\alpha / (K_{ij} \cdot p_j)^\beta] \cdot S_{ij}^\beta \quad \text{where,}$$

$M_{ij}$  is the demand for money of the  $i^{\text{th}}$  firm in the  $j^{\text{th}}$  industry,  
 $k$  is a model parameter for the constant value,  
 $r$  is the market rate of interest,  
 $\alpha$  is the interest elasticity of the demand for money,  
 $S_{ij}$  is the sales of the  $i^{\text{th}}$  firm in the  $j^{\text{th}}$  industry,  
 $\beta$  is the sales elasticity of the demand for money,  
 $K_{ij}$  is a variable which reflects cyclical changes in the demand for the firm's product and in the capital/labour ratio, and  
 $p_j$  is the internal rate of return on assets for firms in industry  $j$ .

Estimates of the model parameters - on the basis of information drawn for a period of nine years on a sample of 14 industries stratified by company asset size class - revealed that  $\alpha$  and  $\beta$  respectively approximated -0.9 and 1.0.

In Meltzer's model, therefore, interest rates, cyclical changes, asset yields and sales are all important determinants of the demand for money by business firms. Over short periods of time, however,  $r$ ,  $K_{ij}$  and  $p_j$  tend to remain constant, which allows the relationship above to be rewritten as follows:

$$M_{ij} = \gamma_{ij} \cdot S_{ij}^\beta$$

According to Meltzer, then, the demand for money by business firms is, for short lengths of time, an exclusive function of sales, linear in logarithm form to a first approximation and unit elastic. In these conditions, Meltzer's model shows no support for either economies or diseconomies of scale. As such, it is as much a clear rejection of the Baumol-Tobin models (which state that there are economies of scale in money holdings, the implied transactions elasticity of cash being 0.5) as it is of Friedman's results (which show a real permanent income elasticity of 1.8). And although in his study Meltzer recognizes that changes in business conditions and in industries might raise or lower the estimate of  $\beta$ , and consequently produce some diseconomies or economies of scale, he argues that none of these will ever be as large as those suggested by the other models.

Criticisms of Meltzer's work are found in Maddala and Vogel [1965], Whalen [1965a], and Vogel and Maddala [1967]. In a short comment, Maddala and Vogel [1965] contend that:

- sales are used by Meltzer as a surrogate for too many things - transactions to test the Baumol-Tobin hypotheses, real permanent income to test Friedman's hypothesis, and wealth to test Meltzer's own hypothesis. If transactions can be represented by sales, it does not seem that this variable can be an adequate substitute for wealth. Total assets instead seem to be a better measure of wealth;
- assuming Meltzer's model to be true, one may conclude after examination of the same data that the quadratic function fits the data better than the logarithm function;
- Meltzer gives no direct evidence of the significance of interest rates.

In a later article, Vogel and Maddala [1967] add another criticism of Meltzer's work when questioning his implicit assumption that interest rates, cyclical changes and asset yields remain constant across different asset size classes. The cost of credit, in particular, is very likely to be higher among small borrowers. Finally, Whalen [1965a, p.160] - in line with the criticism made of Selden - argues that in order to test empirically the Baumol-Tobin hypotheses "... it is necessary to abstract from firms' total cash balances that portion which is held for transactions purposes, and then to observe its



relationship to the firms' volume of sales". Given that Meltzer's regression equations relate global observable cash balances to average firm sales, these equations can support or refute the Baumol-Tobin hypotheses only if the precautionary and speculative motives for holding cash are absent from the firms' demand for cash, which is an extreme assumption. Whalen concludes, therefore, that Meltzer's results cannot be used to rebut the Baumol-Tobin transactions demand for money models since they are not necessarily inconsistent with the latter.

In a second paper, Whalen [1965b] attempts to test empirically the adequacy of the Baumol-Tobin hypotheses. He produces two alternative formulations of the relationship between a firm's transactions demand for cash ( $M_T$ ) and the value of its sales ( $S$ )<sup>(3)</sup>:

- the linear relationship of the traditional monetary theory

$$M_T = a + b.S^{(4)} \quad \text{and,}$$

- the parabolic relationship implied in the Baumol-Tobin hypotheses

$$M_T = a' + b'.S + c.\sqrt{S}^{(4)}$$

As to the investment demand for cash ( $M_I$ ), Whalen develops the following expression:

$$M_I = a_1.(MA - k.S) \quad \text{where,}$$

$a_1$  is the proportion of investment portfolio balances held in the form of cash,

$MA$  is the firm's total amount of monetary assets, and

$k.S$  is the amount of monetary assets held for transactions purposes.

Whalen assumes the two demands for cash to be additive. The total demand for cash ( $M$ ) is then defined as:

$$M = M_T + M_I$$

Finally, Whalen substitutes into this equation the previous expressions developed for  $M_T$  and  $M_I$ , and obtains two alternative equations for the total demand for cash depending on the type of



relationship chosen for  $M_T$ . The two alternative equations for  $M$  can be rearranged, for purposes of regression analysis, as follows:

$$M = a_1.MA + b_1.S$$

$$M = a_1.MA + b_2.S + c.\sqrt{S}$$

Whalen tested these equations to determine which of the two better describes the relationship between cash and sales. For the purpose, he used data drawn for a period of one year on a sample of 14 asset class observations for each of eight major industry groups. The results produced by the statistical test supported at first sight the Baumol-Tobin proposition of economies of scale, since the analysis of variance which tested for the significance of the additional term  $c.\sqrt{S}$  revealed that the increase in explained variation was statistically significant. When the same equations were examined on an industry-by-industry basis, however, no economies of scale appeared to exist, with the sole exception of the wholesale trade industry. For certain industries, cash balances even appeared to increase more than proportionately in relation to sales. Overall, Whalen's results seem to indicate that neither of the two approaches to the transactions demand for cash provides a satisfactory description of reality. Despite this fact, Whalen still believed that economies of scale were likely to be present, having been obscured in his study by inaccuracies in the selection of data, and by inadequate specification of relationships and assumptions (e.g. additivity of cash balances, constancy of firm characteristics within industry, etc.).

Whalen's work is mainly criticized by Vogel and Maddala [1967], who stress the very limited nature of the study due to the restrictive assumptions established and its deficiency from the statistical point of view.

Vogel and Maddala [1967] introduce a new perspective into the problem. They draw on certain developments in the economics literature, namely on the increasing criticism of the traditional Keynesian assumptions of separability and additivity of the three motives for holding money. In contrast to Frazer, Meltzer and Whalen who make the point of confirming or rejecting one of the models of money demand, Vogel and Maddala adopt a more cautious approach by

attempting to set the results of their study against the framework of the more general theory. They follow the suggestion that the variance of any observed economic variable is due both to differences among cases cross-sectionally and to variability over time. Therefore, they use a matricial data display which allows the estimated coefficients from both cross-section and time-series regressions to be compared for interpretation. Data used consisted of selected items from corporate year-end financial statements, reported for the total manufacturing sector and for 16 industry sub-groups, each one divided into 14 total asset size classes. Two matrices of these data were built: one containing observations from the 16 industry groups with 14 size classes each for a period of one year; the other containing observations from the total manufacturing sector divided into ten size classes for a period of 14 years. Regressions were run on these matrices with cash, government securities and liquid assets taken as dependent variables, and sales as the independent variable. The following results were obtained:

- the total asset size class dummy variables substantially reduced sales elasticities, the cash/sales elasticity in particular being reduced from unitary to less than unitary. Reductions in sales elasticities, furthermore, were more prominent in the case of cash than in the case of government securities;
- the industry dummy variables were generally significant though they did not show as much variation as the size class dummy variables;
- the yearly dummy variable for cash revealed a fairly continuous decline but no such steady pattern emerged for government securities.

These findings suggest that money demand is a very complex phenomenon. They indicate specifically that economies of scale in money demand exist, and that substitution of government securities for cash occurs as manufacturing corporations increase in size. Moreover, they point out that sales elasticities vary with the industry variable, which may be explained by factors such as varying patterns of payment or degrees of capital intensity. Finally, it is suggested that the cash/sales elasticity changes over time, probably in response to changes in interest rates and developments in financial management.



Meanwhile, in a completely different type of study, Brunner and Meltzer [1967] try to demonstrate that the Baumol-Tobin models, when developed along the lines their authors sketched, do not imply important economies of scale in the demand for cash balances. In other words, when the rational behaviour underlying the Baumol-Tobin formulations is analysed, none of the two models appears inconsistent with the traditional monetary theory as an explanation of a firm's demand for money. Both models, therefore, provide very little reason for abandoning the use of the quantity theory of money, which does not necessarily mean that the latter is a good explanation of reality. In fact, both approaches (the traditional monetary theory and the Baumol-Tobin hypotheses) may be false.

This idea came to be explored in a more recent article by Budin and Van Handel [1975]. They argue that the very limited success enjoyed by the empirical tests of the Baumol-Tobin hypotheses points towards the possibility that reality may be better explained by other types of model. The Baumol-Tobin hypotheses postulate forms of rational choice for the decision-maker. Budin and Van Handel develop the argument that rules of thumb rather than "rational economic" choices govern the cash balance decision of the firm. Their model assumes that a firm's choice for a particular level of cash-to-sales ratio ( $\alpha'f$ ) is a function of a number of variables such as management's attitude towards risk, the cost (inconvenience) involved in a cash shortage, the financial monitoring organization of the firm, the availability of investment alternatives and additional credit, the cost of money, etc.. Adequate monitoring of the firm's cash flows through a formal organization, for instance, should reduce the firm's apprehension about running out of cash, and influence its choice for a lower  $\alpha'f$ . The same should happen if the firm's expectations relative to the availability of investment alternatives and additional credit are high. Since these factors are directly related to the size of the business - larger firms are likely to give more attention to cash flow monitoring, to have more available investment alternatives, and more borrowing capacity at lower cost - Budin and Van Handel suggest a negative relationship between cash-to-sales ratios and asset size. Furthermore, according to them, this negative relationship should tend to disappear if interest rates rise and the supply of short-term credit is increased in the economy. In

fact, the increase in interest rates raises for all firms the opportunity cost associated with cash holdings, and makes investment in alternative near cash holdings more attractive. Simultaneously, better credit conditions reduce firms' apprehensions as to possible cash shortages. However, for larger firms with already lower cash-to-sales ratios, the benefits associated with a marginal reduction in cash holdings will have to be higher than for smaller firms in order to compensate for the bigger increase in risk. For this reason, smaller firms should be more willing to decrease their cash-to-sales ratio than larger firms, thus reducing the difference initially attributable to asset size. Budin and Van Handel argue, in sum, that rising interest rates accompanied by expanding short-term credit conditions should result in near constant cash-to-sales ratios over asset size in any industry. The statistical testing of these hypotheses produced clear support for their model.

#### 2.3.1.2 The normative approach

Two types of normative solution have been proposed in the literature to solve the problem of the amount of cash a firm should hold: one using control-limit models, and another using linear programming models.

##### A. The control-limit models

According to this type of solution, the cash balance control problem arises because, contrary to Baumol's assumptions, future cash flows are uncertain. This makes it impossible to know a priori what the actual cash balance will be by the end of any period of time. What is known is that if future cash inflows and outflows occurring over the period leave the ending cash balance above a minimum required level, the company will incur a cost equal to the interest forgone that could have been earned, had the excess amount been invested in interest-bearing assets. Conversely, if future cash inflows and outflows occurring over the period leave the ending cash balance below the required minimum, the firm will find itself in an overdraft situation subject to penalty charges [Scott, 1980].



Control-limit models are stochastic models in which uncertain future cash flows are described in terms of probability distributions [Daellenbach, 1974]. To the extent that net cash flows are assumed to be randomly distributed over time, they cannot be effectively forecasted. For this reason, the decision to adjust the cash balance to the desired level is always taken at the beginning of each period [Scott, 1980]. The most well known control-limit model is the Miller and Orr model.

Miller and Orr [1966] accept as valid the analogy between a firm's cash and inventory control problems developed in Baumol's model. Yet, they recognize that for most businesses the cash flow pattern present in the EOQ model is highly unrealistic. Net cash flows are not predictable, but fluctuate irregularly over time both in size and direction. Their model, therefore, attempts to combine the characteristic transfer cost feature of Baumol's model and the stationary random-walk behaviour of net cash flows in business operations. Several assumptions are established, namely:

- the existence of a "two-asset" setting, one being cash and the other a separately managed portfolio of short-term marketable securities, both treated as single homogeneous assets;
- the existence of a fixed minimum level on the cash balance, exogenously determined generally as the result of negotiations between banks and company;
- the absence of a regular trend in the cash balance, i.e. the existence of an average net cash flow of zero;
- daily fluctuations in the cash balance assumed to be completely stochastic (occurring according to a Bernoullian process), independent and stationary;
- transfers between cash and short-term marketable securities assumed to be able to take place at any time, at a given fixed cost per transfer (either purchase or sale);
- transfers assumed to take place instantaneously, thus eliminating the need for a precautionary cash balance;
- maturing securities assumed to be automatically reinvested, and
- the firm assumed to be seeking to minimize the long-run average cost of managing the cash balance under a two-parameter control-limit policy  $(h, z)$ .

According to the decision process implied in the model, the cash balance is allowed to fluctuate freely between two extremes - an upper control limit (h) and a lower control limit (r), the latter set zero for reasons of simplicity. However, if the cash balance reaches either the upper limit or the lower limit, a portfolio transfer is due to occur to restore the cash balance to a return point (z), somewhere between h and r. In the first case, there will be a purchase of marketable securities of h-z whereas in the second case there will be a sale of marketable securities of z. The objective of the model is to determine the values of h and z that provide the most advantageous trade-off between interest forgone on idle cash and transfer costs involved. Or in other words, the purpose is to calculate the values of h and z that allow the expected daily cost of managing the firm's cash balance to be minimized over a planning period. In this context, the optimal solution is:

$$z = \sqrt[3]{3Y\sigma^2/4i} \quad \text{and}$$

$$h = 3z$$

This solution defines the cash limits in terms of the fixed transfer cost to and from cash (Y), the daily interest rate on short-term marketable securities (i), and the variance of daily net cash flows ( $\sigma^2$ ). The higher the transfer cost and the greater the lack of synchronization between cash inflows and outflows, the wider the spread between the upper and lower limit. Conversely, the higher the interest rate, the smaller the spread. The solution, therefore, sets relationships of the same kind as those found in Baumol's model with the exception of the variance of daily net cash flows which stands here, instead of sales, for the transactions variable in the demand function for money.

In two follow-up articles, Miller and Orr try to develop evidence in support of their model. The evidence produced in each, however, is of a very different nature. In the first article [Miller and Orr, 1968], they attempt to show that despite the extremely restrictive or "unrealistic" character of some of the model's assumptions, changes in these do not alter its fundamental relationships. In particular, potentially significant modifications such as the release of the Bernoullian cash flow pattern assumption,



the acceptance of a three-asset model, and the existence of variable transfer costs seem to leave unaltered the main issues regarding the transactions demand for money and the cash management policy in the firm. In the second article [Miller and Orr, 1980], they compare the model's decisions with those of a manager over a period of time. The comparison reveals that the model does better, producing an average daily cash balance about 40 per cent lower than that of the manager.

The model of Miller and Orr is only one among a number of control-limit models which have been developed to deal with the cash balance control problem. Other control-limit models postulate stochastic and stationary cash flows but use dynamic programming (DP) such as the models of Eppen and Fama [1968; 1969], and Neave [1970]. Others assume stochastic cash flows but release the assumption of stationarity, allowing the cash flow distributions to vary over the period. This is the case in the models developed by Archer [1966], Daellenbach and Archer [1969], and Daellenbach [1971], the last two using dynamic programming.

Common to all these models, however, is the assumption that net cash flows behave as if generated by a random walk. In this respect, control-limit models can be criticized inasmuch as cash flows (particularly cash outflows) are to some extent controlled by management. This calls the applicability of these models into question [Weston and Brigham, 1985; Scott, 1980]. Stone [1972] recognizes this limitation and develops a control-limit model which is an attempt to compromise between the two extremes in cash management - absolute certainty as assumed in Baumol's model, and absolute uncertainty as assumed in Miller and Orr's model. Besides imperfect forecasts of future net cash flows, Stone's model further incorporates heuristic rules on cash managers' actual behaviour in practice, particularly towards the existence of different maturity structures for marketable securities and the reinvestment of maturing securities. This model represents a fair improvement over the remaining control-limit models since it takes into account some important aspects of cash management previously ignored, but like the others, it fails to consider the alternative of borrowing. Indeed, it is not yet clear that liquidation of assets is always preferable to external credit

[Weston and Brigham, 1985].

### B. The linear programming models

A different normative solution to the cash balance control problem is provided by the linear programming (LP) models.

These models are deterministic, i.e. they assume that future cash flows are known with certainty [Daellenbach, 1974]. They also assume that the minimum cash balance required is specified, that cash flows are partly or wholly discrete, and that costs of all financial alternatives are known [Robichek et al., 1965]. Two implications follow from these assumptions: first, that in LP models the cash balance is kept at the desired level at all times, and second, that the focus of the problem is on how to provide the funds needed in the business at a minimum cost to the firm, given the constraints within which it operates. This implies, in other words, that the objective of these models is to choose from a set of financial alternatives that combination which minimizes total cost, given the future cash requirements of the firm, the desired minimum cash balance, and the costs and restrictions of each financial alternative under consideration. Total cost is defined in LP models as the sum of the explicit variable costs of the various financial alternatives and the implicit variable costs representing the qualitative restrictions associated with each one of those alternatives.

The first linear programming formulation for a finite planning horizon of the firm's cash balance control problem is due to Robichek et al. [1965]. Here the cash balance control problem finds its solution in the context of the short-term financing decision of the firm. This model was later expanded by Mao [1968] to include additional deterministic constraints, by Orgler [1969] to allow the possibility of unequal time periods, by Pogue and Bussard [1972] to include chance constraints in conditions of uncertainty, and modified by Maier and Vander Weide [1978] to provide a simplified tool for examining different short-term financing/investment strategies.



Linear programming models overcome some of the objections commonly raised against control-limit models. First, they allow for more than one alternative for adjusting the cash balance to its target level [Scott, 1980]. In fact, both the possibility of borrowing (under different conditions) and of managing a portfolio of assets (by investing in and divesting from them) can be incorporated into the models. Second, they allow management to test the sensitivity of the optimal solution to modifications in parameters and relevant variables as well as to determine the opportunity cost incurred with any non-optimal solution [Robichek et al., 1965].

Although linear programming models expand the ability of management to evaluate alternative short-term financial strategies, they are often too complex, which makes them difficult to use and to interpret. Furthermore, they tend to require a large amount of data input which makes them very expensive in terms of computer time [Maier and Vander Weide, 1978]. They can also be accused of being unrealistic. Not only are they partially static models but also the assumption of certainty concerning knowledge of future cash flows and other parameters obviously never holds. Recognition of the limiting nature of this assumption led some authors to make some kind of reference to uncertainty in their models. Robichek et al. [1965], for instance, accept that uncertainty in forecasts and parameters may lead management's objective to change from minimization of costs to avoiding disaster. They also acknowledge the possibility of rerunning the model several times to test the effect of possible divergences from forecasts, or the use of simulation techniques to develop quantitative measures of risk exposure - assuming that probability distributions can be estimated for the various elements of the model. Orgler [1969] does not formally incorporate uncertainty into his model but mentions that sensitivity analysis can be used to determine the impact of forecast errors on the optimal solution. Finally, Pogue and Bussard [1972] formally bring uncertainty into their model.

Ultimately, the applicability of the existing solutions of the cash balance control problem of the firm (both control-limit and linear programming) depends on their performance in practice and can be determined only by testing them with actual data. Surprisingly, the available literature reveals a scarcity of evidence regarding the comparative performance of these solutions. As a matter of fact, most of the research done so far has involved only the testing of a single model, and the one most frequently tested has been the Miller and Orr model. Two exceptions, however, can be found in the literature - Daellenbach [1974] and Scott [1980].

The former [Daellenbach, 1974] attempts to determine upper bounds on the potential savings that can be realized by the application of several cash management optimization models in relation to the simulated performance of a manager in practice using heuristic cash management rules. The author concludes that:

- linear programming models perform reasonably well only if forecast errors are relatively small. Besides, insofar as these models do not allow for fixed transaction costs, their performance worsens as these costs increase. In sum, the upper bounds on the potential savings with linear programming models are very small and may not even compensate for the operating costs of running the models;
- stochastic models based on stationary cash flow distributions are not able to cope properly with predictable large cash outflows. For highly uncertain cash flows, provided their distributions change slowly over time, they are able to capture only a small portion of the potential savings. The Eppen and Fama model is the one that best performs in this group;
- stochastic models based on non-stationary cash flow distributions do fairly well for cash flows with a low degree of uncertainty though the upper bounds on the potential savings are only sizeable for very large fixed transaction costs. For highly uncertain cash flows, they seldom perform better than the Eppen and Fama model.

The results obtained in Daellenbach's study raise serious doubts as to the usefulness of the implementation of cash management optimization models in practice.



The latter study [Scott, 1980] attempts to compare linear programming and control-limit models by assessing the impact of not perfectly predictable net cash flows on the relative performance of these models. The Miller and Orr model, Neave's dynamic programming model, and an unequal period linear programming model are selected for simulation using 1977 cash book data of a firm, and are compared on the basis of the average daily profit, the average daily cash balance, the net daily interest, and the holding/penalty costs produced during the simulation period. The results show that, for the more realistic shorter simulation horizons, the linear programming model is the one which provides the highest average daily profit for all transaction cost structures.

### 2.3.2 The Dynamic View

The dynamic view relates the measurement of liquidity to a certain time span. From this standpoint, proposed measures of the firm's liquidity include the amount of cash internally generated by the firm during that particular time span (an indicator of its internal liquidity), and the amount of cash available to the firm during that same period from its debt and equity financing capacities (an indicator of its external liquidity). In this view - which has been embraced by most of the literature on cash flow - the purpose of liquidity evaluation is to appraise whether the company has the financial framework, via internal and external sources of cash, to support continued operations or even expansion under future expected conditions.

Within the firm's internal cash flow, the cash flow from operations (or operating cash flow) assumes the greatest relevance. Not only because it measures the company's ongoing ability to produce cash - money that will be available for management to use in new investment opportunities, in retirement of debt, in distributions to shareholders, etc. -, but also because it measures the company's cash return on its internal investments [Leitch et al., 1980; Gombola and Ketz, 1981a]. The concept and determinants of the cash flow from operations are analysed next. Equally analysed next are the

determinants of the financing capacity of the firm concerning both debt and equity.

### 2.3.2.1 The cash flow from operations

#### A. Concept

It is essential, at this stage, to clarify the concept of cash flow from operations. Literally, cash flow from operations is cash generated by the firm from its revenue-generating operations. In this sense, it is operating income on a cash basis of accounting: cash revenues minus cash expenses [Gombola and Ketz, 1981a]. This is a simple concept. Yet, the need for clarification arises inasmuch as other concepts, namely net income<sup>(5)</sup> (NI), net income plus depreciation (NIPD), and working capital from operations (WCFO) are often used as proxies for cash flow from operations (CFFO). The process of clarification shows first the computation links between CFFO and the other concepts above; next, it ascertains whether any of those concepts can be accepted as a reasonable indicator of CFFO.

An extensive explanatory literature exists on the adjustment sequence by which accrual income is converted to cash flow from operations [e.g. Staubus, 1966; Tischler, 1974; Gombola and Ketz, 1981a; Ketz and Kochanek, 1982]. Therefore, just a summary of the various additions and subtractions which are involved in the conversion is provided here. A step by step illustration of the conversion sequence is given in Exhibits 2.1 to 2.4.

The substitutability of CFFO and NI, NIPD and WCFO was empirically tested in a study by Gombola and Ketz [1981b]. Data were collected from 130 firms. One hundred of these companies were randomly selected from the Fortune 500 list, 15 from industries in which accruals and deferrals were expected to be relatively small, and the remaining 15 from industries in which accruals and deferrals were expected to be large. On the basis of 1976 data, the four indicators under investigation were computed for every firm in the three samples. Normalization of these indicators was achieved by calculating them as a percentage of total assets. The possibility



Exhibit 2.1

Adjustments to net income to compute net income plus depreciation

Net income plus depreciation (NIPD)	=	Net income (NI)	+	<u>Additions</u> . Depreciation expense . Depletion expense . Amort. of intangibles
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Source: Adapted from Gombola and Ketz [1981a, p.34]

Exhibit 2.2

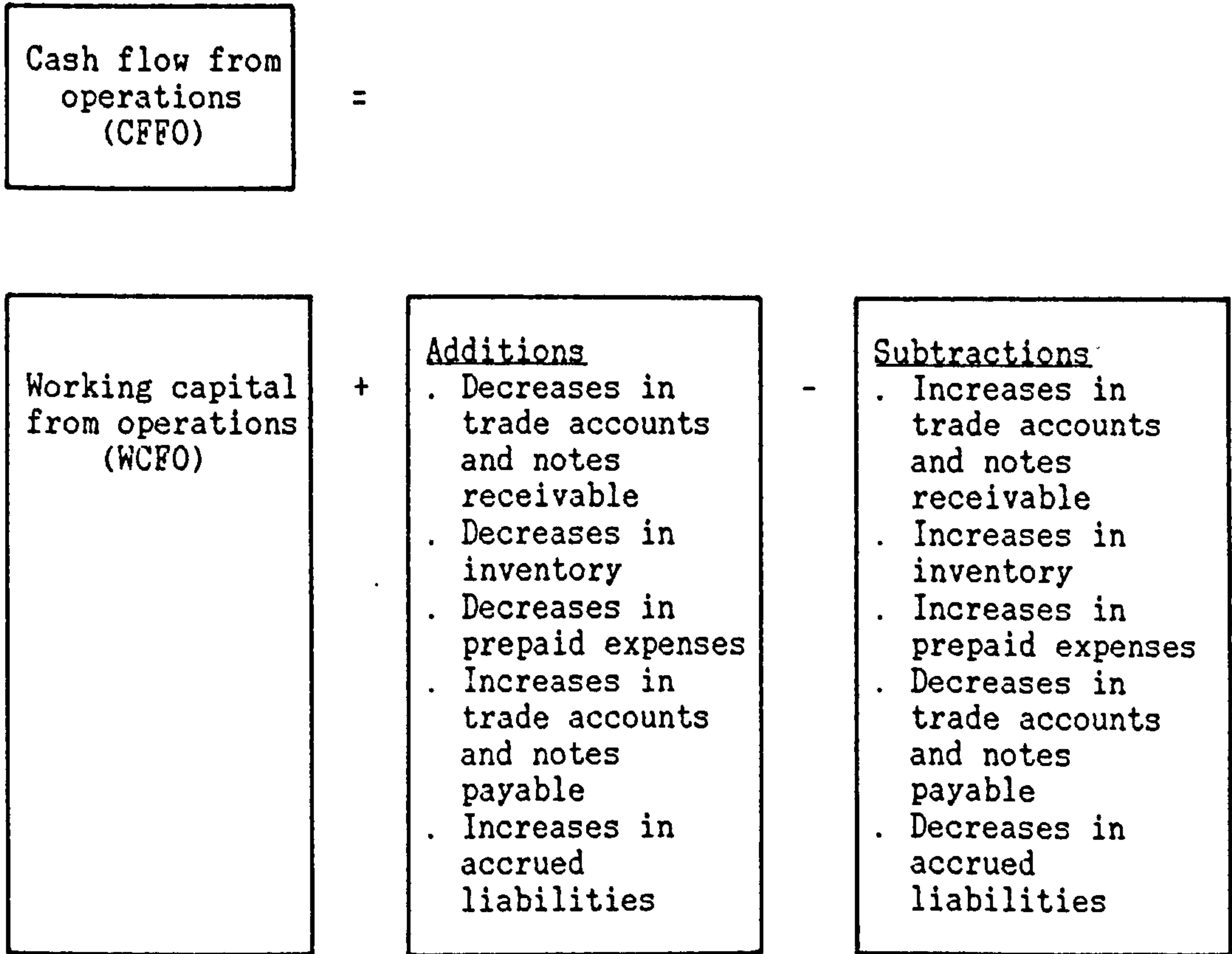
Adjustments to net income plus depreciation to compute working capital from operations

Working capital from operations (WCFO)	=	Net income plus depreciation (NIPD)	+	<u>Additions</u> . Amortization of deferred charges . Amortization of discount on bonds payable . Amortization of premium on bond investments . Pro rata share of reported losses in excess of cash dividends recognized from unconsolidated stock investments under the equity method . Minority interest in consolidated subsidiaries' net income . Losses from non-operating items	-	<u>Subtractions</u> . Amortization of deferred credits . Amortization of premium on bonds payable . Amortization of discount on bond investments . Pro rata share of reported income in excess of cash dividends recognized from unconsolidated stock investments under the equity method . Minority interest in consolidated subsidiaries' net loss . Gains from non-operating items
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Source: Adapted from Gombola and Ketz [1981a, p.34]

Exhibit 2.3

Adjustments to working capital from operations to compute cash flow from operations

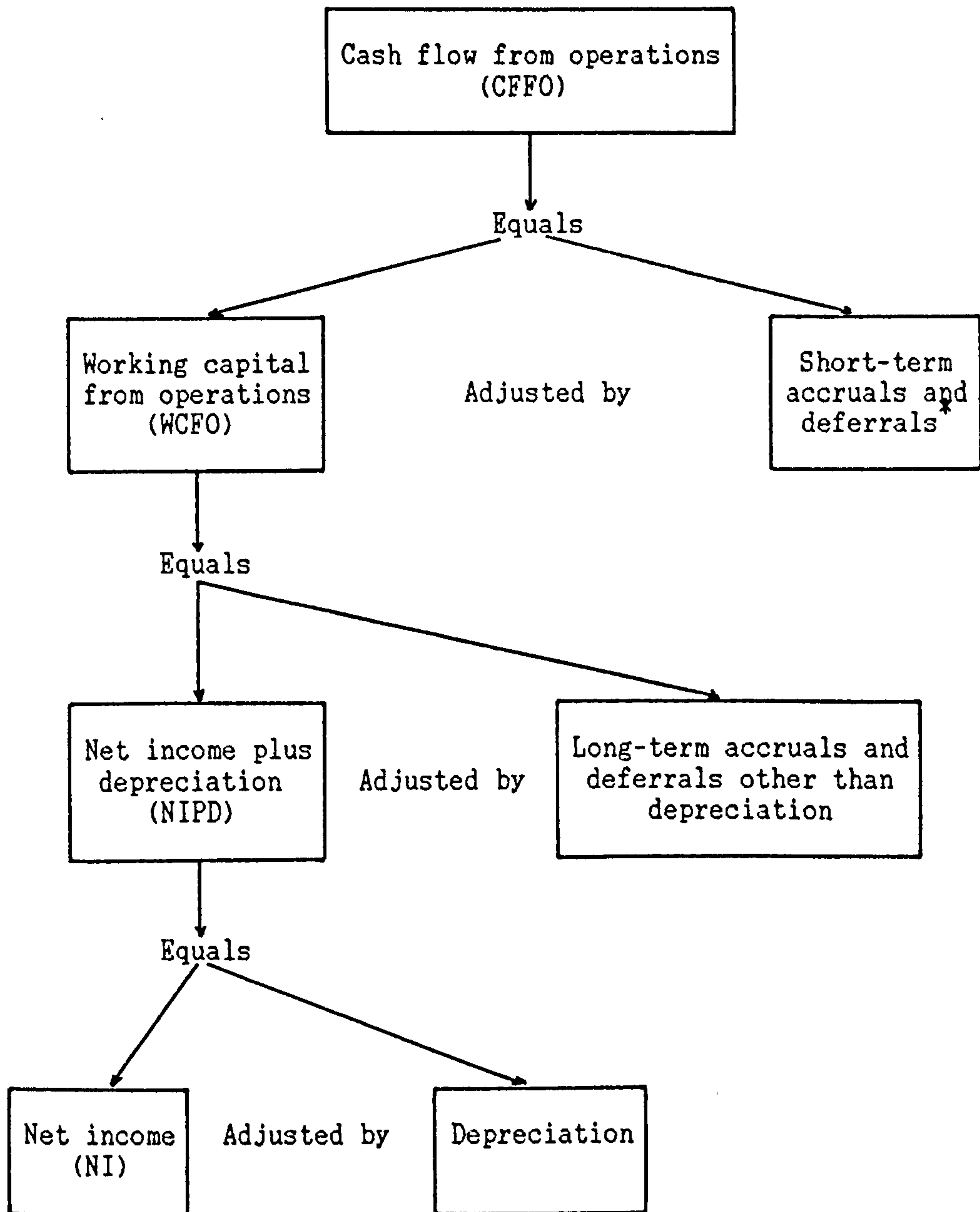


Source: Adapted from Gombola and Ketz [1981a, p.37]



Exhibit 2.4

Adjustment sequence for the conversion of net income to cash flow from operations



\* Adjusting WCFO for short-term accruals and deferrals corresponds to adjusting it for the variation in working capital. By definition, working capital includes here all current asset and current liability items with the exception of liquid assets (cash and short-term marketable securities) and short-term debt.

of any spurious association between the indicators caused by large differences in firm size was thus reduced. Two types of statistical test were employed: Kendall's rank-order correlation tests and t tests for the difference in means. Both types of test were performed on the pairs NI-CFFO, NIPD-CFFO, NIPD-WCFO and WCFO-CFFO. The results obtained suggested four primary conclusions:

- that at least some accruals and deferrals are significant, was indicated by lack of substitutability of net income with cash flow from operations;
- that accruals and deferrals other than depreciation have material effects, was indicated when for two of the samples, net income plus depreciation was not an appropriate proxy for cash flow from operations. A similar conclusion was reached by Tischler [1974] when observing the historical behaviour of both indicators in two companies over a period of four years. Systematic examination revealed that, a) in any given year, net income plus depreciation substantially differed from cash flow from operations, b) every year, the operating cash flow curve changed its slope independently of the net income plus depreciation curve. In a short/medium-term period, therefore, no correlation between NIPD and CFFO was evident;
- that long-term accruals and deferrals are material, was shown by lack of substitutability between net income plus depreciation and working capital from operations, except for firms in the small-effect sample;
- that short-term accruals and deferrals are material was indicated since working capital from operations was not a reliable proxy for cash flow from operations, except in the case of small-effect firms.

These results confirm the distinction between the earning power and the short-run cash generating ability of the firm [Hunt, 1975; Heath, 1978].



## B. Determinants

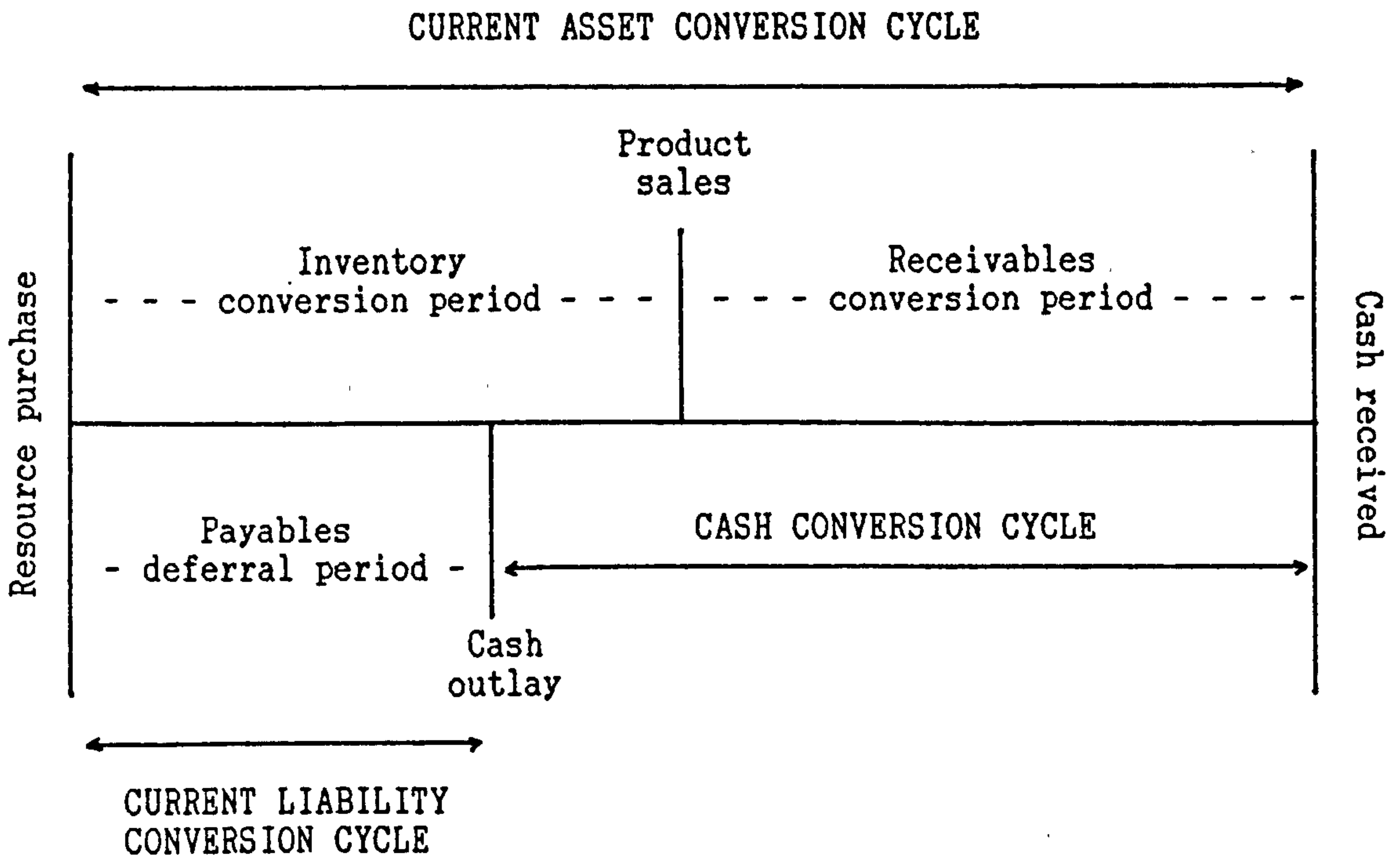
From an operational point of view, two factors determine cash flow from operations: operating profit margins<sup>(6)</sup> and working capital turnover [Walker, 1964].

This idea is best explained through the concept of the cash conversion cycle [Belt, 1979; Richards and Laughlin, 1980; Nordgren, 1981]. According to Richards and Laughlin [1980], the cash conversion cycle reflects the "net time interval" between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales. The concept "... requires explicit recognition of the extent to which four basic activities - purchasing/production, sales, collection, and payment - create flows within the working capital accounts that are noninstantaneous and unsynchronized" [Richards and Laughlin, 1980, p.34]. These flows are portrayed by deriving time intervals from the firm's inventory, receivables, and payables turnover indicators<sup>(7)</sup>.

Exhibit 2.5 illustrates the concept. The cash conversion cycle results from expanding the current asset conversion cycle of the firm to include its current liability conversion cycle. The former is sequential, its length being approximated by the cumulative days per turnover for inventory investments and accounts receivable. The current asset conversion cycle of the firm indicates the time pattern of cash inflows generated by the transformation of its current asset investments. The latter is simultaneous, its length being approximated by the days per turnover for accounts payable. The current liability conversion cycle indicates the time pattern of cash outflow requirements imposed by the firm's current liabilities. The difference between the former and the latter identifies the residual time interval over which additional, non-spontaneous financing must be negotiated to compensate for the non-instantaneous and unsynchronized nature of the firm's working capital investment flows. This is depicted by the cash conversion cycle.

Exhibit 2.5

The cash conversion cycle



Source: Adapted from Richards and Laughlin [1980, p.35]



Two comments are opportune at this stage. The first is that the type of non-spontaneous financing used over the cash conversion cycle affects the risk posture of the firm [Walker, 1964; Belt, 1979; Richards and Laughlin, 1980]. As a rule, given the many variables that influence the size, smoothness and speed of a firm's cash receipts, adequate time should be allowed between the time cash is expected to be generated and the time debt capital becomes due. The second comment is that the cash conversion cycle is determined by the working capital turnover of the firm [Belt, 1979; Richards and Laughlin, 1980; Nordgren, 1981]. Expansion or contraction in the turnover indicators of working capital components influences the cash conversion cycle of the firm. A decrease in the inventory and receivables turnover ratios, for instance, creates a lengthening of the current asset conversion cycle which, if not accompanied by a concomitant lengthening of the current liability conversion cycle, leads to an additional need for non-spontaneous financing to cover a longer cash conversion period.

It is through the influence it exerts over the cash conversion cycle that the working capital turnover of the firm determines cash flow from operations. In effect, the smaller the firm's cash conversion cycle, the more frequently operating profit margins are realized and thus, the larger the firm's operating cash flow becomes, profitability remaining unaltered. By the same reasoning, and holding working capital turnover constant, the larger the realized profit margins and therefore the larger the firm's operating income, the larger its cash flow from operations.

Operating income varies directly, to a greater or lesser extent, with sales. The turnover of working capital however, due to the dynamic relationship of working capital to the anticipated rate of sales [Walker, 1964; Merville and Tavis, 1973; Gentry et al., 1979; Nunn, 1979; Nordgren, 1981], varies inversely with the latter. As sales evolve, operating income and working capital turnover impinge differently on cash flow from operations, the impact of reported earnings upon operating cash flow being largely offset by the impact of working capital turnover. A company's market position is one element which can create considerable pressure on operating cash flow due to the influence of working capital turnover. Gale and Branch

[1981] show that cash flow from operations varies inversely, both with the real market growth rate and the rate of increase in selling prices. Businesses in fast-growth markets absorb more cash than businesses in slow-growth markets due to higher working capital requirements. Therefore, at rapid sales volume growth rates, average ROI may not suffice to generate a positive cash flow. The rise in selling prices does not usually generate cash, contrary to what might be expected, since rising prices are either accompanied or prompted by rising costs. Inflation is growth in value terms and thus the impact on cash of rapid increases in prices is similar to the impact of fast real growth. The need to tie up larger amounts of money in inventory and accounts receivable exacerbates cash requirements.

In addition to market position, a company's market strategy can also negatively affect operating cash flow mainly by influencing cash use [Gale and Branch, 1981]. Attempting to maintain a share in a growing market, or to build a share in a growing, stable or shrinking market is expensive and consumes cash. Management may decide to increase expenditures for marketing programmes or new product developments, increase inventories, or liberalize receivables policy, but this not only inflates costs and reduces operating income, it also slows down working capital turnover.

Another element which can negatively impinge on the operating cash generating ability of the firm is declining sales and earnings during periods of economic adversity. Disinvestment in working capital in anticipation of future lower levels of activity can for a while counteract the negative impact of declining earnings upon operating cash flow. Nevertheless, it is important to realize that firms are subject to environmental (mainly industrial) constraints which create built-in rigidities in their current asset and liability turnovers [Hartley, 1976]. Such rigidities make difficult any attempt to reduce working capital and improve its turnover. Together with the operating cash leverage factor of the firm, they significantly magnify the problem of cash flow management during economic downturns [Richards and Laughlin, 1980].



It is clear from these examples that the two determinants exert in the short-run a combined or opposite influence over cash flow from operations. Aggressive asset management is vital therefore to ensure cash in the short-term. Its purpose is twofold: to reduce the amount of investment required to keep pace with growth, and to reduce excess capital and thereby improve profits [Gale and Branch, 1981]. In the long-run however, short-term effects stabilize and working capital variations lose momentum. The underlying trend in earnings becomes the sole determinant of the operating cash generating ability of the firm [Hartley, 1976].

#### 2.3.2.2 The firm's debt and equity financing capacities

The financing potential of a business is influenced by numerous economic factors including inflation, money market rates, attractiveness of equity issues, financing needs of public institutions, fund availability of banks and governmental monetary policies [Siegel, 1980]. Basically however, it depends on the type of capital under consideration and on the eligibility of the business for that type of capital [Diener, 1980].

In financial circles, capital is categorized as permanent (or equity capital) and repayable (or debt capital). Equity capital that does not take the form of retained earnings can only be obtained by entry of fresh money from owners or new investors. In modern business, the most important method of attracting outside permanent capital is through public stock issues. Regardless of the type of security involved (common stock, preferred stock or convertibles), present and past earnings plus future increased earnings potential appear to determine the eligibility for, and the size of, a public issue financing [Diener, 1980].

Debt capital can be obtained under many different forms and arrangements from financial institutions. The simplest means of obtaining it is on an unsecured basis. The eligibility of a business for unsecured financing depends on the specific purpose the borrowed funds are required for. If they are needed to support temporary working capital commitments arising from the fluctuating

activity of the business, their maturity is usually short-term, and the business is expected to demonstrate its ability to repay them during the firm's period of greatest liquidity in a cycle of one year [Diener, 1980]. Evaluation of this ability is often cited as being centred on the balance sheet of the firm, most particularly on working capital and debt-to-worth considerations. Yet, to the extent that it is valid for present purposes to extrapolate the results of the work of Backer and Gosman [1980] on the use of financial ratios in trade credit downgrade decisions, it is possible that other factors, namely profitability and cash flow and not those mentioned above, may in fact determine short-term unsecured debt financing capacity.

Unsecured financing of permanent capital investment (either in working capital or in fixed assets) is normally medium/long-term in nature since the capital is not related to the cyclical aspect of the business but to its growth. When a firm applies for a growth capital loan, it is expected to demonstrate that the investment will yield cash flow to provide for the orderly repayment of the loan over the investment period [Diener, 1980]. Thus, the prime consideration in evaluating long-term unsecured debt financing capacity is generally recognized to be annual cash flow. Other considerations of importance are earnings and financial leverage. The study by Backer and Gosman [1980] confirms these factors as major determinants of firm's long-term unsecured debt financing potential.

The secured borrowing capacity of a business depends apparently on a different set of criteria, because the lender is indeed a preferred creditor who can count on certain assets being allocated strictly to liquidation of his credit. There appears to be common agreement that the liquidation value of the collateral and the indicated ability to repay the loan based on cash flow, are the basic determinants of this financing potential. Simultaneously, since the lender is not on a par with the other creditors, not so much emphasis should be placed on the debt-to-worth ratio. On a secured lending basis, three types of asset can be used as collateral: fixed assets, inventories and accounts receivable. Each of them, by their very nature, creates differing financing potentials [Diener, 1980].



Finally, debt capital can be obtained from sources other than financial institutions. The issue of corporate bonds for instance, represents a way of attracting debt financing from the public at large. Bond ratings are used extensively in the investment community as a surrogate measure for the riskiness of bonds. In effect, bond yields correlate strongly with bond ratings, high rated bonds selling at substantially lower yields than low rated bonds [Hickman, 1958]. Bond ratings therefore, are an indicator of debt quality, and indirectly of bond financing capacity. Understanding the determinants of the former is essential to understanding the determinants of the latter.

Leverage, profitability and cash flow generation are the three basic factors that, on a past and pro-forma basis, senior executives of bond-rating agencies claim to take into account in their rating decision process [Clark and Harries, 1976; Backer and Gosman, 1980]. In particular, the ratios of cash flow to long-term debt, long-term debt to capitalization, and fixed-charge coverage appear to be most important in the financial analysis [Backer and Gosman, 1980]. Yet the evidence offered by empirical studies which have developed statistical models to explain and predict the ratings of large cross-sections of corporate bonds, is only partially congruent with the bond raters' decision model.

Horrigan [1966] identifies six independent variables: subordination status of bond, total assets, net worth to total debt (book values), net operating profit to sales, working capital to sales (industry adjusted), and sales to net worth (industry adjusted). These variables could explain about 65 percent of changes in bond ratings in the population surveyed. West [1970] uses four independent variables - earnings variability, reliability in meeting past obligations, capital structure and market value of firm's publicly traded bonds - to develop a bond rating prediction equation quite different from the former. The variables are drawn from a study by Fisher [1959] on the determinants of risk premiums on corporate bonds. The predictive ability of West's model however, did not significantly diverge from Horrigan's. Long-term debt to total assets, the coefficient of variation of earnings, and total assets are the most significant independent variables found by Pogue

and Soldofsky [1969]. Return on assets is less important and earnings coverage of interest charges is insignificant. Pinches and Mingo [1973] develop a carefully executed multiple discriminant analysis (MDA) to classify bonds into bond-rating categories. In the discriminant functions, subordination status is the most important variable, followed by earnings stability and size. The financial ratios - long-term debt to total assets, net income to total assets, and interest coverage - are the least important. Altman and Katz [1976] also apply MDA to bond ratings, but unlike Pinches and Mingo perform no a priori screening of independent variables. Interest coverage, earnings variability, interest coverage variability, return on investment, and maintenance and depreciation expense to operating revenues, are found to contribute the most to the performance of the discriminant function. Kaplan and Urwitz [1979] develop a statistical procedure appropriate to the ordinal nature of a bond rating. A simple linear model using a subordination dummy variable, total assets, one financial ratio (long-term debt to total assets) and the common stock market beta coefficient, was found to be successful in classifying correctly two-thirds of a holdout sample of newly issued bonds. Overall, only the study by Backer and Gosman [1980] appears to bring some support to bond raters' decision model. The statistical findings of their study reveal that two of the three ratios stressed in the interviews by bond raters, namely cash flow to long-term debt and long-term debt to capitalization, did in fact significantly deteriorate prior to bond downgrades.

#### 2.4 Liquidity as Debt-Paying Ability

Another major perspective on liquidity as a business characteristic defines it as the debt-paying ability of the firm. Underlying this definition is the assumption that the firm is a going concern, i.e. an entity currently in operation and anticipated to remain active under future expected conditions.



As a going concern, the firm is a dynamic entity. This dynamic carries important implications for the analysis of liquidity [Lemke, 1970; Fadel and Parkinson, 1978; Heath, 1978]. First, it makes it compulsory for liquidity analysis to be referred to a time span. Given the on-going nature of the business, future time spans are the focus of liquidity analysis [Walter, 1957]. Second, it makes it compulsory for liquidity analysis to be set in terms of funds flows. The concept of funds, however, is ambiguous. In most cases, funds tend to be defined as working capital. Yet sometimes they are also understood as being cash, total current assets, or even total assets [Jaedicke and Sprouse, 1965; Helfert, 1977]. Usually, the time period in question as well as the decision problem itself help to determine which flow concept is most appropriate. With respect to liquidity analysis, there seems to be a generalized consensus as to the specific notion of funds to be employed: funds tend to be identified with cash, and any flow that causes a change in the liquid asset (cash and short-term marketable securities) account is considered relevant to the discussion [Jaedicke and Sprouse, 1965].

In this framework, the liquidity of the firm for any future period of time is determined by the relationship between the amount of cash available to the firm and the amount of cash needed to pay the firm's maturing obligations. Since being a going concern presupposes a state of solvency<sup>(8)</sup>, the amount of cash available to the firm will always have to equal or exceed the firm's required cash payments on a daily basis [Lemke, 1970; Hartley, 1976; Heath, 1978]. For any future time span therefore, the liquidity of the firm will always have to be equal to or greater than zero (if determined in absolute terms), or equal to or greater than one (if determined in relative terms). In this sense, liquidity can be understood as being a margin.

Two major approaches to the measurement of liquidity are advocated in the literature. The main difference between the two lies in the determinants of liquidity. In order to derive its perception of cash available and cash needed, the first approach draws on the nearness to money concept of a company's assets and liabilities. The second draws both on the concept of nearness to money and on the dynamic concept of a firm's cash resources. Both approaches are developed in Chapter 3.

## 2.5 Summary

A substantial amount of confusion and imprecision exists concerning liquidity. Identifying and distinguishing the several meanings of liquidity is an essential step towards clarifying the subject.

Liquidity is often identified in the literature as a characteristic - reflecting the nearness to money - of a company's asset and liability holdings. For purposes of reporting liquidity in the balance sheet, assets and liabilities have been traditionally divided into two groups - current and non-current - of which the former is supposed to comprehend the most liquid portion of total capital. Such a classification presents a major difficulty insofar as there are two alternative criteria for defining current assets and current liabilities - the maturity-date approach and the operating-cycle approach. Both criteria exhibit inherent faults. Accordingly, other proposals have been suggested which provide an alternative to the conventional balance-sheet classification for the reporting of liquidity.

In a different perspective, liquidity has been identified in the literature as a business characteristic. In this context, one viewpoint has been to associate liquidity with the cash resources of the firm, and to set its measurement either in reference to a certain moment in time (static view) or to a certain time span (dynamic view).

In the static view, the amount of cash held by the firm at a particular moment is the suggested measure of its liquidity. Studies embracing this view represent a large part of the literature on cash management. They comprise two groups, both of which evolved from the early work of Baumol [1952] and Tobin [1956] on firms' transactions demand for cash. The first group, in the field of economics, adopts a positive approach and tries to determine empirically whether the traditional monetary theory or the Baumol-Tobin hypotheses provide a better description of cash management behaviour. The second group, in the field of corporate finance, adopts a normative approach and attempts to determine the amount of



cash a firm should maintain. Two types of normative solution have been proposed in the literature: one using control-limit models, and another using linear programming models.

The dynamic view, which has been embraced by most studies on cash flow, relates the measurement of liquidity to a certain time span. Proposed measures of the firm's liquidity include the amount of cash internally generated by the firm during that particular time span (an indicator of its internal liquidity), and the amount of cash available to the firm during that same period from its debt and equity financing capacities (an indicator of its external liquidity). Within the firm's internal cash flow, the cash flow from operations assumes the greatest relevance. Not only because it measures the company's ongoing ability to produce cash, but also because it measures the company's cash return on its internal investments. Literally, cash flow from operations is operating income on a cash basis of accounting: cash revenues minus cash expenses. From an operational standpoint, two factors determine cash flow from operations: operating profit margins and working capital turnover. In the short-run, they exert a combined or opposite influence over operating cash flow. In the long-run however, the underlying trend in earnings is the sole determinant of the operating cash generating ability of the firm.

Another major perspective on liquidity as a business characteristic defines it as the debt-paying ability of the firm. Behind this definition is the assumption that the company is a going concern. From this point of view, the liquidity of the firm for any future period of time is determined by the relationship between the amount of cash available to the firm and the amount of cash needed to pay its maturing obligations. The former will always have to equal or exceed the latter on a daily basis, since being a going concern presupposes a state of solvency. For any future time span therefore, the liquidity of the firm will always have to be equal to or greater than one (if determined in relative terms). In this sense, liquidity can be understood as being a margin. Of the three meanings of liquidity, the last was the one adopted in the study.

Footnotes

- (1) Sales being assumed in most studies to be a good surrogate for transactions.
- (2) The study by Budin and Van Handel does not share the same characteristics of the other studies in the group, yet it is included here since it has a similar objective in common with them.
- (3) Whalen treats transactions and precautionary cash balances as a single variable, since both are equally a function of sales.
- (4) Whalen assumes that  $a$  and  $a'$  are zero.
- (5) Net income is measured before interest and taxes.
- (6) For purposes of the analysis in the section, operating profit margins are before deduction of depreciation and other non-cash expenses.
- (7) The payables turnover ratio is defined as the firm's annual cash operating expenditures divided by current trade accounts, notes payable and accruals directly associated with deferral of those operating expenditures. Both payables and accruals represent spontaneous financing [Richards and Laughlin, 1980].
- (8) Being solvent means that the business unit is able to meet its maturing obligations [Walter, 1957; Heath, 1978].



## Chapter 3 MEASUREMENT OF LIQUIDITY

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### 3.3.4 The Instant Reserves

## 3.4 Summary



## Chapter 3 MEASUREMENT OF LIQUIDITY

### 3.1 Introduction

The present chapter deals with the major approaches to the measurement of liquidity. In the absence of a specific terminology in the literature by which to designate these approaches, the following identification is suggested by the author: balance-sheet approach and flow approach.

In the balance-sheet approach (Section 3.2), the relationship between a company's current assets and current liabilities is typically used to measure liquidity. Thus, emphasis is placed on the working capital position, and on a balance-sheet indicator - the current ratio - as the measure of the firm's debt-paying ability. In this section, the rationale as well as the historical background of the current ratio as liquidity measure are presented. Also presented are five proposals for assessing the adequacy of the current ratio value. The section ends with a discussion of the three main criticisms - ease of manipulation, ambiguity of interpretation of indicator's behaviour, and static nature - which have been raised against the current ratio as liquidity measure.

In the flow approach (Section 3.3), the dynamic nature of the debt-paying process of the firm is recognized. Therefore, the proposed measure of liquidity takes into consideration all types of funds likely to be available to the firm, as well as all the various obligations likely to mature during the period of time concerned. A "liquid asset reservoir" view of the business provides in the section a useful framework for the examination of the approach and the revision of several liquidity measures proposed in the literature. The analysis of the resources of liquidity - both reserves and modifications of planned operating cash flows - follows in the section. Given the importance assumed by the instant reserves

among the resources of liquidity, the section further discusses the determination of the amount of such reserves a company should hold.

The chapter is finally summarized in Section 3.4.

## 3.2 The Balance-Sheet Approach

### 3.2.1 The Current Ratio as Liquidity Measure

#### 3.2.1.1 Rationale

The rationale for the use of the current ratio as measure of the firm's debt-paying ability rests on two basic premises:

- current liabilities are the firm's maturing obligations. As such, they represent the amount of cash needed by the firm for the period of time concerned;
- an analogy exists within the firm between the role of current assets and the role of current liabilities, whereby the former are seen as the source from which the latter are paid [Fadel and Parkinson, 1978; Heath, 1978]. Current assets, therefore, represent the amount of cash available to the firm for the period of time concerned. The analogy is a product of the self-liquidating concept of short-term liabilities. The idea is that current liabilities are the proper financing vehicle for current assets. On the other hand, it is the disposal through sale of these temporarily acquired assets that generates the cash flows which are available for the repayment of the incurred obligations<sup>(1)</sup>. The shorter the interval between purchase and sale of the assets, the greater the likelihood that the generated cash flows are sufficient. Yet, even where short periods are concerned, the risk exists that realized receipts may fall short of corresponding liabilities. It follows from this that it is in the company's interest that an adequate safety margin in the form of a



surplus of current assets over current liabilities is maintained, so that even if substantial shrinkage occurs in the realization value of its current assets the firm does not become technically insolvent [Walter, 1957; Heath, 1978].

Major implications derive from these premises. First, the time span underlying the definition of current items is the relevant period of time for the measurement of liquidity in the balance-sheet approach. Second, in this approach cash available is an exclusive function of the nearness to money characteristic of the firm's recorded assets.

### 3.2.1.2 Historical background

The use of the current ratio as liquidity measure arose in the United States in the last few years of the 19th century [Foulke, 1968] in strict association with credit analysis. From its very beginning, the current ratio came out as a key consideration in assessing a firm's creditworthiness or eligibility for a loan [Horrigan, 1968; Heath, 1978]. The rationale for the use of this indicator was very different then, deriving from the principles of credit analysis operating at the time. As Heath [1978, p.12] reports: "although creditors undoubtedly relied on the ability of a debtor to repay its debts out of cash provided by normal operations without having to resort to liquidation, credit analysis centered on the ability of a company to repay its debts if liquidation were to occur...". In other words, the focus in early credit analysis was on the debtor's ability to generate large enough funds from the liquidation of its assets to compensate for its liabilities. Since fixed assets were considered to have little realizable value in a forced liquidation<sup>(2)</sup>, and at that time long-term credit forms were almost unavailable<sup>(3)</sup>, the problem was reduced to a comparison between the firm's current assets and current liabilities. This rationale, however, was so visibly inconsistent with a going-concern view of the business that soon the need was felt to modify it along the lines described in 3.2.1.1 above.

In this new context, the use of the current ratio as liquidity measure quickly spread. Furthermore, the search for an adequate safety margin that companies should preserve led analysts to emphasize a preconceived minimum value for the ratio. A two-to-one value became the most prominent absolute criterion, in fact for many years it was the only liquidity criterion in use [Foulke, 1968; Horrigan, 1968].

From the beginning of the thirties, the importance of the current ratio as measure of the firm's debt-paying ability started to decline, particularly for credit grantors. The reasons for this decline can be found:

- in the increasing criticisms of the "single ratio, single value" rule [Heath, 1978];
- in the increasing use of new forms of financing, mainly medium and long-term [Dewing, 1953]; and,
- in the development of new ways of business appraisal, specially after the American stock market crash of 1929, the depression of the 1930s, and the rapid expansion of nearly all types of business in the late 1940s [Dewing, 1953; Heath, 1978].

By the 1950s, the supremacy of the working capital position in credit analysis had virtually disappeared. The view had developed that it was the business as a whole which should be the fundamental basis of credit, at least as far as medium and long-term financing were concerned. As such, the crucial element to be stressed was the firm's earning power and not the amount of current assets or their selling prices [Dewing, 1953]. However, when short-term financing was the case, working capital considerations were still rated most important, though the idea that no one absolute comparison and no one ratio could give a reliable picture of the firm's debt-paying ability had become predominant. This new attitude in credit analysis is well expressed in the works of Jacoby and Saulnier [1942], Robinson [1962], and Prochnow and Foulke [1963].

The importance of the working capital position in the evaluation of liquidity - not only for credit purposes alone but also for every purpose in general - further declined with the development from the



beginning of the 1960s of a new approach to the measurement of liquidity. Even so, a significant part of the literature today [e.g. Hunt et al., 1971; Foster, 1978; Weston and Brigham, 1985; Van Horne, 1986] still acknowledges the current ratio as the most immediate liquidity indicator. Although this literature tends to assign to the ratio the status of a "crude" or "rough" measure of the debt-paying ability of the firm because of its several limitations, it points out that when better and more detailed information is lacking, the current ratio represents the quickest and easiest way of approaching the subject.

### 3.2.2 Assessing the Adequacy of the Current Ratio Value

For the defenders of the balance-sheet approach, "keeping the [current] ratio at the proper level is the key to assuring continued liquidity" [Chisholm, 1977, p.45]. This expresses the objective of liquidity management in the approach. To this extent, the main concern of the balance-sheet approach has been assessing the adequacy of the current ratio value. Several proposals have been suggested in this regard.

#### 3.2.2.1 Comparison of the ratio value with a fixed standard

The earliest recommendation on how to judge the adequacy of the current ratio value proposed its comparison with a fixed standard. This recommendation, which enjoyed a widespread acceptance for a long time, defended the arbitrary requirement that the ratio value should not fall below two to one, this relationship being regarded as the safety limit of technical solvency.

This rule of thumb is open to criticism on several grounds [Wright, 1956]. First, is the pure subjectivity of the standard itself. There is nothing intrinsically significant in a two-to-one ratio. Second, the rule is one-sided. The current ratio is primarily viewed as an index of financial strength and stability, not as a measure of efficient utilization of resources. Third, the rule

does not allow the specific financial conditions inherent in companies operating in distinct lines of business activity to be reflected.

### 3.2.2.2 Comparison of the ratio value with a flexible standard

With the purpose of meeting the above criticisms, it subsequently became the practice to recommend the comparison of the current ratio value with a flexible standard. This rule recognized that the nature of firms' operations makes different balance-sheet structures appropriate. It accepted, therefore, that some types of business may require a current ratio higher or lower than two to one. It advocated, however, that any departure from this standard, either upward or downward, should be analysed. Management should then be able to demonstrate either the need for the increased margin or that an undue risk was not being incurred.

A first comment on this rule is that it is not in anyway less subjective than the former. A second comment is that the implication of such a rule "... seems to be that a working capital ratio of 2:1 or less can never be too high - which is a doubtful proposition - and that a working capital ratio of 2:1 or more can never be too low - which is almost certainly wrong" [Wright, 1956, pp. 102-103].

### 3.2.2.3 Comparison of the ratio value with a theoretical standard - The industry average

A more serious approach to the problem, in the meantime, developed the idea that the standard for comparison ought to be scientifically, not arbitrarily, determined [Wright, 1956]. This approach was based on the early works by Bliss [1923] and Boulding [1950]. It argued that the industry average should serve as target for a firm's current ratio. The central point of the argument was that certain factors - and among these, industry classification in particular - tend to increase the inter-firm dispersion of financial ratios, thereby making it difficult to differentiate between firms on the basis of ratios.



This being so, the extent of the dispersion present in ratio distributions could be substantially reduced by industry stratification. This would allow meaningful industry average figures to be obtained at the same time [Horrigan, 1965]. In the case of the current ratio, the mean value of the indicator for each industry segment would reflect the general tendency of liquidity in the sector. As such, it should be used as a target for every firm in that segment. Despite being a target, the industry average was not viewed as a compulsory figure companies should try to maintain. The approach allowed sufficient flexibility in the sense that it accepted that well managed firms might be above or below the standard; yet, a substantial deviation from the average should be a signal for a more in-depth analysis.

The industry average approach is still often applied nowadays [e.g. Weston and Brigham, 1985]. "Unfortunately, the validity of [its] arguments has not withstood the test of time and today the industry averages serve as target levels more as a rule of thumb than a theoretically grounded proposition" [Peles and Schneller, 1979, p.13]. Two reasons contributed to this development. The first was the recognition that the industry average is not in itself an index of optimal performance. The second reason was the realization that companies within industry groupings are not homogeneous, which affects the meaning of the industry average figures [Van Horne, 1986]. Some empirical research attempted to confirm this last point.

A first group of studies provides the evidence that another factor besides industry classification, namely profitability of the firm, can also increase the dispersion in short-term liquidity ratio distributions. For instance, the study conducted by Chudson [1945] of company data concluded that short-term liquidity ratios were not only significantly different between industries, but also significantly different between profitable and unprofitable firms with the former showing higher ratios. Two more works are referred to by Horrigan [1965] along this line: a study of firms in various trade industries by the U.S. Department of Commerce, Business and Defense Services Administration [1959] which confirmed that short-term liquidity ratios were higher in profitable firms; and, a study by

Jackendoff [1962] which found that financial ratios (specifically, the current ratio, the working capital to total assets and the net worth to total debt ratios) clearly distinguished between profitable and unprofitable firms, the ratios of profitable firms being consistently higher.

This evidence, however, suffers from an important shortcoming: its aggregate nature. Higher short-term liquidity ratios may be a characteristic of profitable firms independently of their industry classification, but it is also possible that they may be a characteristic of industries where profitable firms happen to predominate [Horrigan, 1965]. Since the studies above do not show whether the relationship between short-term liquidity and profitability holds within industries, they fail to demonstrate the inadequacy of industry averages as target levels for a firm's liquidity ratios.

Such evidence is provided by Peles and Schneller [1979]. They show that a firm's liquidity ratios may deviate from those of the average firm in the industry due to two factors: size and labour intensity. In the face of such conclusions, it is impossible to rely on the industry average to determine a firm's target level for its current ratio, since at least the two factors above will be operating to produce deviations from the standard. The impact of other variables such as profitability of the firm on the value of the liquidity ratio may also be relevant but it still remains to be the subject of appropriate research.

#### 3.2.2.4 Analysis of the ratio value trend

Another current approach regarding the adequacy of the current ratio value claims that it is not so much the ratio value of the moment that is important but the trend the ratio value follows over a period of time. A falling trend in the ratio value will be interpreted as a deterioration in liquidity, whereas an increasing trend will be indicative of an improvement [Wright, 1956; Chisholm, 1977]. Although this approach takes a new dimension - time - into account, it is no less ambiguous than the preceding ones. Not only



an upward or downward trend in the ratio value can be due to a variety of causes (see 3.2.3.2), but also the implications of the trend cannot be clearly visualized unless the state of the liquidity situation at the beginning of the trend period is known. In sum, the implications of the trend are always dependent upon the value of the current ratio at the beginning of the trend period, and upon the a priori judgement the analyst makes about the adequacy or inadequacy of that value [Wright, 1956].

### 3.2.2.5 The scientific approach

More recently, a scientific approach to the problem has emerged, with attention being shifted from the current ratio value to the working capital amount and the determination of its optimal level. In this approach, complex and sophisticated mathematical models have been applied to working capital management<sup>(4)</sup>. The approach corresponds to an attempt to develop sufficiently generalized models that are applicable to any type of firm regardless of size, industry classification or any other factor. It also corresponds to an attempt to develop, at the same time, sufficiently flexible models that provide for each firm the level of working capital that is optimal for the type of business in question and the particular moment of time.

The scientific approach distinguishes itself from the previous approaches inasmuch as in most of the models referred to above, the search for the optimal level of working capital is not triggered by a liquidity concern. On the contrary, the search is made while regarding working capital as an investment the existence of which is necessary for the firm to guarantee continuity of sales and production. As such, its level ought to be optimized. In this respect, the purpose of the models is the identification of that level of working capital that either minimizes total cost or maximizes the value of the firm. Liquidity considerations are not usually taken into account, and if they are, such considerations are simply expressed in terms of a constraint imposing a certain minimum value (arbitrarily set) for the current ratio or the working capital amount<sup>(5)</sup>. Models where the problem of overall risk<sup>(6)</sup> is

explicitly built into their construction are few, despite the fact that the duality of goals - profitability/liquidity - and the existing trade-off between the two have long been recognized in relation to working capital decisions [Walker, 1964; Smith, 1980]. The models which have explicitly emphasized this risk-return trade-off concept are those using multiple goal programming techniques or portfolio theory.

In goal programming models, the objective function reflects management's attitude towards the relative importance of the two goals. Whereas linear programming deals with only one objective (profit or cost), goal programming assumes there are multiple objectives whose feasible combinations depend on the nature of the firm, its investment opportunities and its possible sources of financing. Furthermore, in goal programming formulations, the aim is to minimize the absolute deviations from the desired objectives rather than trying to maximize or minimize those objectives. Rankings are set for each of the objectives by means of penalties assigned to their violation, and objectives are simultaneously satisfied in a manner that results in a minimum overall penalty<sup>(7)</sup>. A somewhat different goal programming technique applied to working capital management is suggested by Krouse [1973]. He also uses a hierarchical ranking of the objectives (according to their relative importance to the firm), but contrary to the traditional formulation, makes them be sequentially satisfied in the pre-defined order.

Portfolio theory, mainly through the capital asset pricing model (CAPM), provides a powerful means of analysing risk-return relationships among portfolios of securities, and among individual securities within portfolios. To the extent that the assets of a firm can be viewed in a portfolio context [Friedland, 1966], the CAPM appears as a suitable vehicle for calculating the required rate of return on individual working capital components. Other advantages in favour of the application of the CAPM to working capital decisions include: the fact that the CAPM is a single period model which is closer to the horizon of working capital decisions than to that of longer range expansion decisions which cover several future periods; and, the fact that the CAPM allows consideration of projects with very different levels of risk, which is the case with working capital



components, in particular receivables and inventories. Notwithstanding these advantages, only a few works such as those by Cohn and Pringle [1973], Bierman et al. [1975], and Copeland and Khoury [1979] have attempted to extend capital asset pricing theory to working capital management decisions. The reasons for this seem to lie either in doubts about the general applicability of the CAPM, or in difficulties associated with the integration in the theory of major imperfections existing in connection with real asset investments. In fact, the CAPM can only be applied to individual working capital components inasmuch as there are no major violations of the perfect capital market assumptions. If significant imperfections exist - and these are expected to increase as one moves from more to less liquid assets - they first have to be integrated into the theoretical model before its application is relevant.

### 3.2.3 Criticisms of the Current Ratio as Liquidity Measure

To what extent is the current ratio appropriate for the task it has been assigned in the balance-sheet approach? The answer to this question is given by a review of the three main criticisms which have been raised against it as liquidity measure.

#### 3.2.3.1 Ease of manipulation

The first major criticism regards the ease with which the current ratio can be manipulated [Sorter and Benston, 1960; Glautier, 1971; Fadel and Parkinson, 1978; Siegel, 1980]. It is widely recognized that certain events at year end may have a "window dressing" effect, leading the ratio to imply a better or worse liquidity situation than the one obtained on average through the year. "Window dressing" occurs whenever, through purposeful or chance manipulation of the timing of exchanges of assets and liabilities, the amount of current liabilities at balance-sheet date becomes distorted and atypical of the average amount of current liabilities held by the firm throughout the year. Also, some accounting practices may have a "window dressing" effect since they contribute, by design or by chance, to the

artificial inflation of the current ratio.

Being aware of these difficulties, some authors [e.g. Abd El-Motaal, 1958] have suggested that the working capital amount be used instead. However, if the amount of working capital is immune from "window dressing" effects caused by atypical liabilities, it is not free from "window dressing" effects caused by accounting practices.

### 3.2.3.2 Ambiguity of interpretation of indicator's behaviour

The second major criticism relates to the ambiguity which characterizes the interpretation of the current ratio's behaviour [Wright, 1956; Lemke, 1970; Richards and Laughlin, 1980]. Such an ambiguity arises because the current ratio is a function of many variables which affect liquidity differently.

A comprehensive analysis of possible patterns of current ratio behaviour is presented in Lemke [1970]. His analysis is based on a number of simplifying assumptions<sup>(8)</sup> and on the condition that sales increase at a constant interperiod rate. Lemke identifies six basic types of behaviour for the current ratio ( $r$ ) (Exhibit 3.1). This is done by showing that the general pattern of behaviour of the ratio depends on the relative position assumed by the paths followed by two variables -  $X$  and  $Y$  - where:

$X$  is a weighted average of the ratios ( $x_i$ ) which are obtained by dividing the amounts of individual current assets at the beginning of the period into the corresponding amounts at the end of the period. The weights ( $a_{ib}$ ) are the amounts of the individual current assets at the beginning of the period. For  $n$  current assets,

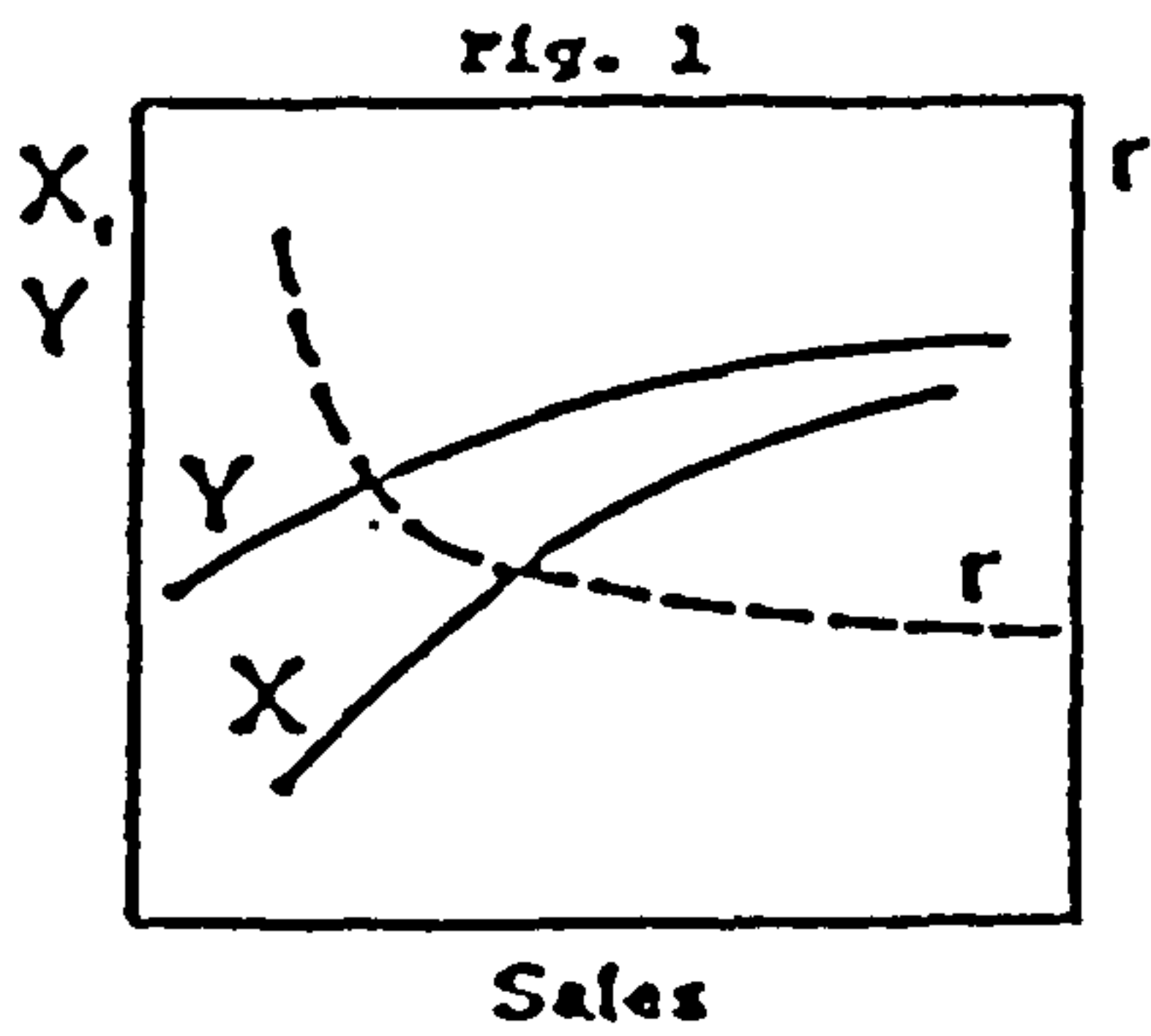
$$X = \frac{\sum_{i=1}^n a_{ib} \cdot x_i}{\sum_{i=1}^n a_{ib}} \quad \text{and,}$$

$Y$  is a weighted average of the ratios ( $y_i$ ) which are obtained by dividing the beginning-of-period amounts of individual current liabilities into the corresponding end-of-period amounts. The weights ( $k_{ib}$ ) are the beginning-of-period amounts of the

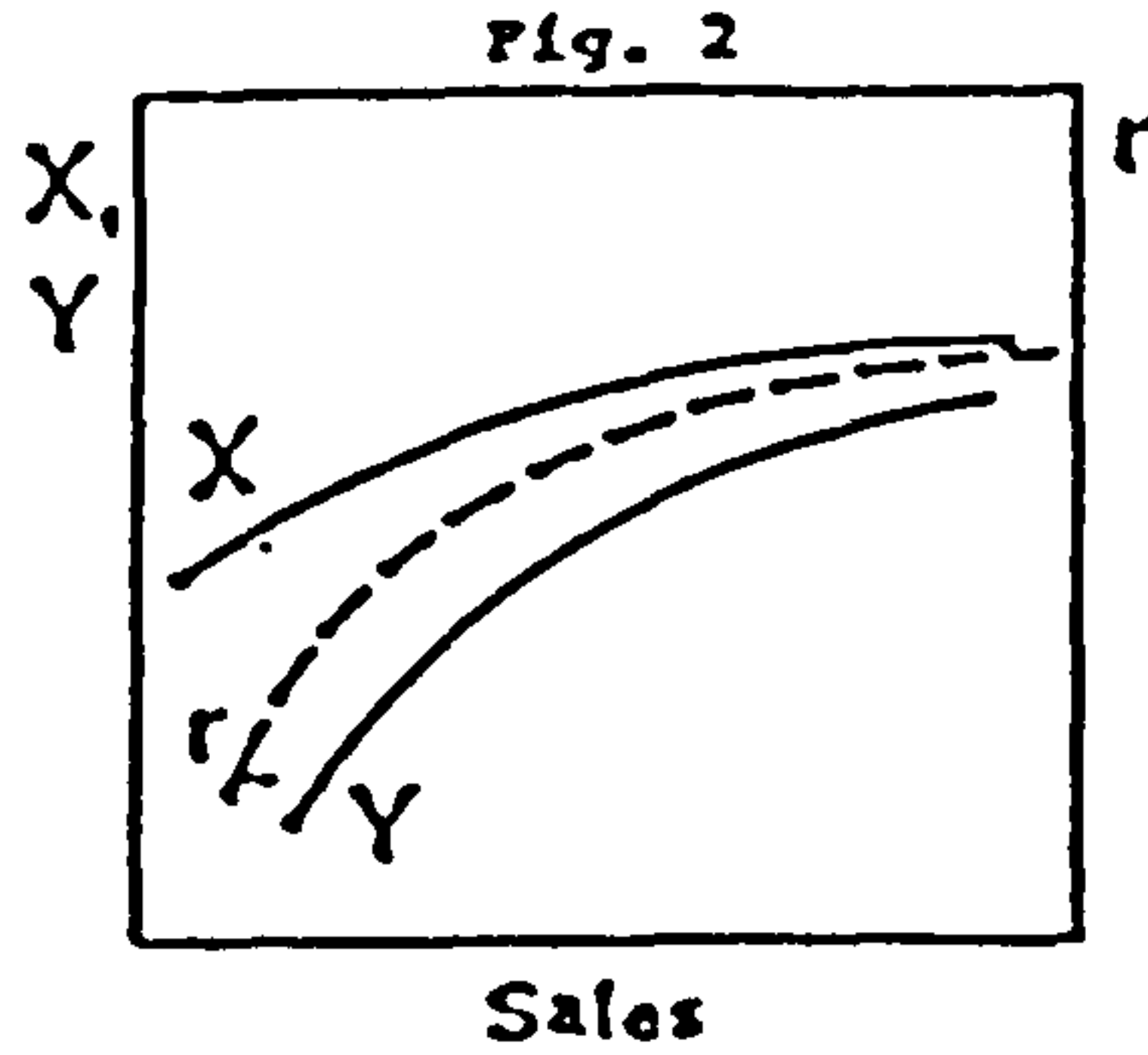


Exhibit 3.1

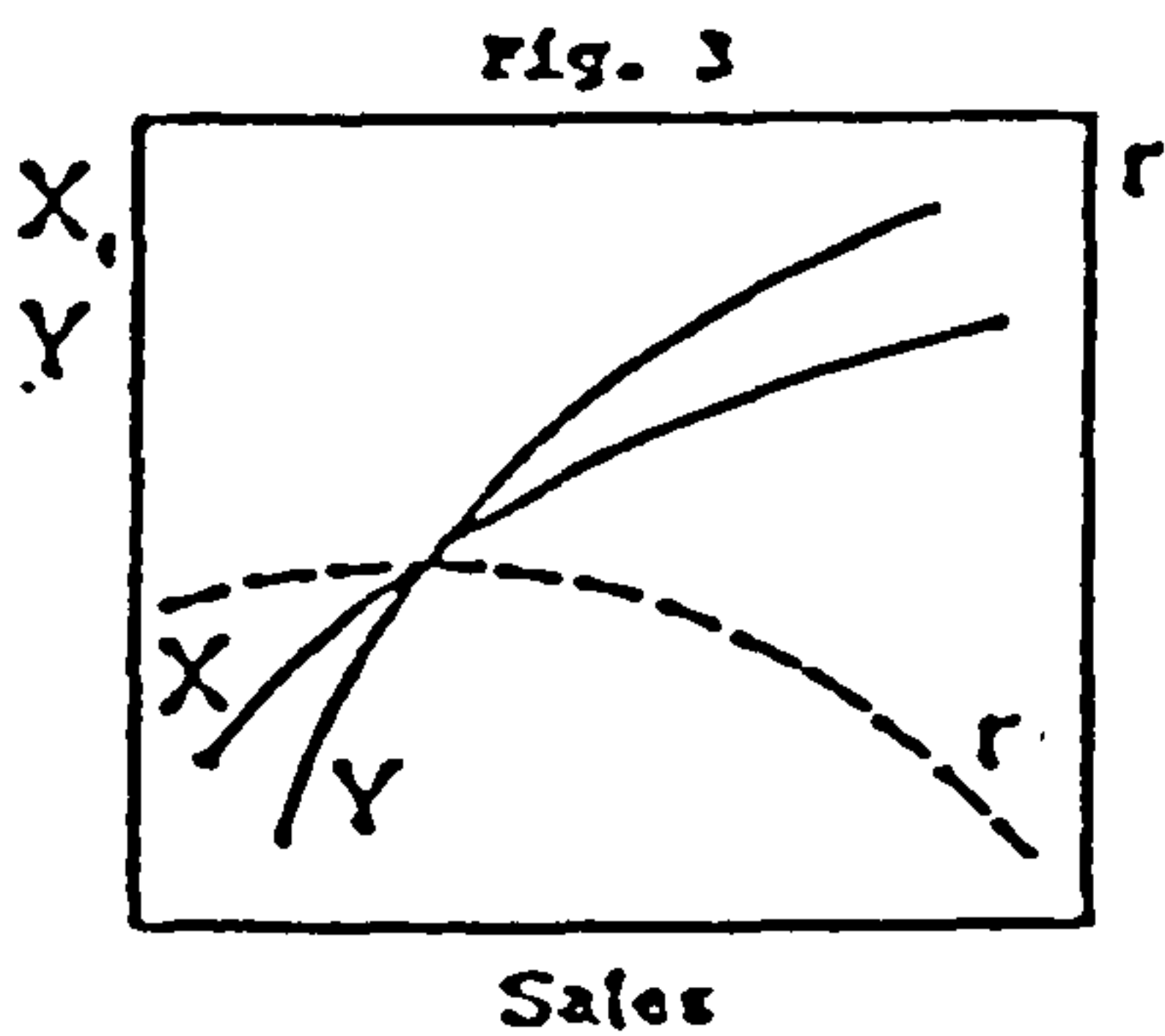
Basic types of current ratio behaviour



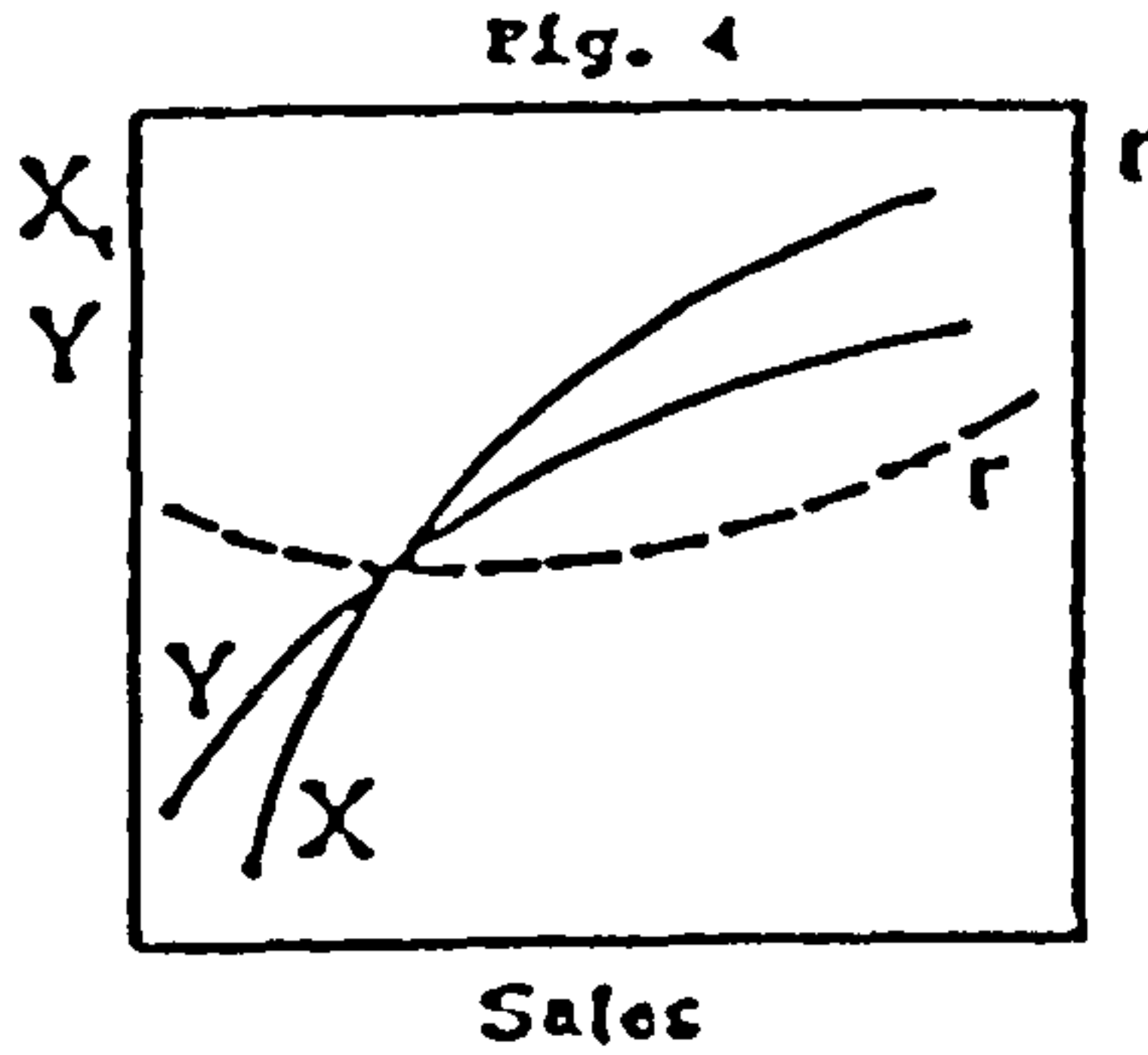
Type A - Gradual decrease, continuing indefinitely



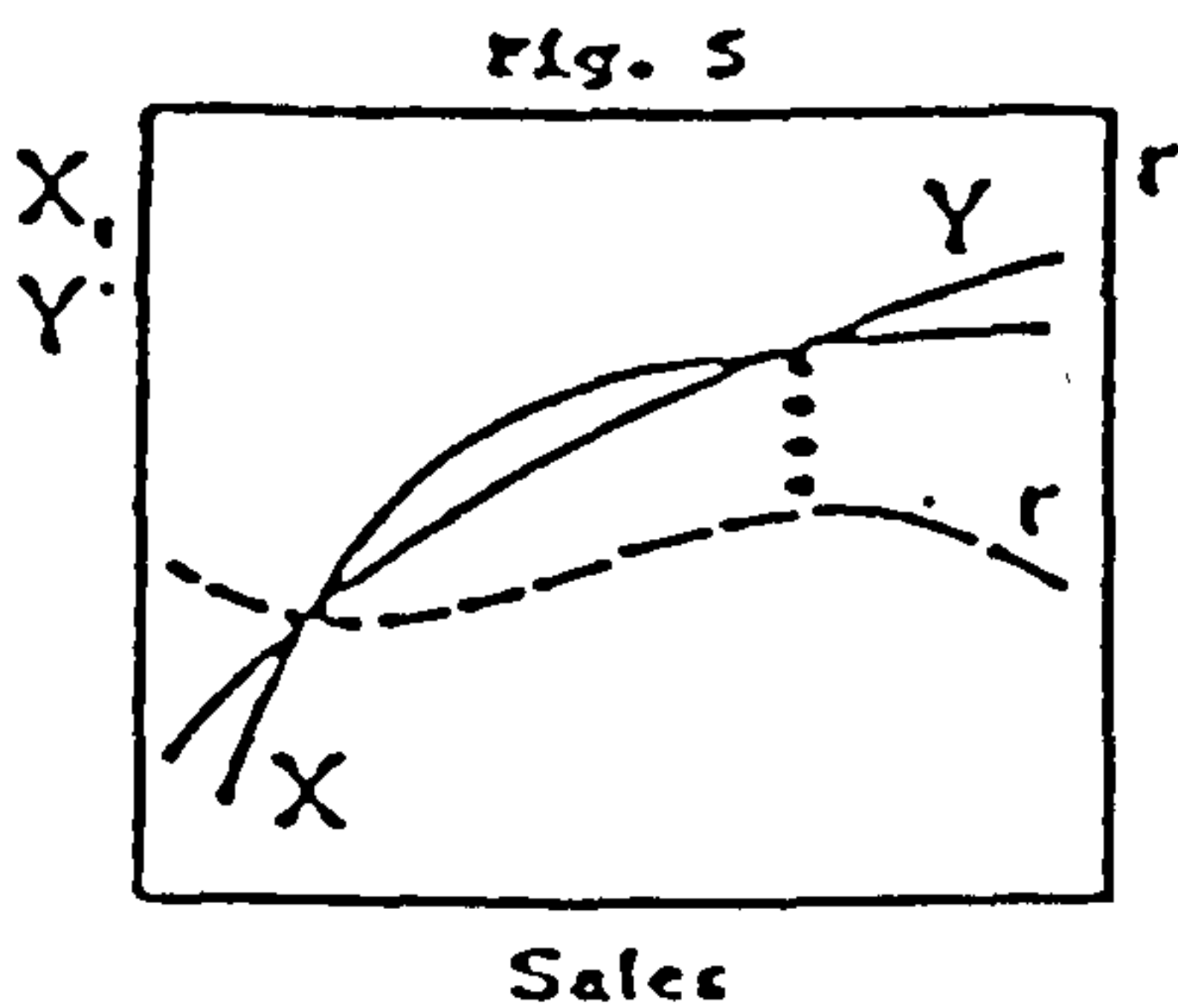
Type B - Gradual increase, continuing indefinitely



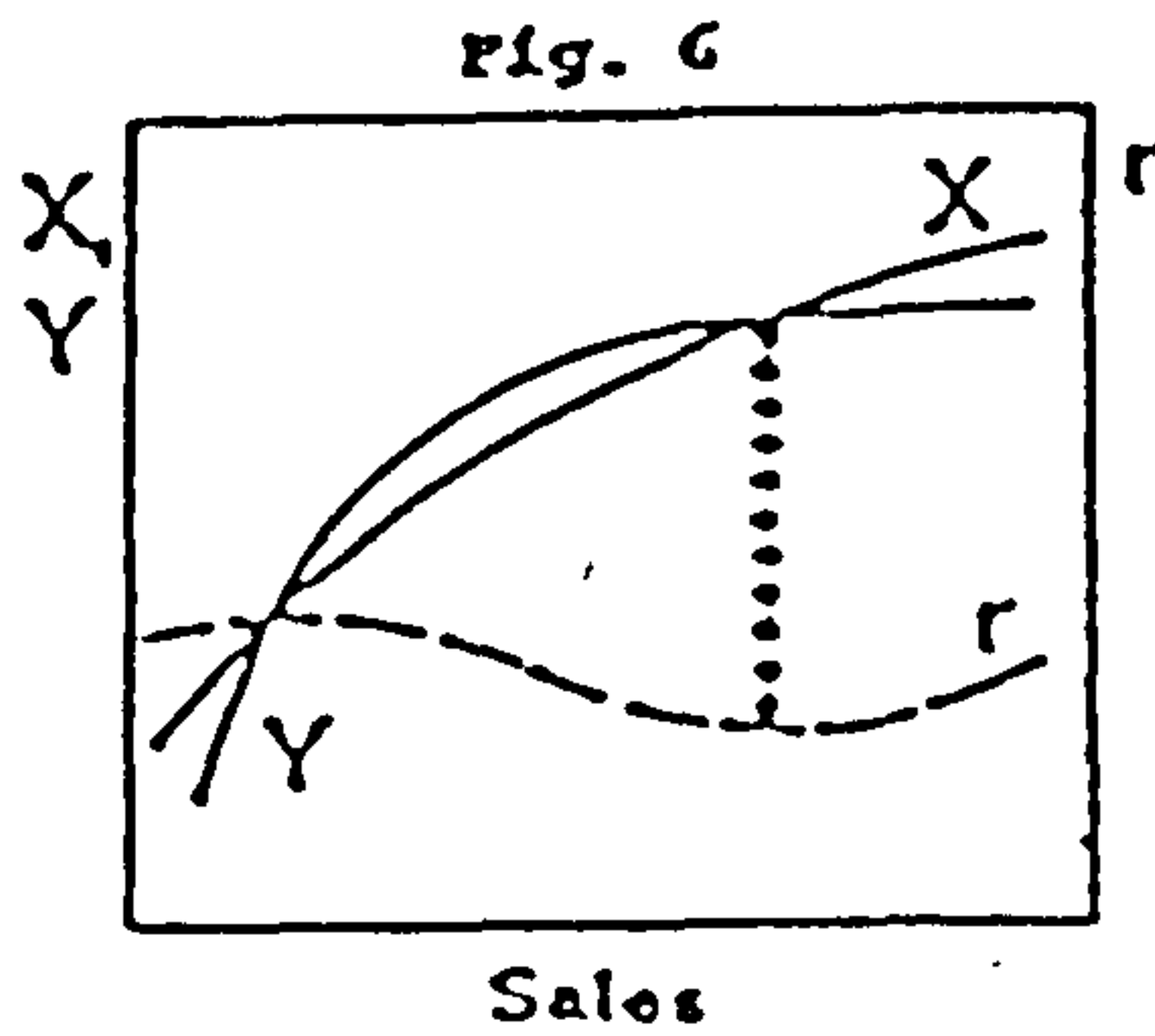
Type C - Gradual increase, followed by gradual decrease



Type D - Gradual decrease, followed by gradual increase



Type E - Gradual decrease, followed by gradual increase, followed by gradual decrease



Type F - Gradual increase, followed by gradual decrease, followed by gradual increase

Source: Lemke [1970, p.56]

individual current liabilities. For  $m$  current liabilities,

$$Y = \frac{\sum_{i=1}^m k_{ib} \cdot y_i}{\sum_{i=1}^m k_{ib}}$$

According to the assumptions, the  $x_i$ 's and the  $y_i$ 's respectively represent optimal or rational adjustments by individual current assets and current liabilities to the period's change in sales. If sales are increasing at a constant rate,  $X$  and  $Y$  will increase asymptotically towards the largest  $x_i$  and  $y_i$  respectively, i.e. the  $x$  of the current asset, and the  $y$  of the current liability, which are the most responsive to sales increases. Algebraic manipulation shows, furthermore, that the current ratio increases where  $X > Y$ , decreases where  $X < Y$ , and remains stable where  $X = Y$ . The fact that the values of  $X$  and  $Y$  rise towards an eventual asymptotic levelling off means that whatever the actual paths of  $X$  and  $Y$  - and these depend on the specific initial composition of current assets and current liabilities and on their specific degrees of responsiveness to increasing sales - only three situations can feasibly occur, thereby originating the six basic types of current ratio behaviour mentioned before and depicted in Exhibit 3.1. Either:

- $Y$  continually exceeds  $X$ , the current ratio indefinitely decreasing (Type A) or
- $X$  continually exceeds  $Y$ , the current ratio indefinitely increasing (Type B) or, still,
- the paths of  $X$  and  $Y$  intersect, thus reversing the direction of change in the current ratio (Types C, D, E and F). In the analysis the paths are considered not to intersect more than twice, since improbable composition of current assets and current liabilities would have to be assumed in order to derive them.

Even when several combinations of assumptions are released (regarding, for instance, rate of sales growth, selling price, cost and credit conditions), the behaviour of the current ratio tends to fall into one or the other of the six main patterns identified. To the extent that many different conditions can lead to identical types of current ratio behaviour, Lemke [1970, p.59] concludes that: "... changes in the current ratio do not necessarily imply the occurrence, much less



the size or direction, of changes in liquidity or managerial efficiency. Changes in the current ratio cannot therefore be interpreted in consistent fashion, even under ideal conditions".

Since the interpretation of the current ratio is so ambiguous, the usefulness of this indicator as liquidity measure is highly diminished. Some analysts have responded to this problem by suggesting that the use of the current ratio be supplemented with more stringent measures such as the quick or acid test ratio [Welsch and Anthony, 1977; Richards and Laughlin, 1980]. The idea is that the composition of the assets is more important for assessing debt-paying ability than the single working capital position [Van Horne, 1986]. Yet an analysis of the quick ratio reveals it to be as unreliable an indicator as the current ratio as far as the two main criticisms raised so far are concerned.

### 3.2.3.3 Static nature

The third major criticism refers to the static nature of the current ratio [Fadel and Parkinson, 1978]. The balance-sheet approach assumes a linear debt-paying process whereby, through the realization of current assets, current liabilities are reduced to zero at the end of the period of time in question. Yet in a going-concern context, every business is continuously engaged in an uninterrupted process of discharging existing current liabilities while at the same time incurring new ones, and in an uninterrupted process of realizing existing current assets while at the same time generating new ones by way of fresh sales [Fadel and Parkinson, 1978]. As the debt-paying process of the firm is dynamic in nature, the balance-sheet approach to the measurement of liquidity cannot be accepted as valid. As a matter of fact, three reasons exist why:

- current liabilities held by the firm at moment zero cannot be taken as representing the amount of obligations that will be maturing during period  $t$  ahead, and
- current assets held at moment zero cannot be taken as representing the amount of cash that will be available to the firm during period  $t$  [Leitch et al., 1980; Siegel, 1980].

First, the presumption of business continuity implies that current assets are not reducible to zero and current liabilities are never wholly discharged [Walter, 1957; Fadel and Parkinson, 1978]. The preservation of the business as a going concern implies, for instance, that a minimum permanent investment in trade debtors and inventories has to be maintained. Also, not all items shown on the balance sheet as cash are available for payment of maturing obligations. On the other hand, as long as sales volume is steady or rising, the payment of current liabilities tends to be a refunding or refinancing operation.

Second, in a going-concern context, funds will be available to the business during period  $t$  which are not reflected in the amount of current assets at moment zero [Walter, 1957; Coughlan, 1960]. Current assets at moment zero are only the visible source of funds for period  $t$  ahead. "Invisible" sources exist, however, which are too important to be ignored [Lim, 1979]. Similarly, obligations will mature during period  $t$  which are not contemplated in the amount of current liabilities at moment zero [Walter, 1957; Lemke, 1970].

Third, in normal conditions, even if it is assumed that the whole of current assets at moment zero will be converted into cash during period  $t$  ahead, the amount of such assets does not indicate the amount of funds about to be generated from such a source. First, because the inventory account in the balance sheet is a mixed account. To the extent that the inventory proportion of raw materials and work-in-progress is not disclosed, the inventory account provides an inflated estimate of the amount of funds that can reasonably be expected to be obtained from the sale of finished goods during period  $t$ . Second, because inventories are ordinarily recorded in the balance sheet at cost, profit margins earned on the sale of finished goods are ignored [Walter, 1957].

Of the three criticisms presented, the last is undoubtedly the most important. It questions the validity of the rationale for the use of the current ratio as liquidity measure, therefore it demonstrates the total unsuitability of the indicator as a measure of liquidity.



### 3.3 The Flow Approach

#### 3.3.1 The Measure of Liquidity

The business process involves an uninterrupted series of resource commitments for profit, the deployment of such resources being the result of a set of interrelated management decisions [Helfert, 1977]. In financial terms, business activity expresses itself in a continuum of flows of funds being transferred into and out of specialized use.

The funds flow model of a business can be depicted as a system of reservoirs and pipes through which flows are driven by the marketing effort and regulated by management using the various valves at key decision points (Exhibit 3.2). Each flow represents a resource movement and reflects a particular category of management decision. Given the importance of cash in liquidity analysis, the system can be rearranged in order to emphasize cash flows alone. In Exhibit 3.3, the firm is seen as a reservoir of liquid assets (cash and short-term marketable securities) which is continuously supplied by cash inflows and drained by cash outflows. Inlet and outlet pipes, each provided with a control valve (ZZZ), allow the circulation of cash into and out of the reservoir. The control valves regulate both the rate and the timing of the flows. The contents of the reservoir must never be allowed to fall below a minimum level<sup>(9)</sup>, given business continuity.

Exhibit 3.3 brings into focus those areas of management responsibility where decisions are taken which cause cash to flow. Simultaneously, it identifies the major sources as well as the major uses of cash<sup>(10)</sup>. In this respect, it provides a useful background for the examination of the flow approach and the understanding of the proposed measure of liquidity.

The spirit of the approach is expressed in a statement by Heath [1978, p.2], according to which the liquidity of the firm "... depends on its ability to raise cash by whatever means available to it in relation to its need for cash". For any future period of time, therefore, the measure of the firm's liquidity is provided by the

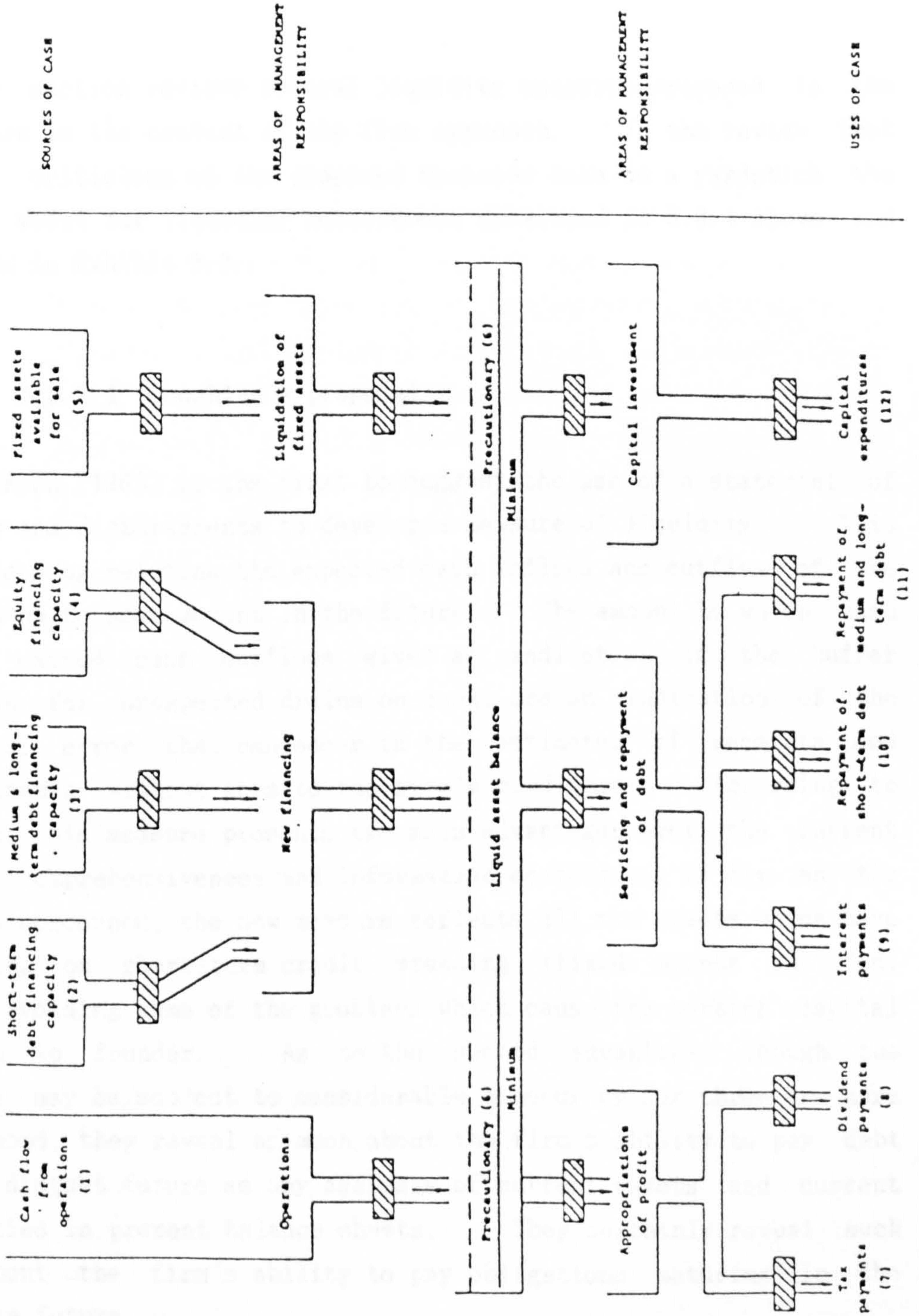






Exhibit 3.3

A "liquid asset reservoir" view of the business



relationship between the maximum cash potential capable of being generated through the firm's internal and external sources (items 1 to 6 of Exhibit 3.3), and the amount of cash needed to settle its maturing obligations (items 7 to 12 of Exhibit 3.3).

### 3.3.2 Other Liquidity Measures

This section reviews several liquidity measures proposed in the literature in the context of the flow approach. In the review that follows, criticisms of the proposed measures take as a yardstick the general model for liquidity measurement developed in 3.3.1 above and presented in Exhibit 3.3.

#### 3.3.2.1 Coughlan's proposal

Coughlan [1960] is the first to suggest the use of a statement of receipts and disbursements to develop a measure of liquidity. This is provided by relating the expected cash inflows and outflows of the business up to some moment in the future. The amount by which cash inflows exceed cash outflows gives an indication of the buffer available for unexpected drains on cash, and an indication of the margin of error that can occur in the estimates of receipts and disbursements without loss to the firm's creditors. According to Coughlan, his measure presents two main advantages over the current ratio - comprehensiveness and informative content. As far as the first is concerned, the new measure reflects all the assets which have a bearing on short-term credit standing (fixed assets included) thereby avoiding some of the problems which cause the working capital approach to founder. As to the second advantage, though the estimates may be subject to considerable inaccuracy for three or more years ahead, they reveal as much about the firm's ability to pay debt in the distant future as any analysis of current assets and current liabilities in present balance sheets. They certainly reveal much more about the firm's ability to pay obligations maturing in the immediate future.



Overall lack of detail is the major criticism of Coughlan's analysis. Although the concept of liquidity is correctly expressed, when it comes to specifying the components involved, cash inflows and outflows are mentioned in general without any identification of the different types of flows being included. Furthermore, too much emphasis put on the cash flow statement leads his analysis to disregard important components of the problem. Because he deals with cash inflows instead of cash sources, Coughlan ignores the maximum cash potential at the disposal of the firm.

### 3.3.2.2 Bierman's proposal

Bierman [1960] argues that any liquidity measure which uses only the funds<sup>(11)</sup> statement is incomplete. He suggests, therefore, a measure which combines balance-sheet items - such as current assets and current liabilities - with a funds flow item, namely the funds flow from operations<sup>(12)</sup>. This measure is, in fact, akin to the current ratio<sup>(13)</sup> with the added advantage that the difference between current assets and current liabilities is related to the ability of the firm to generate working capital through operations. The different computations of the measure are shown in Exhibit 3.4. When the funds flow from operations is positive and the current ratio is less than one, the measure reveals the number of days required to recover current liabilities net of current assets. A high ratio value then corresponds to a long recovery period and is a symptom of low liquidity. The smaller the rate at which operating funds are generated, the larger the impact of any excess of current liabilities over current assets on the firm's debt-paying ability. However, computing the measure in the case of a firm where the funds flow from operations is positive and the current ratio is greater than one, is meaningless. In these circumstances, a high ratio value may be either the result of a large excess of current assets over current liabilities, a sign of high liquidity, or the result of a small rate of funds flow generation, a sign of low liquidity. Yet the measure regains its significance if the firm has been losing rather than generating funds from its operations and its current ratio is greater than one. It then indicates the number of days supply of current assets on hand, with a high value for the ratio reflecting a high

Exhibit 3.4

Measuring liquidity - Bierman's proposal

Proposed measure		Meaning
Assumptions	Computation	
<p>The funds flow from operations is positive and the current ratio is less than one</p>	$\frac{\text{Current liabilities} - \text{Current assets}}{\text{Funds flow from operations}} \times 365 \text{ days}$	<p>Required days to recover current liabilities net of current assets</p>
<p>The funds flow from operations is negative and the current ratio is greater than one</p>	$\frac{\text{Current assets} - \text{Current liabilities}}{\text{Funds flow from operations}} \times 365 \text{ days}$	<p>Supply of net current assets in days</p>
<p>The funds flow from operations is positive and the total liabilities net of current assets are positive</p>	$\frac{\text{Total liabilities} - \text{Current assets}}{\text{Funds flow from operations}} \times 365 \text{ days}$	<p>Required days to recover total liabilities net of current assets</p>



liquidity situation. The measure becomes meaningless again when a current ratio of less than one develops in association with a negative funds flow from operations. Finally, the measure can be turned into an indicator of the impact of long-term debt on the liquidity of the firm, if total liabilities instead of current liabilities are incorporated in its computation.

Although the measure proposed by Bierman takes into account a dynamic element - the operating funds flow - it still treats liquidity as a function of stocks of assets and liabilities. In this respect, the measure does not represent a complete breakaway from the principles of the balance-sheet approach, and is liable therefore to the same criticisms as the current ratio as liquidity measure.

### 3.3.2.3 The interval measures

The "interval measure" proposed in Sorter and Benston [1960] is intended to evaluate the stock of defensive assets of a firm under the assumption of a complete cessation of sales revenue. It is expressed by the formula:

$$\frac{\text{Defensive assets}}{\text{Projected operating expenditures}} \times 365 \text{ days}$$

Defensive assets are those held by the firm which can be converted into uncommitted purchasing power without any decrease in normal production. Included in this category are cash, marketable securities and accounts receivable. Prepaid expenses and inventories of raw materials and work-in-progress are excluded on the basis that normal production implies the maintenance of their level. Also excluded are inventories of finished goods, since their realization is dependent upon the continuation of sales.

In order that a measure of the firm's debt-paying ability may be obtained, defensive assets are related to the operating uses for which they are required. In contrast to the current ratio however, it is not the amount of current liabilities which is matched against the availability of assets but the amount of operating expenditures expected to occur during the period of analysis. In fact the firm's

average level of current liabilities will be continually renewed and no disbursement of defensive assets will be necessary given business continuity. Yet the actual level of current liabilities at any given date may differ from their average level. In this case, an adjustment of defensive assets for the difference between actual and average liabilities needs to be made. Expected operating expenditures, however, is the item to be met by either adjusted or unadjusted defensive assets.

As to the informative content of the interval measure, the authors explain that the measure indicates the defensive position of the firm, since it relates the company's present ability to pay its debts to the debts it will have to pay in the near future. Specifically, it shows the number of days the company can continue to operate on its projected normal scale without having to resort to additional financing, despite a complete cessation of inflows from sales. This concept is expanded in the same article in order to permit the appraisal of the firm's debt-paying ability under a variety of conditions. As a result, a whole family of interval measures comprising the "basic interval" and four related ones - the "no credit interval", the "cash interval", the "reduced sales interval", and the "reduced operations interval" - is identified. This is presented in Exhibit 3.5.

Sorter and Benston [1960] further compare the interval measure with the current ratio. Their argument in favour of the former as a better measure of the firm's debt-paying ability is based on three observations:

- the adjusted "basic interval" is completely immune from any "window dressing";
- current assets are not the same as defensive assets; hence they do not reflect the amount of money the firm has on hand to pay its maturing obligations;
- current liabilities do not indicate the firm's need for defensive assets; the assumption that the need for defensive assets is correctly measured by a multiple of current liabilities would be valid only if a functional relationship existed between the firm's projected operating expenditures and



Exhibit 3.5

Measuring liquidity - The interval measures

Interval measures	Computation	Meaning
"Basic interval" Unadjusted - Adjusted	$\frac{\text{Defensive assets}}{\text{Projected operating expenditures}} \times 365 \text{ days}$ $\frac{\text{Defensive assets} - \text{Actual current liab.} + \text{Average current liab.}}{\text{Projected operating expenditures}} \times 365 \text{ days}$	<ul style="list-style-type: none"> <li>Number of days the company can continue to operate on its projected normal scale, despite a complete cessation of inflows from sales</li> </ul>
"No credit interval"	$\frac{\text{Defensive assets} - \text{Current liabilities}}{\text{Projected operating expenditures}} \times 365 \text{ days}$	<ul style="list-style-type: none"> <li>Id. as above and assuming that the company will no longer be able to obtain short-term credit</li> </ul>
"Cash interval"	$\frac{\text{Cash} + \text{Marketable securities}}{\text{Projected operating expenditures}} \times 365 \text{ days}$	<ul style="list-style-type: none"> <li>Number of days the company can continue to operate on its projected normal scale, despite a complete cessation of inflows from sales and from collection of outstanding receivables</li> </ul>
"Reduced sales interval"	$\frac{\text{Defensive assets}}{\text{Projected operating expenditures} - \text{Expected operating receipts}} \times 365 \text{ days}$	<ul style="list-style-type: none"> <li>Number of days the company can continue to operate on its projected normal scale, should sales decline less than 100%</li> </ul>
"Reduced operations interval"	$\frac{\text{Defensive assets}}{\text{Projected operating expenditures} - \text{Savings on operating expenditures because of reduced operations}} \times 365 \text{ days}$	<ul style="list-style-type: none"> <li>Number of days the company can survive a depression or recession, assuming that it will reduce its operations in response to the cessation of revenues from sales</li> </ul>

its current liabilities. Since this would require that the firm had the same disbursement pattern for all its expenditures, the possibility that current liabilities may be a good proxy for projected expenditures is quite unlikely.

Empirical evidence of the comparative behaviour of the interval measure and of the current ratio is provided by Davidson et al. [1964]. The evidence reveals that the interval measure and the current ratio give divergent impressions of the movement and size of a firm's liquidity. This analysis, however, simply indicates that the two measures portray distinct pictures of a firm's debt-paying ability - it does not reveal which of the two is a better measure of liquidity. In fact, support for one measure over the other can be justified only on theoretical grounds. This is precisely the attitude adopted by Sorter and Benston [1960] and eventually also by Davidson et al. [1964]. The latter, in particular, give their preference to the interval measure inasmuch as this seems to provide more meaningful and logical information, at the same time that it allows more informed value judgements than does the current ratio. Furthermore, the interval measure appears to be more consistent over time than the current ratio, which suggests that it better reflects company policy with regard to working capital management.

Since it focuses attention upon the relationship between sources of cash and cash uses, the interval measure appears to be a valid measure of liquidity. Yet set against the general model depicted in Exhibit 3.3 it reveals its limitations, given that it takes into account only some of the components involved in the evaluation of the debt-paying ability of the firm. Excluded among cash sources are the firm's debt and equity financing capacities and the fixed assets available for sale. Excluded among cash uses are the payments associated with taxes, dividends and interest, and the payments associated with retirement of debt and capital expenditures. In reality, the only components brought into the analysis are the liquid asset balance and the cash flow from operations. In this context it may be argued, furthermore, that the interval measure is unrealistic since it rests on the unlikely assumption of a complete cessation of revenues from sales. Also unlikely is the assumption that under



such conditions a company would not or could not reduce its projected operating expenditures. Sorter and Benston [1960] anticipate such a criticism. They defend the applicability of the measure in seasonal businesses where it may be advantageous to equalize production despite the absence of revenue during the low season, and in businesses in general where the reduction of expenditures in response to decreased revenue cannot occur instantaneously. In both cases, the interval measure indicates the duration of the lag those companies can support without additional financing. The authors, nevertheless, take care to emphasize that the assumptions in question merely offer a basis for analysis. In fact they are relaxed in other interval measures where broader conditions are contemplated. Despite this, it is difficult to deny that interval measures assume company performance in too narrow conditions to be of general, or even wide, significance [Lemke, 1970]. They have, therefore, little relevance to the typical situation of a firm where sales revenue is the normal and primary source of funds [Fadel and Parkinson, 1978]. Overcoming this deficiency would entail recognition that receipts from expected period sales would have to be added to defensive assets in the numerator of the measure.

#### 3.3.2.4 The liquidity flow-indices

More recently, Lemke [1970] suggested a new measure of debt-paying ability - the liquidity flow-index. For any period of time, this is given by the following equation:

$$\frac{\text{Practical maximum rate of outflow}}{\text{Required rate of outflow}} \quad \text{where,}$$

- the practical maximum rate of outflow is defined as the total amount of cash available per unit of time to meet required obligations without drawing on external funds or prejudicing operating efficiency; and,
- the required rate of outflow is defined as the amount of obligations falling due for payment per unit of time.

The former consists of the total operating receipts for the period plus the opening liquid asset balance less the closing liquid asset balance necessary to the efficient conduct of future operations. The latter includes obligations arising from operating expenditures as well as from taxes, servicing and retirement of debt, and capital expenditures.

Given that the concept of creditworthiness is future-oriented, the constituents of the index will have to be estimated, the projected liquidity flow-index becoming the ratio of the projected practical maximum rate of outflow to the projected required rate of outflow. Reliable information being available, the projected liquidity flow-index measures for any given degree of earnings volatility, the margin of ease or difficulty with which the firm expects to meet its maturing obligations in the normal course of business under expected operating conditions. From a different point of view, the index also measures the firm's general ability to withstand financial difficulties.

In relation to the current ratio, the projected liquidity flow-index is a more meaningful measure, not only because it embodies a going-concern concept of debt-paying ability, but also because any increase (decrease) in the index can always be consistently interpreted as an improvement (deterioration) in liquidity. In relation to other measures proposed in the literature (e.g. the interval measures), the projected liquidity flow-index represents a more comprehensive measure of liquidity. According to Lemke, however, the index has two major limitations. First, the projected liquidity flow-index is difficult to compute by external analysts since company reporting of projected cash flow data is uncommon. Second, computation of the index based on periodic data hides intraperiod fluctuations. Yet this limitation assumes less importance because a satisfactory index for the period under consideration may be interpreted as an indication that any intraperiod embarrassment will not be excessively prolonged.

Another measure referred to by Lemke [1970] is the emergency liquidity flow-index. If, in order to meet an emergency, one assumes that precautionary cash balances can be drained, external uncommitted funds can be obtained, or inventory or other assets can be



sold, then, the resultant total amount of cash available per unit of time is the emergency maximum rate of outflow. Relating this to the required rate of outflow leads to the emergency liquidity flow-index, and on a projected basis, to the projected emergency liquidity flow-index. In Lemke's argument, however, emergency indices are of little interest because they "... tend to look at liquidity from the point of view of liquidation of the firm or of its survival under dire circumstances, rather than from the more generally interesting and relevant point of view of the firm's ability to take adversity in its stride" [Lemke, 1970, p.66]. Here lies the major criticism of Lemke's work. Indeed, it does not appear that the emergency index measures liquidity from a liquidation or technical insolvency viewpoint just because it takes into account other cash available to the firm besides that generated from operations. Provided the minimum asset levels necessary to the continuation of expected operations are safeguarded, what the emergency index really represents is the maximum cash potential which for any period of time is available to the firm without risking the preservation of the business as a going concern. This being so, and contrary to what Lemke suggests, it is the emergency index, of the two indices proposed, which is the most relevant indicator of the firm's capacity to withstand financial difficulties while remaining technically solvent. A few minor points in Lemke's work can still be the object of criticism, such as his own perception of the notion of precautionary cash balances, and the fact that dividend obligations are ignored in the index.

### 3.3.3 The Resources of Liquidity

This section is the result of an attempt by the author to integrate Donaldson's concept of "resources of mobility" [1969a; 1969b] with the concept of liquidity measure as proposed in the flow approach.

Modern management theory places great emphasis on corporate planning. This consists of specifying the desired future of the organization as well as the means of achieving it [Ackoff, 1970].

Setting the organization's objectives, therefore, is one of the most important aspects of corporate planning. The achievement of corporate objectives, however, depends on funds being available to management to implement the necessary strategy [Jaedicke and Sprouse, 1965]. This fact directs attention to the role of the cash flow plan. Once corporate objectives and associated action as well as the implications of past and future corporate policies have been translated into financial terms, the cash flow plan - by anticipating the pattern of release of funds from, and of commitment of funds to the various specialized uses - provides an estimate of future cash flows, both as to amount and timing. Furthermore, the cash flow plan - by identifying those occasions when a surplus or shortage of cash may be expected - allows early steps to be taken to employ the surplus or to cover the deficit. Overall, the cash flow plan ensures that expected cash outflows are timely matched by proper amounts of cash inflows, and that this is done in a manner consistent with the fulfilment of corporate objectives and the non-violation of the boundaries set by the established financial policies of the firm. As such, it is the instrument that ensures funds flow equilibrium under future expected conditions. In so doing, the cash flow plan sets the basis for preserving future corporate solvency and, therefore, corporate continuity.

Given the importance of specifying magnitude and timing of expected cash flows, companies tend to develop rather detailed cash flow plans (or pro-forma cash flow statements) for periods up to one year or more ahead. Detail is usually reflected both in terms of dimension of the intervals of division used over the planning period and in terms of degree of decomposition of the expected cash flows. A representation of a cash flow statement is shown in Exhibit 3.6 using aggregate flows rather than an itemization of the components involved. The reason for this lay-out is to maintain comparability with Exhibit 3.3. The assumption of a going concern implies that, for any planning period  $t$ , the total amount of cash outflows anticipated to be required under expected conditions (i.e. the firm's "expected total cash plough-back") will have to equal the total amount of cash inflows expected to be internally and externally generated by the company (i.e. the firm's "expected total cash gearing"). In most circumstances, this is less than the maximum cash potential



Exhibit 3.6

Representation of a cash flow statement in terms of aggregate flows

Total cash gearing						
Internal cash inflow			External cash inflow			
Cash inflow from operations *	Decrease in precautionary liquid assets	Liquidation of fixed assets	Increase in short-term debt	Increase in medium & long-term debt	Increase in equity	Other cash inflows
Total cash plough-back						
Internal cash outflow		External cash outflow				
Capital expenditures	Increase in precautionary liquid assets	Tax, dividend and interest payments *	Repayment of short-term debt	Repayment of medium & long-term debt	Other cash outflows	

\* It is assumed in this representation that:  
 - the cash flow from operations is positive which means that it represents a cash inflow;  
 - taxes, dividends and interest represent cash outflows.  
 Had the assumptions been the opposite, the cash flow from operations would have been included instead in the firm's total cash plough-back. As to taxes, dividends and interest, they would have been included in the firm's total cash gearing.

Source: Adapted from Lee [1982]

capable of being generated under expected conditions during the same time span. The difference between the latter and the former identifies the liquidity of the firm for the planning period.

Since actual cash flows invariably deviate from expected cash flows, liquidity is viewed as the firm's safety margin or buffer against unexpected cash shortages or financial needs. Furthermore, these may be the result of either favourable or unfavourable change in the external or internal environment of the company. Liquidity, therefore, is as much an opportunity buffer that allows the firm to take advantage of unexpected profitable investment opportunities (e.g. major price changes, industry boom, acquisition, new product line, etc.), as an emergency buffer that allows the firm to withstand unexpected crises (e.g. industry recession, introduction of a new product by a competitor, etc.) [FASB, 1980; Emery and Cogger, 1982].

The resources which constitute this margin are the instrument of management's capacity to act in response to such financial needs. They are the resources of liquidity. Moreover, they indicate to the firm the margin of technical solvency. This means that only those resources which the firm can deploy without incurring abnormally high and competitively prohibitive costs are taken into account in the evaluation of the margin. Resources proceeding from forgoing unexpected profitable investment opportunities, disrupting corporate objectives (e.g. selling productive assets, giving up planned capital expenditures, etc.), or violating the boundaries set by the established financial policies of the firm (e.g. borrowing beyond some safety threshold, cutting back planned dividend payments, etc.) are consequently excluded. Resources such as these are theoretically resorted to only when no other alternative is left available to the firm. They set the margin of technical insolvency [Campbell, 1979; Backer and Gosman, 1980; Emery and Cogger, 1982].

When confronted with an unexpected financial need, management may either commit reserves or implement modifications of planned operating cash flows. The characterization of the resources of liquidity starts with the analysis of the reserves, followed by an analysis of the modifications of planned operating cash flows. The works by Donaldson [1969a; 1969b], Heath [1978] and the FASB [1980] provide



the basis of analysis.

### 3.3.3.1 Reserves

The reserves which are available as resources of liquidity are found among the economic and financial resources of the business at the beginning of the planning period.

Economic resources are defined as the various tangible assets of the firm which represent a past allocation of financial resources to specialized use in the interests of future income generation. Short-term marketable securities are excluded from this category as they are considered the equivalent of cash. Since inventories are dealt with in 3.3.3.2, the economic resources are confined here to the fixed assets (investments, property, plant and equipment) of the firm.

Provided there are no restrictions on sale imposed by debt and other agreements, fixed assets are always within reach for alternative use. This may sound surprising inasmuch as liquidation of most fixed assets impairs the earning power of the business in a direct or indirect<sup>(14)</sup> way. In some cases, it may even put at risk the very existence of the firm. Yet there is nothing wrong if a company decides to finance some new capital investments by liquidating some of its existing earning capital commitments, provided these can be sold without disruption of the operation of the whole business. What has to be emphasized is that any decision to phase out an earning portion of the business - whether this may involve selling a complete division, a segment of operations, or selling and leasing back plant and equipment - should always be based on long-term considerations of alternative use of the resources. In this respect, an estimate of the liquidation value of the assets is essential to evaluate the return on investment by which their desirability as an investment is being judged. As one businessman said, Heath [1978, p.22] quotes, "everything in [the] company is for sale if the price is right". In short, earning assets are mobile but their mobility is conditional, which limits the role they can play as resources of liquidity. Only non-earning assets enjoy unconditional mobility.

Financial resources are defined as those resources by means of which the firm may have access to additional human, technological and economic resources. They comprise the liquid asset balance of the firm, accounts receivable, and the company's debt and equity financing capacities. Accounts receivable are dealt with in 3.3.3.2. With the exception of the minimum level of cash and short-term marketable securities, both the precautionary liquid asset balance and the firm's financing facilities are mobile in the sense that they are available for alternative use. The availability of medium/long-term debt and equity financing, however, is conditional on the purpose for which the funds are intended.

The economic and financial resources of the business identified as mobile include, resources to which the business has legal title (internal), and resources to which it has access outside the firm (external). Ownership is thus not a prerequisite of resource mobility. Furthermore, while some mobile resources are immediately available (instant), others involve some negotiation before becoming fully accessible (negotiable). Unlike the former, the latter are subject to a time and an uncertainty constraint. The time constraint implies that an interval is required to convert the resources into alternative use. The uncertainty constraint implies that an element of judgement is involved in ascertaining both the timing and the magnitude of their potential purchasing power equivalent.

Because they are reserves, the economic and financial resources of the business identified as mobile can be portrayed as a finite quantity at any point in time. If, at the beginning of the planning period, one excludes:

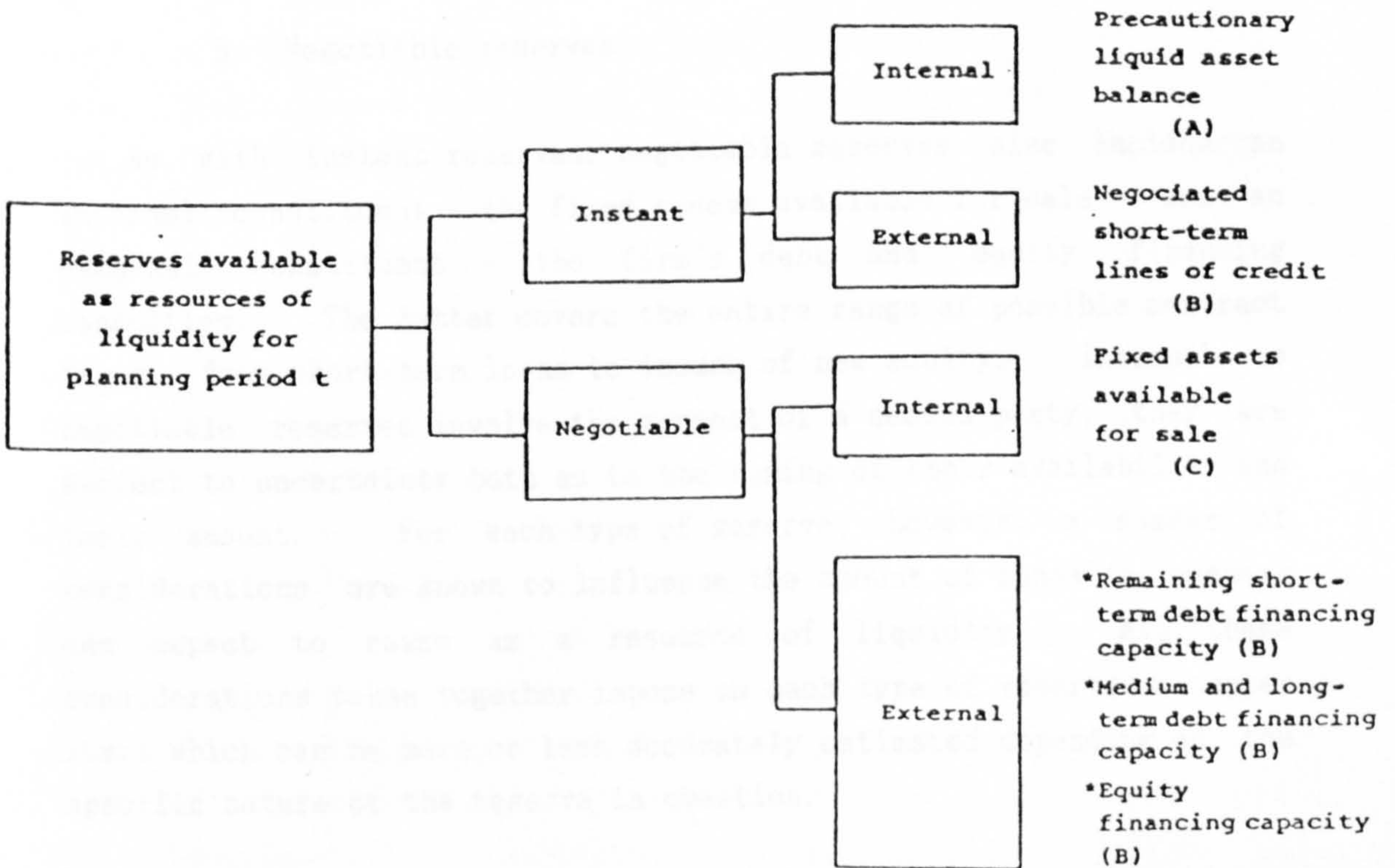
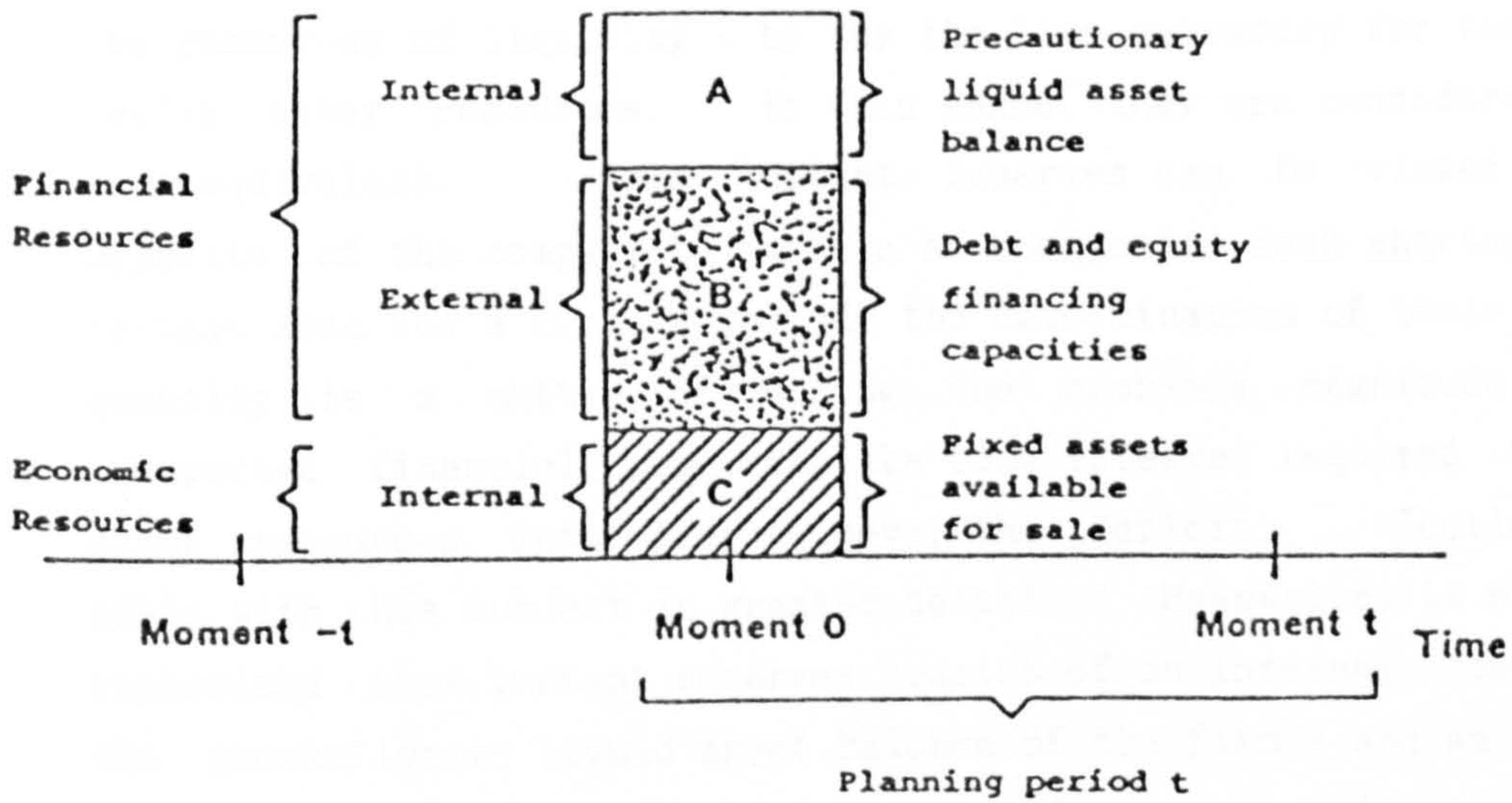
- first, the proportion of reserves which are not expected to be available for alternative use within the period, and
- second, the proportion of reserves which are to be deployed during the period under expected conditions,

one is left with the amount of reserves which, for that time span, are at the disposal of the firm as resources of liquidity (Exhibit 3.7).



Exhibit 3.7

Reserves available as resources of liquidity for planning period t



Source: Adapted from Donaldson [1969b, pp.64 & 68]

## A. Instant reserves

Due to their characteristics (immediate availability, complete certainty, no restriction as to use, and direct accessibility by the finance officer), the instant reserves serve a unique purpose among the resources of liquidity - to buy the time necessary for the firm to deploy other resources. In this sense, they are considered as a time-equivalent. Since instant reserves can be viewed as the capacity of the company to sustain an unexpected cash shortage of a certain size for a certain period, the determination of their optimal quantity is a matter of judging the probable magnitude of the unexpected financial need, and the time interval required to bring other resources into play to cover the deficit. Section 3.3.4 deals with this subject in greater detail. Meanwhile, it should be emphasized that instant reserves consist of an internal component - the precautionary liquid asset balance of the firm - and an external component - represented by its negotiated short-term lines of credit (Exhibit 3.7).

## B. Negotiable reserves

As with instant reserves, negotiable reserves also include an internal constituent - the fixed assets available for sale - and an external constituent - the firm's debt and equity financing capacities. The latter covers the entire range of possible contract forms, from short-term loans to issues of new equity. Inasmuch as negotiable reserves involve the consent of a second party, they are subject to uncertainty both as to the timing of their availability and their amount. For each type of reserve, however, a number of considerations are known to influence the amount of funds a company can expect to raise as a resource of liquidity. All these considerations taken together impose on each type of reserve an upper limit which can be more or less accurately estimated depending on the specific nature of the reserve in question.



### 3.3.3.2 Modifications of planned operating cash flows

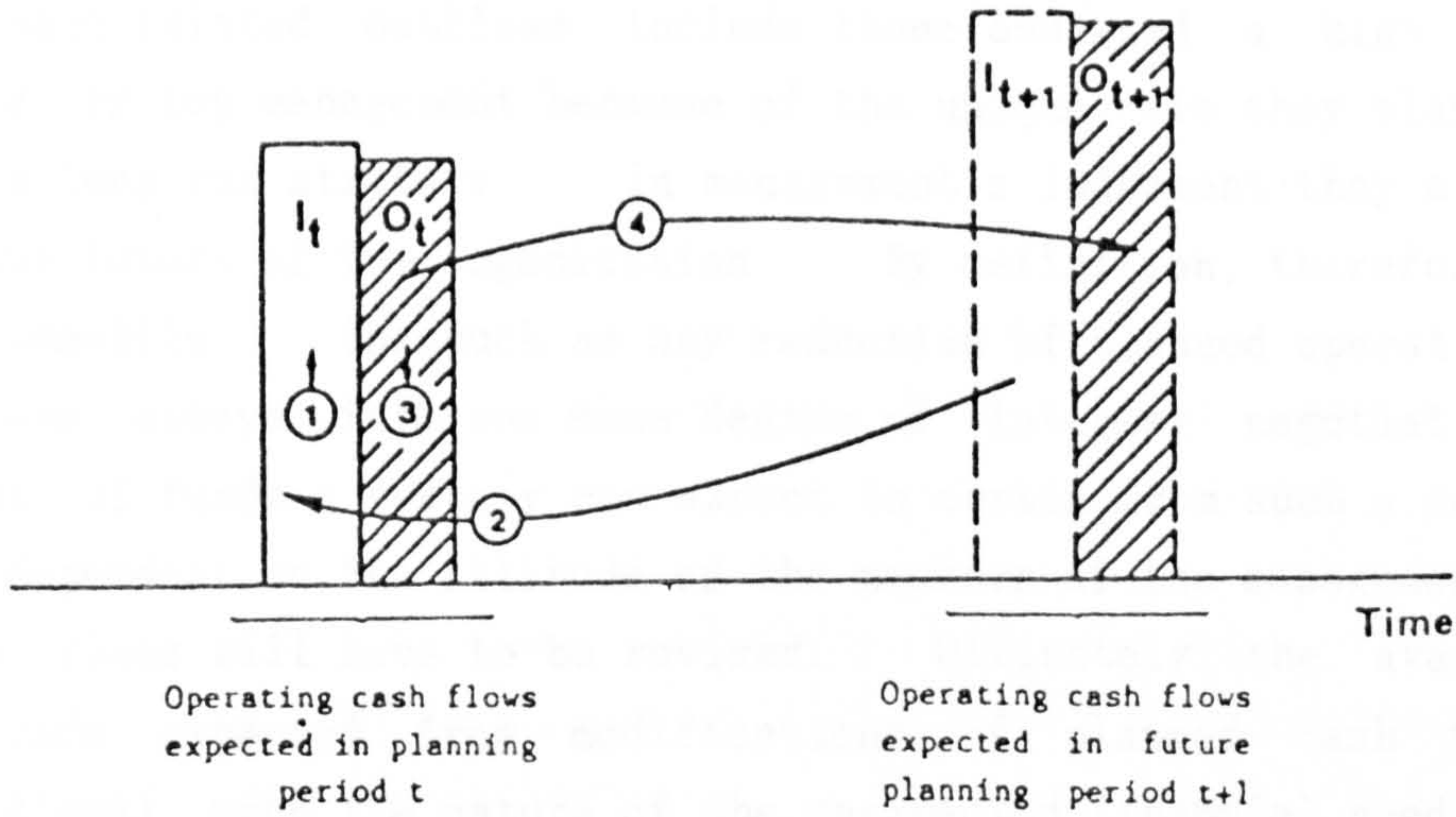
Resources of liquidity other than reserves include modifications of planned operating cash flows. These flows proceed from the resources expected to accrue during the planning period or even beyond.

The modifications of planned operating cash flows comprehend four basic types of action (Exhibit 3.8). Types 1 and 2 imply the increase of operating cash inflows expected in period  $t$  - the former by adding new cash inflows proceeding from increasing sales revenue in period  $t$  (e.g. either by increasing the unit sales price or by increasing sales volume through a scheme of price reductions and rebates), the latter by anticipating cash inflows related to period  $t$  income but expected in a future period (e.g. by shortening customers' credit period or by factoring or sale of receivables). Types 3 and 4 imply the reduction of operating cash outflows expected in period  $t$ . These outflows may simply be curtailed (type 3) or, alternatively, they may be postponed to a later period (type 4). The latter may be appropriate for cash outflows relating to future period income (e.g. a market development outlay), or relating to period  $t$  income provided deceleration of outflows is achieved (e.g. by lengthening suppliers' credit period).

The amount of funds a company can expect to generate from these modifications depends on a number of factors. Increasing planned operating cash inflows depends on the demand for the firm's output (including price elasticity), on the age and composition of the firm's inventory, on the responsiveness of sales volume to changes in credit conditions, on the age and composition of accounts receivable, etc.. Reducing planned operating cash outflows depends on the extent to which they are discretionary in nature. This, in turn, depends on whether cash outflows are identified as volume, scale, or strategic-related. Curtailment of volume-related outflows is conditional upon the coincidence of the unexpected financial need with a decline in sales, and limited to the extent of the sales decline. An exception is made in the case of outflows dictated by the production plan of the firm. Where buffer stocks of inventories have been accumulated, production can be slowed down independently of any decline in units

Exhibit 3.8

Basic types of action comprehended in the modifications of planned operating cash flows



- |   |  |
|---|--|
| 1 New additions to operating cash inflows expected in period $t$  | 3 Curtailment of operating cash outflows expected in period $t$  |
| 2 Anticipation of operating cash inflows expected in period $t+1$ | 4 Postponement of operating cash outflows expected in period $t$ |

Source: Adapted from Donaldson [1969b, p.69]



sold. Scale-related outflows are roughly defined by the size of the business. Since currently planned sales and earnings are largely unaffected by sizable changes in scale-related outflows, there is usually some room for curtailment or postponement of these outflows. Scale-related outflows associated with administrative overheads are the ones which normally enjoy the largest mobility. Finally, strategic-related outflows include those assigned a high priority rating by top management because of the unique role they play in the firm's long-run strategy. In management's judgement they are vital to the future of the organization. By definition, therefore, they are immobile. Inasmuch as any reduction of planned operating cash outflows always involves some degree of internal negotiation, the amount of funds a company can expect to obtain from such a source is also dependent on the attitude of the members of the management group whose plans will have to be revised. Ultimately, the availability of funds expected from modifications of planned cash flows is conditional upon the nature of the unexpected financial need itself. For instance, funds that might be released from reducing customers' credit period will not be available in case an industry-wide recession develops and the firm is forced to give easier credit terms in order to reach the expected activity level. On the other hand, more funds will be available from the production schedule of the firm if the actual level of activity happens to be lower than the expected level. Also, inasmuch as the appearance of unexpected cash shortages may change corporate priorities, funds may become available from modifications of planned cash outflows initially viewed as immobile. In this regard, marketing and R & D outflows originally identified as strategic-related may cease to be so considered, consequently becoming mobile. Marketing outflows identified as scale-related may also have their expenditure horizon extended, or to the extent that capital expenditures represent the implementation of strategic decisions, a change in corporate priorities may lead to cuts or postponement of planned capital outlays. The main difficulty here lies with how quickly the stream of outflows can be arrested. Likewise, where the unexpected financial need is accompanied by a material decline in earnings, the option is open for a change in the firm's dividend policy. A sharp reduction in planned dividend payments can represent a significant source of funds for the company.

Overall, the modifications of planned operating cash flows are inherently subject to a time constraint. Furthermore, they are subject to an uncertainty constraint which makes any assessment of the amount and timing of the funds likely to be released from them a delicate and judgemental issue.

### 3.3.4 The Instant Reserves

Because of the significance of instant reserves among the resources of liquidity, the determination of the amount of such reserves a company should hold is of crucial importance.

In a recent study, Emery and Cogger [1982] develop an expression to measure the likelihood that a firm exhausts its instant reserves and becomes technically insolvent. For the purpose, they model a firm's provisions for meeting its very short-term obligations (i.e. its immediate liquidity) as a stochastic process. Three assumptions underlie their model, namely that:

- there is a time horizon ( $T$ ) over which a firm's immediate liquidity is a matter of concern. The length of this time horizon varies from firm to firm, but it should correspond to the time interval necessary to activate resources other than instant reserves. This implies that the instant reserves held at the beginning of the time horizon ( $L_0$ ) constitute the only stock of resources that are available to meet cash requirements during the period. Additional resources during the time horizon can be obtained only by incurring abnormally high and competitively prohibitive costs, i.e. by becoming technically insolvent;
- a firm's periodic net cash flows are independent, identically distributed random variables<sup>(15)</sup>. Instant reserves are reduced/increased by the negative/positive net cash flows that occur during the time horizon;
- instant reserves are allowed to fluctuate randomly during the time horizon as long as they remain positive. This means that management intervenes in the process during the time horizon



only if instant reserves are exhausted - otherwise they are adjusted only at the beginning of each time period.

According to Emery and Cogger, these assumptions permit the description of a firm's immediate liquidity as a Wiener process beginning at  $L_0$  with a single absorbing barrier at the origin. Under these conditions, the probability that the firm will become technically insolvent during period  $T$  is given by the following distribution function:

$$F(T) = \underbrace{[(-L_0 - \mu T)/\sigma\sqrt{T}]}_{(1)} + \exp[-2\mu L_0/\sigma^2] \underbrace{\Phi[(\mu T - L_0)/\sigma\sqrt{T}]}_{(2)} \text{ where,}$$

$\Phi[.]$  is the normal distribution function, and  $\mu$  and  $\sigma^2$  respectively are the mean and variance of net cash flow per unit of time.  $T$  is given in units of time.

The equation is composed of two terms. Term (1) indicates the probability that the firm will become technically insolvent at the end of period  $T$  regardless of its condition prior to that moment. Term (2) indicates the probability that the firm will become technically insolvent prior to end of period  $T$ . These probabilities tend to move together, i.e. firms with a high/low likelihood of insolvency on day  $T$  also tend to have a high/low likelihood of insolvency prior to day  $T$ .

Manipulation of  $F(T)$  reveals that the function enjoys some intuitively appealing properties. First, it is nondecreasing in  $T$  which implies that the longer the time horizon over which management cannot bring other resources into play, the more likely is technical insolvency. Second, it is monotone decreasing in both  $L_0$  and  $\mu$  but increasing in  $\sigma^2$ . The larger the firm's initial stock of instant reserves, and the larger the net cash flows of the firm, the smaller the likelihood of technical insolvency; yet, the more uncertain the firm's net cash flows, the greater the likelihood<sup>(16)</sup>.

$F(T)$  may be used directly or indirectly to compare liquidity across firms; directly, inasmuch as the smaller the value of  $F(T)$ , and therefore the smaller the probability of technical insolvency, the more likely the firm is to remain liquid throughout the period;

indirectly, through  $\lambda$  - a statistic or index which is given by the expression:

$$\lambda = (L_0 + \mu T) / \sigma \sqrt{T},$$

this being the negative of term (1) of the  $F(T)$  equation. A complementary study of the behaviour of  $F(T)$  and  $\lambda$  by the authors for a sample of 30 hypothetical companies with widely varying values for  $T$ ,  $L_0$ ,  $\mu$  and  $\sigma$  revealed that rankings of liquidity position based on  $F(T)$  were not significantly different from rankings based on  $\lambda$ . The index seems thus to retain most of the information about liquidity contained in  $F(T)$ , lower values for  $\lambda$  corresponding to increased probabilities of technical insolvency. As such,  $\lambda$  may be used as a substitute for  $F(T)$ , though on its own, it is not sufficient for providing the overall probability of technical insolvency of the firm.

Other approaches are found in the literature which approximate to that developed by Emery and Cogger. Walter [1957], for instance, proposes a procedure for the determination of technical solvency which may be interpreted as an exact description of  $\lambda$ . He states [p.43]: "The appropriate topic for discussion [in technical solvency determination] appears, rather, to be whether prevailing cash inflows (plus cash resources) cover existing cash outflows by a sufficient margin to protect against possible reductions in inflows or increments in outflows". In other words, "the primary intent in measuring technical solvency is ... to ascertain the extent to which possible deviations from expected outcomes are covered. The analysis thus reduces approximately to a comparison between these deviations and cash items plus the excess of net cash flows over inflexible non-expense items" [Walter, 1957, p.41]. Other authors explicitly set forth other methods of comparing liquidity across firms. These methods are founded on the theory of stochastic processes and share the assumption that a firm's instant reserves behave as a random walk. However, while authors such as Tinsley [1970] and Wilcox [1971; 1973] suggest methods which use a Gambler's Ruin perspective of failure, others such as Vinso [1979] develop methods which consider the dynamics of a firm's operation and its likely ability to sustain continued functions of the firm. In this perspective, Vinso [1979] produces a safety index that is related to the firm's maximum risk of ruin. As shown in Emery and Cogger [1982], the measures obtained by



Tinsley and Wilcox may be derived from  $F(T)$  whereas Vinso's measure is a special case of  $\lambda$  when the net cash flow distribution is symmetrical.

A basic limitation of the group of studies above is that they only provide ways of assessing relative liquidity. In order to assess absolute liquidity and, therefore, to determine the amount of instant reserves a company should hold, studies of this kind ought to involve considerations of the risk-return trade-off associated with various levels of instant reserves. As demonstrated in Cogger et al. [1981], the lower a firm's stock of instant reserves, *ceteris paribus*, the greater its likelihood of technical insolvency. On the other hand, the higher a firm's stock of instant reserves, the higher the opportunity cost associated with the holding of such reserves. Van Horne [1969] identifies three methods whereby a firm can select the appropriate amount of instant reserves to hold. In the first method, the solution is determined by balancing the risk of running out of cash against the cost of providing a solution to avoid such a possibility. The optimal amount of instant reserves for a firm is, therefore, the one that equates the expected cost of a cash stockout with the opportunity cost associated with the holding of that particular amount. The expected cost of a cash stockout can be defined as the cost of such a stockout times its probability of occurrence. Yet because the cost of technical insolvency presents measurement problems, this method is seldom used in practice. A more straightforward approach suggests the specification of a risk tolerance for running out of cash. Given an acceptable level of risk, the firm can then seek the least costly solution to reducing the probability of running out of cash to that level. Finally, the third method suggests the formulation of risk tolerances on the basis of the opportunity cost involved in reducing the risk of a cash stockout to various tolerance levels. Since it shows the least costly solution to reducing risk to various levels, this method allows a better evaluation of the risk-return trade-off.

### 3.4 Summary

Two major approaches to the measurement of liquidity are advocated in the literature.

In the balance-sheet approach, the relationship between a company's current assets and current liabilities is typically used to measure liquidity. The use of the current ratio as liquidity measure rests on the basic premise that a) current liabilities represent the amount of cash needed by the firm for the period of time concerned, and b) current assets, being the source from which the former are paid, represent for the same period the amount of cash available to the firm. Liquidity is viewed, therefore, as the safety margin or buffer against possible reductions in the amount of cash available to the firm due to potential shrinkage in the realization value of current assets.

The dynamic nature of the debt-paying process of the firm questions the validity of this rationale. Hence the development of an alternative approach to the measurement of liquidity. In the flow approach, the proposed measure of liquidity takes into consideration all types of funds likely to be available to the firm, as well as all the various obligations likely to mature during the period of time concerned. Since the measure relates, for any future time span, the expected possible maximum availability of cash to the expected cash outflows of the firm, liquidity is viewed in the flow approach as the firm's safety margin or buffer against unexpected cash shortages or financial needs. The resources which constitute this margin are the instrument of management's capacity to act within the limits of technical solvency in response to such financial needs. They are the resources of liquidity. The latter comprise both economic and financial reserves and modifications of planned operating cash flows. Among the resources of liquidity, instant reserves assume a particular significance due to their characteristics, namely immediate availability, complete certainty, no restriction as to use, and direct accessibility by the finance officer.



Footnotes

- (1) Only current assets represent realizable values. To dispose of fixed assets would mean cessation of operations for most businesses [Vatter, 1947].
- (2) Fixed assets are valuable only as long as they are used for specific purposes [Vatter, 1947].
- (3) Term loans from banks, long-term leasing and other forms of long-term credit were in widespread use only after World War II [Heath, 1978].
- (4) For a systematization of the several types of mathematical model which have been developed in this context, see Nunn [1979] and Smith [1980].
- (5) Beranek [1963], for instance, attempts to investigate jointly the liquidity and profitability objectives using a linear programming model for the purpose. The profitability objective is incorporated in the objective function, whereas the liquidity objective is expressed as a constraint on the level of cash and of the quick ratio. As far as liquidity is concerned, deviations from the target are possible but only in one direction and with the amount of the deviation being of no consequence. Furthermore, all sacrifice in the model has to be in terms of the level of achievement of the profitability objective since the liquidity objective is treated as an inviolable constraint.
- (6) Overall, risk of a company is taken here as the chance of that company's becoming technically insolvent.
- (7) A general description and application of the goal programming technique to working capital management is given in Sartoris and Spruill [1974].
- (8) Lemke calls attention to the fact that the assumptions are restrictive and unrealistic, and that this may be to the advantage of the study. Indeed, if it is possible to demonstrate that the current ratio is incapable of consistent interpretation under optimal conditions, then it is demonstrated that in real-world situations where internal inefficiencies exist, the interpretation of the ratio is even more problematic.
- (9) This minimum level should include:
  - the minimum transactions balance consistent with the expected volume of operations, and
  - specific cash commitments of the firm.
- (10) Attention should be called to the fact that Exhibit 3.3 merely portrays the case of a hypothetical firm based on what is most commonly observable in practice. One should be aware, however, that in reality firms may reveal a slightly modified structure of cash inflows and cash outflows. For instance, the flows associated with taxes, dividends or interest which are ordinarily cash users, may occasionally be sources of cash if the firm holds

a creditor rather than a debtor position. Similarly, the flow from operations, which is usually an important source of cash, may occasionally be a cash user, if negative.

- (11) Funds meaning here working capital, i.e. current assets less current liabilities.
- (12) Although an estimate of the funds flow to be generated in future time periods would be more correct, Bierman bases his measure on the funds flow derived from operations of the most recent accounting period.
- (13) The measure can also be akin to the quick ratio if quick assets are used instead of current assets in its computation. The use of quick assets is consistent with the point of view that inventories are working assets and therefore are not available for paying off debt.
- (14) Fixed assets may be so interdependent that liquidation of some of them significantly reduces or destroys the profitability of those remaining [Heath, 1978].
- (15) Direct empirical support for this assumption is provided in Emery [1981], and in Homonoff and Mullins [1975].
- (16) For a proof of these relationships, see Cogger et al. [1981].



## Chapter 4 OBJECTIVE AND CONTENT OF LIQUIDITY MANAGEMENT

### 4.1 Introduction

### 4.2 The Objective of Liquidity Management

### 4.3 The Content of Liquidity Management

#### 4.3.1 Cash Flow Planning

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##### 4.3.4.1 The inventory of resources

. Rationale for the deployment of resources

### 4.4 Summary

## Chapter 4 OBJECTIVE AND CONTENT OF LIQUIDITY MANAGEMENT

### 4.1 Introduction

In the balance-sheet approach, the objective of liquidity management is to provide for the optimal level of liquidity. However, providing for financial mobility at minimum cost should gain priority as the main objective of liquidity management in the flow approach. As a result, three basic activities - cash flow planning, implementation of early warning systems and resource planning for financial mobility - should constitute the content of liquidity management in the same approach. These ideas proceed from the author's attempt to integrate with the general theory, Donaldson's concept of "financial mobility" and his notion of a strategy for its development [1969a; 1969b].

The objective of liquidity management is discussed in detail in Section 4.2. Section 4.3 identifies and explores the content of liquidity management. A summary of the chapter is provided in Section 4.4.

### 4.2 The Objective of Liquidity Management

Measuring liquidity for any future period of time does not give any information on the intraperiod situation of the firm. The fact that a company has liquidity for a given future time span does not imply that it has the capacity to redirect resources in response to unexpected financial needs that may arise at any point within that time span. The resources which constitute the liquidity of the firm may become available only towards the end of the period, which leaves the firm with no safety margin or buffer (and, with a high probability of technical insolvency) for most of the period, or else they may become available throughout the period but not in the amount or type



necessary to meet the need. Providing for financial mobility for a certain period of time is, therefore, more important than providing for the optimal level of liquidity. The idea is a straight consequence of the fact that unexpected financial needs have a different nature, timing, magnitude, and duration. Donaldson [1969b], who introduced the concept of financial mobility, defines it as the "... capacity to redirect the use of ... resources in a manner consistent with the evolving goals of management as it responds to new information about the company and its environment" [p.8]. In the present review, financial mobility is defined as the capacity to redirect the necessary resources to restore funds flow equilibrium, that is, to restore balance in funds flows within the limits of technical solvency and with an acceptable risk exposure. Insofar as there is an opportunity cost associated with such a capacity, providing for financial mobility at minimum cost should be the main objective of liquidity management. This opportunity cost as much includes the implicit cost of holding financial mobility, as the explicit cost associated with the particular form in which financial mobility resides.

Three major concerns, therefore, should guide liquidity management:

- concern for continuity and growth of the business over time;
- concern for the implications of present action on future alternatives;
- concern for the sustainability and growth of value over time which hinges on the ability to redirect resources with minimum loss of present and future earning power. This, in turn, hinges on the ability to redirect resources without relinquishing profitable investment opportunities, without disruption of corporate objectives, without violation of the boundaries set by the established financial policies of the firm, and with minimum maintenance of idle or less-productive resources.

### 4.3 The Content of Liquidity Management

To fulfil its objective, liquidity management should comprise three basic activities: cash flow planning, implementation of early warning systems and resource planning for financial mobility. Each of these activities is examined in this section.

#### 4.3.1 Cash Flow Planning

Cash flow planning is an element of financial planning and this, in turn, is an intrinsic part of corporate planning.

##### 4.3.1.1 Corporate planning

Higgins [1980, p.4] defines corporate planning as "... the systematic process of setting corporate objectives and making the strategic decisions and developing the plans necessary to achieve those objectives". Implicit in this definition are the three characteristics that make corporate planning a decision-making process:

- corporate planning is a process geared towards producing one or more future desired states not expected to occur unless some action is taken [Ackoff, 1970]. In this sense, corporate planning is not about predicting the future but about controlling it;
- corporate planning is a process that involves postulating and evaluating the outcome of various sets of highly interrelated decisions [Ackoff, 1970]. In this sense, corporate planning is not only the design of a desired future but also the design of effective ways of bringing it about;
- corporate planning is a process of deciding what to do and how to do it before taking action [Ackoff, 1970]. In this sense, corporate planning is anticipatory decision-making.



The corporate planning process as a whole may be summarized as shown in Exhibit 4.1. A distinction is made between strategic and operational planning. This distinction is relative rather than absolute, and is mainly based on three criteria: timescale, breadth and differing emphases on "ends" and "means" [Ackoff, 1970; Higgins, 1976]. Strategic planning is concerned:

- with decisions that have enduring effects which are difficult to reverse. Strategic planning, therefore, is long-term planning. Operational planning is of shorter range;
- with issues that affect the whole or large parts of the organization. Strategic planning, thus, is broad in scope. Operational planning, on the other hand, is narrower;
- with formulation of goals ("ends") and selection of "means" by which goals are to be attained. Operational planning is concerned only with selecting "means" by which to pursue specified goals.

Further distinction between strategic and operational planning can be established on the basis of a few more criteria [Higgins, 1980]:

- decision-making at operational levels tends to be less subjective than at strategic levels which makes the use of operational research and computer-based techniques of analysis more relevant at operational levels;
- operational decision problems tend to be more recurrent, better structured, and less uncertain or risky than strategic problems;
- operational decisions commonly involve a much narrower range of alternatives than strategic decisions;
- operational decisions and plans are easier to evaluate.

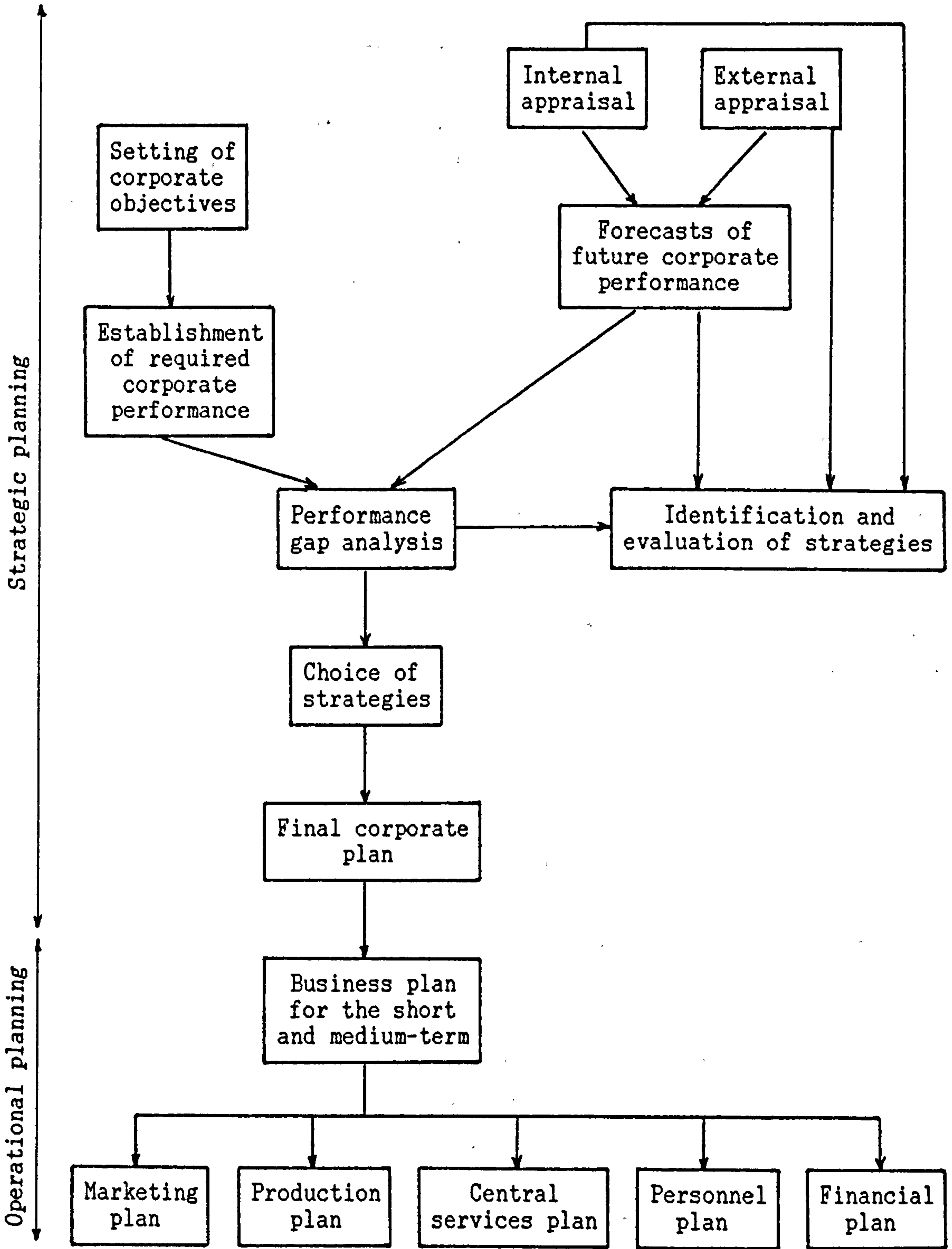
Although different, both types of planning - strategic and operational - are necessary. They complement each other and should not be separated.

##### A. Strategic planning

Strategic planning is clearly the responsibility of top management. According to Exhibit 4.1, it aims at the production of a corporate plan requiring the completion of a sequence of steps

Exhibit 4.1

Corporate planning process in outline



Source: Adapted from Higgins [1976, pp.21 & 26; 1980, p.15]



[Higgins, 1980].

First among these is the setting of corporate objectives. The latter are concerned with the organization as a whole and derive from the expectations of internal and external stakeholders. Corporate objectives may be economic or non-economic; qualitative as well as quantitative. Whatever the variety of corporate objectives, increasing profits and shareholder wealth is always a prime, if not the prime, objective of the firm. Once corporate objectives have been defined, a set of sub-objectives or goals must be specified, usually translated in terms of targets for such corporate performance measures as profits, market shares, manufacturing costs, etc.. These goals must be mutually consistent, correctly timed, and such that their achievement guarantees the accomplishment of corporate objectives. Simultaneously, appraisals should be made of the current state of the organization and its environment. The internal appraisal or situation audit is a survey of the organization's current state in resource and performance terms. The appraisal may cover every functional area of the business or a few primary functions. Whatever the case, it should consist of an assessment of their strengths and weaknesses, and an assessment of their performance computed against appropriate standards. Analysis of past performance, comparison of current with past performance and inter-firm comparisons should also be included. The external appraisal or environmental analysis is a survey of the organization's environment (economic, social, political, technological, etc.). Both the internal and the external appraisal contribute essential information for the preparation of forecasts of future corporate performance, and for the identification and evaluation of strategies. The forecasts of future corporate performance should simply be a passive extrapolation from past and current trends. From the comparison between forecasted performance and required performance, some disparity may become apparent. Given the existence of a performance gap beyond some acceptable level of tolerance, the business must ask itself which strategies it can adopt in order to reduce the gap, and to meet the corporate objectives. This requires the use of strategy identification techniques. Thereafter, strategic planning follows an iterative procedure as the several identified strategies are evaluated by adjusting the initial

forecasted performance and comparing it with the required performance. In this process, some modification of the original corporate objectives and required corporate performance may occur. Before the final corporate plan can be proposed, management will have to make a choice from the various alternative strategies evaluated. The chosen strategy or set of strategies determines the final corporate plan. This is essentially a statement, in both qualitative and quantitative terms, as to how the organization as a whole will meet its objectives.

### B. Operational planning

Operational planning is concerned with deciding how the resources of the firm should be deployed in the short and medium-term to meet the organization's objectives. Logically, it should be based on strategic planning [Higgins, 1980].

Operational planning comprises the preparation of individual plans for each major functional area in the company (Exhibit 4.1). These plans correspond to a thorough development of the final corporate plan for the short and medium-term [Cooper-Jones, 1974; Higgins, 1980]. A list of basic elements which should be included in operational plans is given in Exhibit 4.2.

#### 4.3.1.2 Financial planning

Financial planning helps:

- communicating corporate objectives and goals,
- evaluating the interrelatedness of business decisions,
- promoting action coordination, and
- establishing a basis for measuring performance [Higgins, 1980; Brealey and Myers, 1984].

The end product of financial planning is a description in monetary terms of the chosen strategy or set of strategies of the firm and a projection of its expected implications.



## Exhibit 4.2

### Basic elements in operational plans

- A. Business plan for the short and medium-term
  - A.1 Definition of business - products, markets
  - A.2 Review of market environment
  - A.3 Major premises, problems, strategies and key steps
  - A.4 Key financial data
- B. Marketing plan
  - B.1 Market statistics
  - B.2 Product competitiveness - own products
  - B.3 Order input plan and selling strategy
  - B.4 Market development and research
  - B.5 Market expense analysis and control
- C. Production plan
  - C.1 Engineering plan
    - C.1.1 New product development - scheduled and planned
    - C.1.2 Technological trends
    - C.1.3 Engineering expense analysis and control
    - C.1.4 Capital requirements
  - C.2 Manufacturing and facilities plan
    - C.2.1 Factory load plan
    - C.2.2 Direct and indirect manpower plan
    - C.2.3 Material scheduling, purchasing and cost reduction
    - C.2.4 Inventory control
    - C.2.5 Manufacturing expense analysis and control
    - C.2.6 Capital project expenditure
    - C.2.7 Facilities
  - C.3 Quality control plan
    - C.3.1 Quality costs
    - C.3.2 Quality manpower plan
    - C.3.3 Quality improvement plan
- D. Central services plan
  - D.1 Central services organization and procedure improvements
  - D.2 Central services expense analysis and control
- E. Personnel plan
  - E.1 Manpower utilization plan, including staff turnover and wages data
  - E.2 Industrial relations
  - E.3 Staff recruitment and training
- F. Financial plan
  - F.1 Operational budgets
  - F.2 Capital expenditure plan
  - F.3 Profit contribution and overheads
  - F.4 Pro-forma income statement
  - F.5 Cash flow budget
  - F.6 Pro-forma balance sheet

Source: Adapted from Cooper-Jones [1974, p.31] and Higgins [1976, p.26]

The distinction between strategic and operational planning can be applied to financial planning. It is a question as much of the length of the planning horizon concerned (where strategic is identified with long-term, and operational is identified with short/medium-term) as of the breadth of the decisions involved. Crucial issues like investment strategy, financing policy and the choice of a target dividend payout ratio are the core of strategic financial planning. Operational financial planning is more concerned with the overall financial implications proceeding from the generation and utilization of resources in each major functional area of the business, as specified in the operational plans [Cooper-Jones, 1974; Brealey and Myers, 1984].

The separation between strategic and operational financial planning reflects itself in the degree of detail contained in the financial plan. Strategic financial plans tend to include [Brealey and Myers, 1984]:

- a description of the strategy or set of strategies (R & D efforts, steps to improve productivity, design and marketing of new products, pricing strategy, etc.) to be used to reach the corporate objectives;
- a capital expenditure plan, usually broken down by category (investment for replacement, for expansion, for new products, etc.), and by division or line of business;
- a summary of planned financing and dividend policy;
- pro-forma financial statements - such as income statements, cash flow statements and balance sheets - usually prepared on an annual basis within the planning horizon, and presented in rather condensed form.

Operational financial plans tend to include the basic elements as described in Exhibit 4.2. The operational budgets represent in monetary terms the organization's operational plans for the period of time concerned. Operational budgets together with the capital expenditure plan for the budget period serve as a basis for the preparation of a projected income statement and a projected balance sheet for the budget period end, as well as for the preparation of a projected cash flow statement, the so-called cash flow budget. All these elements are usually prepared in great detail. Budgets,



furthermore, are usually broken down for shorter periods of time over the budget period [Higgins, 1980].

Both at the strategic and at the operational level, the cash flow plan is always the element that ensures funds flow equilibrium into the future. The cash flow plan:

- provides an estimate of future cash flows under expected conditions, both as to amount and timing;
- identifies those occasions when a surplus or shortage of cash may be expected; and,
- allows early steps to be taken to employ the surplus, or to cover the deficit in a manner consistent with the fulfilment of corporate objectives and the non-violation of the boundaries set by the established financial policies of the firm.

#### 4.3.2 The Nature of the Unexpected Events

In a dynamic economy, active or latent threats to and opportunities for the business originate with some kind of change: change in consumer behaviour, in technology, in competitor action, or change within the business itself. Usually, where change is anticipated, the threat can be avoided and the opportunity can be seized. Since it is important to ensure that all change is anticipated change, management spends considerable effort attempting to forecast change in the external and internal environment of the business. Given the uncertainty, however, that surrounds the future, it is unrealistic to assume that management can produce a perfect score in this respect.

In order to formulate a strategy for the business consistent with the attainment of corporate objectives, corporate planning is forced to prejudge corporate performance on the basis of a set of assumptions about the future. In view of the above, this set of assumptions can only be a "best" guess about the future external and internal environment of the business. Such a "best" guess is usually a consensus estimate of the most likely future experience.

Therefore, despite the aura of precision surrounding the corporate plan, management is aware that unexpected events (i.e. unknown, uncertain or less likely events at the time of the plan preparation) may subsequently occur. Unexpected events that are relevant for liquidity management are those with major financial implications for the expected funds flow equilibrium of the firm - in particular, those implying major negative deviations from the expected cash flows of the firm, due to an increase in expected cash outflows, or a decrease in expected cash inflows, or both. In addition, unexpected events material to liquidity management are those whose financial implications cannot be minimized or neutralized by insuring for losses. Unexpected events such as these may be external or internal to the company. They may also be favourable or unfavourable to the business. A classification of such unexpected events is suggested by Donaldson [1969b]. According to it, they fall under one of the following possible categories:

- a change in the general (economic, social, political, etc.) environment - e.g. the occurrence of a major economy- or industry-wide recession, social unrest, strike, government interference, termination or outbreak of war, etc.;
- product innovation - e.g. the introduction of a competing product with potential to cause serious loss of volume in traditional product lines;
- change in technology - e.g. the introduction of new ways to produce the product in larger quantity, with better quality, or at lower cost;
- change in consumer behaviour - e.g. resulting in shifts in demand, in distribution systems, or in marketing approaches;
- competitive action - e.g. a strategic move by competitors on price or product; and,
- management behaviour - e.g. a movement on the part of the firm's own management affecting the pattern of expected cash flows.

The problem of these events is that they create a substantial imbalance (of a certain nature and duration) in the expected funds flow equilibrium of the firm which requires a timely action on the part of management. It is in this context that the development of planning processes allowing the firm to provide for financial mobility



at minimum cost gains crucial importance. Such planning processes comprise the implementation of early warning systems and resource planning for financial mobility.

#### 4.3.3 Implementation of Early Warning Systems

The objective of the implementation of early warning systems, and consequently of an organized information search into the future, is to achieve an understanding, at the earliest possible moment, of the potential financial implications of unexpected events. Because early warning systems increase the understanding of the problem, they give management a greater capacity to deal with it. Simultaneously, the earlier the process of mastering the problem takes place, the more time there is for management to develop a proper strategy of response, and to take the basic action to guarantee the necessary resource availability. A proper solution to the problem is the one which attempts to restore equilibrium in funds flows at minimum cost, including minimum dependence on idle or less-productive resources. Early warning systems comprise traditional methods, such as cash flow plan revisions and cash flow updates or forecasts, as well as contingency planning - a more recent and elaborate method.

##### 4.3.3.1 Traditional methods

The first of these methods involves the preparation of cash flow plan revisions following updates in the assumptions, objectives and strategies stated in the corporate plan. This method demands a global approach on the part of the company to the problem of the unexpected event, and implies going through the whole corporate planning process several times during the planning period.

In the face of the conflict between a plan which is taken as "certain" and an uncertain environment, this traditional solution states: when the unknown becomes known, assess its impact on the existing plan and create a new "certainty" (i.e. a new plan) that incorporates the new information. From this point of view, the only

limitation for dealing with uncertainty is the organization's capacity to develop new plans.

This solution is a product of the control systems in planning processes dominated by conventional philosophies of "satisficing" and "optimizing". These two philosophies of planning are thoroughly described in Ackoff [1970]. The distinction between the two relates to the level of attainment set in the corporate plan. To satisfice is to do "well enough", whereas to optimize is to do "as well as possible". Inevitably, this translates itself into further differences between the two approaches.

Cash flow plan revisions represent a substantial burden for the organization both in terms of time and in terms of the resources which have to be allocated to their preparation. For this reason, a second method of handling uncertainty is commonly advocated [e.g. Soldofsky and Schwartz, 1972; De Salvo, 1972; Leitch et al., 1980; Sizer, 1981]. This method involves either the preparation of updates of the cash flow plan or the preparation of cash flow forecasts. Cash flow updating or forecasting identifies a form of cash flow planning, usually for the short-term, where the estimate of a firm's cash inflows and outflows is exclusively done in pure cash terms with no links to profit and loss account figures. With this method, the problem of the unexpected event is dealt with at a restricted level usually within the finance department of the company.

The two methods described - cash flow plan revisions and cash flow updates or forecasts - are very similar. Both work on the basis of the recognition of the actual or future occurrence of unexpected events. Further, they are both based on the principle that the closer the future, the more precise the information about it, and therefore the more accurately it can be estimated. The approach they suggest is basically the same - monitoring of deviations, and adjustment of the original planning in feed-back to the development of new information concerning unexpected events which have occurred or which are known to be about to occur. The main difference between them lies in the way in which the updating process is carried out in the company.



## 4.3.3.2 Contingency planning

Since it deals with only one set of assumptions about the future, the cash flow plan builds in an inflexibility which militates against timely and effective response to the unexpected event.

Although traditional methods of handling uncertainty attempt to minimize this difficulty, they are subject to the same type of shortcoming faced in the cash flow plan. Both cash flow plan revisions and cash flow updates or forecasts seek to correct the initial estimate of future cash flows by incorporating the implications of unexpected events which have subsequently developed or which are known to be about to develop. But, as with the cash flow plan, a single set of assumptions about the future continues to underlie these updated cash flow projections. As such, traditional methods are likely to be based on deficient estimates of the future, and to prompt the company into a strategy of response which may be inadequate.

Moreover, by the time the occurrence of an unexpected event is recognized by the traditional methods, if the firm has not secured the resource availability necessary to implement a proper strategy of response, it may be too late to take the required action. Furthermore, there may be a lag between the occurrence of an unexpected event and its recognition by the traditional methods. This lag may be more critical to the firm than the occurrence of the event itself. In this respect, traditional methods lack the diagnostic capacity and the fast response capacity needed to deal with unexpected events [Hartley, 1976].

One way to surmount such difficulties is through contingency planning. This recently proposed method of handling uncertainty finds its origin in a philosophy of planning identified by Ackoff [1970] as "adaptivizing". The latter stands on the presumption that:

- "the principal value of planning does not lie in the plans that it produces but in the process of producing them" [Ackoff, 1970, p.15]; and, that

- "most of the current need for planning arises out of lack of effective management and controls ... Therefore the principal objective of planning should be to design an organization and a system for managing it that will minimize the future need for retrospective planning - that is, planning directed toward removing deficiencies produced by past decisions - and to do so by reducing the possibility of such deficiencies being produced" [Ackoff, 1970, p.16].

This demonstrates the importance of adaptation. Adaptive behaviour<sup>(1)</sup> implies an adequate range of appropriate responses to possible stimuli. Translated into planning, the nature of adaptation involves designing efficient organizational systems capable of coping with an uncertain future. This requires that both the organizational structure and the planning process itself are flexible, that management information systems are properly responsive, and that reward systems are suitably motivating [Higgins, 1976; Higgins, 1980]. "Adaptivizing", or innovative planning, is difficult to put into practice since no systematized methodology exists for carrying it out. However, some degree of adaptiveness can be designed into organizations where the planning process is dominated by either a "satisficing" or an "optimizing" philosophy. Contingency planning is an example of how adaptiveness may be introduced into conventional systems [Ackoff, 1970; Higgins, 1980].

Contingency planning implies a totally different and more elaborate approach to the problem of the unexpected event than traditional methods. The principle behind it is that uncertainty should be explicitly taken into account at the planning stage, resulting in the preparation of several cash flow plans, each for a different set of assumptions concerning a variety of future outcomes [Higgins, 1976; Higgins, 1980]. In this regard, contingency planning gives rise to two immediate counter-arguments. One is that contingency planning is impossible because the unknown is, by definition, unplannable. This argument is convincing as far as unexpected events which are beyond human experience are concerned. Yet, most unexpected events involving cash shortages have happened before and are, therefore, known to management to some extent - that is, management is aware that there is some probability of their



occurrence. The fact that they were not incorporated into the cash flow plan simply means that their probability of occurrence at the time of the plan preparation was either not known or not high enough for them to be treated as "certainties". The other counter-argument is that contingency planning is impracticable since the full range of probable futures is almost without limit. This argument fails however, insofar as what is in question in contingency planning is not an exhaustive exploration of the probable futures, but only of the most probable ones and these are a finite set at any given time.

In order that management can formulate an adequate strategy of response for each of the possibilities relevant at any given time, each possibility has to be fully explored in terms of its potential implications for the expected funds flow equilibrium of the firm. This requires a careful sensitivity analysis of the cash flow impact of a series of assumptions concerning each possibility. One way of generating alternative sets of assumptions about future events is through the use of multiple scenario analysis (MSA). The idea of scenario development for institutional planning was introduced by Kahn and Wiener [1967]. Since then the literature on scenario development methodology has proliferated [e.g. Abt et al., 1973; Zentner, 1975; Palmer and Schmid, 1976; Linneman and Kennell, 1977; MacNulty, 1977; Holroyd, 1979; Linneman and Klein, 1979; Klein and Linneman, 1981; Zentner, 1982]. The essential purpose of MSA is to stimulate thinking about alternative environments. Scenarios provide an effective way of communicating an awareness of future uncertainty to management, and a structured framework within which the elements of corporate risk can be systematically identified and evaluated.

In a second stage, the process of developing an adequate strategy of response should involve a multitude of "what if" questions on the possible type and timing of remedial action to be taken in each scenario. At the strategic level of response, effective sensitivity analysis will help to isolate the key aspects of the business upon which financial recovery from the event will depend [Cooper-Jones, 1974; Hartley, 1976].

In this context, contingency planning requires a whole new information system. Indeed, due to its inherently static nature, the established accounting information system on which conventional planning is based places severe limits on the number and variety of "what if" questions that can be examined in any reasonable period of time. Contingency planning demands a dynamic instrument of analysis capable of quickly and accurately exploring a range of alternatives so that management can obtain a reliable answer to any "what if" question it views as important. This implies the need for a financial simulation model. Such a model should depict the cash flow system of the firm by expressing in quantitative terms the way in which the various elements of the business operation are likely to change over time, how they affect each other, and ultimately how they affect cash flows and profits. Examples of such financial simulation models are widely found in the literature [e.g. Lerner, 1968; Gershefski, 1969; Gorman, 1970; Warren and Shelton, 1971; Carleton et al., 1973; Pappas and Huber, 1973].

Finally, a distinction needs to be established between what might be called proactive and reactive contingency planning. Ideally, contingency planning should be an ex-ante or proactive approach to the problem of the unexpected event. It is possible, however, on the basis of the conceptual typology of environmental scanning and forecasting systems developed by Fahey et al. [1981], to consider a different form of contingency planning, which may be identified as reactive. Such planning responds to environmentally generated crises, i.e. it is carried out when the firm is faced with the real situation of a specific unexpected event which has occurred or which is known to be about to occur. Due to its ex-post approach to the problem of the unexpected event, reactive contingency planning misses the advantage of minimization of the recognition/response delay. Furthermore, since it attempts to reduce perceived uncertainty rather than enhancing the organization's capability to handle environmental uncertainty, reactive contingency planning fails to detect opportunities to facilitate the creation of radically new solutions to problems.



#### 4.3.4 Resource Planning for Financial Mobility

Ansoff [1965], Drucker [1969], and other management theorists assume that physical, financial, economic and human resources can be assembled once management has identified a market opportunity or discovered a technological break-through. Writers such as Ward [1970], however, express reservations about such an assumption. In fact, in most strategic situations, it is not so much a case of identifying a market opportunity as of matching the resources which exist or can be readily acquired to the business opportunities which can be discovered and exploited. This idea became particularly relevant during the 1970s with the development of a world-wide resource crisis, characterized by shortage and fast rising prices of many resources. The need, felt at the time, to develop and implement a strategy for resources gave rise to a new subject area known as corporate planning for resources. Most theoretical contributions in the area have concentrated on the availability of physical supplies. Resource planning for financial mobility has extensively drawn on this literature [e.g. LaLonde, 1971; LaLonde and Robeson, 1972; Taylor, 1974].

The objective of resource planning for financial mobility is to guarantee, at the earliest possible moment, the resource availability necessary to restore funds flow equilibrium at minimum cost. A crucial feature is the preparation, at the planning stage, of an inventory of the resources of liquidity.

##### 4.3.4.1 The inventory of resources

An inventory of the resources of liquidity constitutes a new kind of financial statement which clearly departs from the objectives and conventions of traditional financial statements. It is concerned with funds flows (not with income and value), is designed for a limited internal audience, is action-oriented and therefore forward looking, and is basically judgemental. Such an inventory is depicted in Exhibit 4.3. Besides the identification of the resources that may be called into play in the event of an unexpected

Exhibit 4.3

Possible format of an inventory of the resources of liquidity

Resources of liquidity	Lead time required for deployment						Certainty of availability	Conditions of availability
	Available for use:							
	Immediately £	Within:						
		One month £	Three months £	Six months £	One year £	More than one year £		
<b>I. Financial reserves</b>								
<b>A. Instant reserves</b>								
. Precautionary liquid asset balance								
. Negotiated short-term lines of credit								
<b>B. Negotiable reserves</b>								
. Remaining short-term debt financing capacity								
. Unsecured								
. Secured								
. Medium and long-term debt financing capacity								
. Equity financing capacity								
<b>II. Modifications of planned cash flows</b>								
<b>C. New additions to planned cash inflows</b>								
<b>D. Anticipation of planned cash inflows</b>								
<b>E. Curtailment of planned cash outflows associated with</b>								
. The production plan								
. The marketing plan								
. The R & D plan								
. Administrative overheads								
. Capital expenditures								
. Dividends								
<b>F. Postponement of planned cash outflows</b>								
<b>III. Economic reserves</b>								
<b>G. Negotiable reserves</b>								
. Fixed assets available for sale								
<b>Total</b>								
<b>Cumulative Total</b>								

Source: Adapted from Donaldson [1969a, p.72; 1969b, p.277] and Sizer [1981, p.301]



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financial need, the inventory is intended to disclose four basic dimensions to each entry - magnitude, lead time required for deployment, certainty of availability within a given time period, and conditions of availability, if any.

Given the attempt made to quantify the relative magnitudes of the entire array of alternatives open to management, the inventory of resources allows situations of possible excess or deficiency in overall resource position to be exposed. It also allows gaps in the range of alternatives to be identified. It does so by revealing excessive dependence on a single resource, whether dominant resources are subject to internal or external negotiation, whether they are quickly or slowly deployed, whether they are more or less predictable, whether or not they are conditionally mobile, etc.. Generally, an inventory of the resources of liquidity serves the useful purpose of providing a basis for a top management review of the issue of strategic response to unexpected events, of the effect of corporate plans on the capacity to sustain unexpected cash shortages, and of the need for action before pressures of time make appropriate remedial action ineffective, difficult or even impossible.

Any evaluation of the adequacy of the resources in the inventory, both in total amount and in distribution with regard to timing and certainty of availability, has to be made first in terms of the specific unexpected events most likely to occur during the planning horizon. Contingency planning should provide the essential information for this purpose - namely, a quantitative measure of the range of cash shortages likely to result from those probable outcomes, as well as a quantitative measure of the amount and type of resources required to restore funds flow equilibrium at minimum cost. The comparison between the latter and the quantitative measure of the available resources as expressed by the inventory, will indicate whether current overall resource position exposes the firm to risk levels above its margin of tolerance, or whether there is a serious disproportion in the composition of those resources in relation to what is required.

The adequacy of the resources in the inventory should be evaluated next in relation to a general, unspecified unexpected event representing all those unknown, less likely and uncertain events for which contingency plans have not been prepared. This is undoubtedly the most difficult part inasmuch as information concerning it is simply non-existent. First, there is no way to translate unavailable information in terms of a specific capacity to respond to unexpected needs for funds. Since there is not a reference point by which to assess risk magnitude, it becomes impossible for management to choose from a range of possible capacities in terms of subjective risk preferences. No rational approach to the problem exists therefore - only an instinctive one. As far as resource composition is concerned, it seems sensible to go for a wide range of resources (that is, a range in terms of the speed and certainty with which they can be reallocated, and of the conditions under which they can become available) rather than just concentrating on one type of resource. How large each one of those resources should be, is again a problem for which no rational approach exists.

All these considerations emphasize the important contribution of contingency planning to the evaluation of the inventory of resources. For a firm not preparing contingency plans, evaluating the adequacy of the resources in the inventory can only be an entirely instinctive exercise.

#### . Rationale for the deployment of resources

The evaluation of the inventory of resources is based on the idea of a proper strategy of response to the unexpected event. As defined earlier in the chapter, a proper strategy of response is one which attempts to restore balance in funds flows at minimum cost for any acceptable risk exposure. Therefore, there has to be a rationale or set of rules for the deployment of resources governing the setting out of a proper strategy of response.

It seems logical that the deployment of resources should first consider the resources currently contributing least to the growth process of the firm, proceeding to those contributing most. According to this principle, the firm should turn first to passive



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resources (i.e. to financial reserves) since these are not currently contributing to the attainment of corporate objectives. Specifically, the firm should respond to an unexpected financial need by starting with those financial reserves with the longest deployment time permitted by the need. Deployment of active resources (i.e. modifications of planned cash flows and liquidation of fixed assets available for sale), should be considered only after exhaustion of passive resources. In sum, since active resources are employed in profit-generating activities while passive resources are currently inactive, it seems logical from the point of view of minimizing disruption of corporate plans and loss of earning power to try to contain the impact of the unexpected financial need with the exclusive use of passive resources. This rationale, however, exhibits inherent flaws. First, it involves the danger of quickly consuming all of the company's financial reserves, including the highly mobile instant reserves. Second, it may influence companies to hold excessively large, and therefore expensive, amounts of passive resources in order to reduce their risk of exhaustion. Third, the rationale ignores the fact that the deployment of active resources does not represent a significant loss of present or future earning power for the company, given the way in which they are identified as resources of liquidity (see Chapter 3). The rationale also ignores the fact that the nature of the unexpected financial need determines the availability of certain immobile resources.

In this context, a different set of rules for the deployment of resources is required. The first is to recognize that the set of resources available for deployment at any moment is contingent upon the nature of the unexpected need for funds. This rule concerns as much the availability of conditionally mobile resources as the availability of immobile resources following changes in corporate priorities produced by the appearance of the need. The second rule is to match as closely as possible each unexpected cash shortage with the resource most comparable with it in certainty and timing of availability. If a choice exists among resources to match the need, then, the rule is to choose that resource which provides the best risk-to-cost trade-off. This rationale has two major objectives - to defend financial reserves while keeping them at a minimum, and to

preserve the firm's capacity for instant response.

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Finally, it seems appropriate to consider briefly how liquidity management should be carried out in the company.

"Many firms have an intuitive feel for what they might do in a financial crisis, even though it is not formally thought through and written down" [Hartley, 1976, p.190]. Statements such as this reveal that, despite its importance, liquidity management is often denied in practice the benefits of formal analysis. It is contended here, however, that if liquidity management is to be of any value to the firm, it should be the object of thorough and systematic discussion by the entire top management team. In effect, it emerges clearly from the literature review that the capacity of the firm to act properly in response to unexpected change in its external and internal environment presupposes an interplay between the several management areas - financial, production, marketing, technological, administrative, strategic, etc.. To the extent that the full range of resources goes beyond the financial domain, liquidity management should be seen as a group responsibility involving the participation at top level of the several areas of management.

This process, however, is not without problems inasmuch as participants will have conflicting viewpoints concerning the reallocation of resources. The various operational centres that manage the different resources of the firm will each recognize a need for mobility in its own area, and each will be contesting with the others for the limited corporate resources available for this purpose. For these centres, the whole idea of modifications of planned cash flows as resources of liquidity appears unacceptable. Any reallocation of resources away from these centres may be expected, therefore, to meet considerable opposition - the argument likely to be that once accepted, the corporate plan should be carried out, being the function of financial reserves to insulate it from the shock of the unexpected event. Since financial reserves are particularly visible and vulnerable in the sense that they are the least specialized of all the resources, they will be the target of all the



operational managers' demands, and the finance officer will have to fight to preserve his own form of mobility. In other words, liquidity management will have to involve vigorous negotiation. To the extent that a large part of financial reserves is also subject to negotiation, the finance officer's control over the resources of the business will depend on his bargaining power, both internally and externally. Overall, the finance officer's bargaining power will determine the form in which financial mobility will reside. If that power is weak, the business will most likely end up relying exclusively on those resources which are most predictable, most completely under the finance officer's control, and involving the least disturbance to the status quo of the firm. Only if unexpected needs are large or persistent, will the business turn to other resources of increasing difficulty of negotiation. Independently of the finance officer's bargaining power, however, negotiation will always introduce not only an element of uncertainty as to the amount and time of release of the negotiated resources, but also an element of cost expressed in terms of stress on the financial manager, and strain on his relations with fellow executives and outside sources of funds. Further discussion of the behavioural aspects of the process is beyond the scope of this review.

#### 4.4 Summary

Providing for financial mobility at minimum cost should be the main objective of liquidity management in the flow approach. Three basic activities therefore - cash flow planning, implementation of early warning systems and resource planning for financial mobility - should constitute the content of liquidity management in this approach.

Cash flow planning is the means of ensuring funds flow equilibrium in the firm under future expected conditions. Cash flow planning is an element of financial planning and this, in turn, is an intrinsic part of corporate planning. Risk and uncertainty are the essence of corporate planning. Therefore, despite the image of precision

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surrounding the corporate plan, management is aware that unknown, uncertain or less likely events at the time of the plan preparation (i.e. unexpected events) may subsequently occur. For liquidity management, the relevant unexpected events are those with major negative implications for the expected funds flow equilibrium of the firm, and whose implications cannot be minimized or neutralized by insuring for losses. It is in this context that the development of planning processes, specifically the implementation of early warning systems and resource planning for financial mobility, becomes of crucial importance. The objective of the implementation of early warning systems is to achieve an understanding, at the earliest possible moment, of the potential financial implications of unexpected events. The aim is to increase the time available for management to develop a proper strategy of response, and to take the basic action to guarantee the necessary resource availability. Early warning systems comprise two methods - traditional methods, such as cash flow plan revisions and cash flow updates or forecasts, and contingency planning. The objective of resource planning for financial mobility is to guarantee, at the earliest possible moment, the resource availability necessary to restore funds flow equilibrium at minimum cost. A crucial feature is the preparation, at the planning stage, of an inventory of the resources of liquidity.

Overall, liquidity management is too important to a company's future to be left to the random fortune of the business at the time of an unexpected financial need, or to the value system of a single individual in the organization. If liquidity management is to be of any value to the firm, it should be the object of thorough and systematic discussion by the entire top management team.



Footnotes

- (1) The concept of adaptive behaviour has its theoretical basis in cybernetics and the behavioural sciences [Higgins, 1976].

Part II RESEARCH METHODOLOGY

Chapter 5 RESEARCH PROBLEM AND STRATEGY

Chapter 6 DATA COLLECTION METHODS



## Part II RESEARCH METHODOLOGY

Part II discusses the research methodology used in the study. Chapter 5 presents the research strategy which was considered most appropriate for the study in the face of the research problem defined and the research questions being asked. Chapter 6 describes the data collection methods employed.

## Chapter 5 RESEARCH PROBLEM AND STRATEGY

### 5.1 Introduction

### 5.2 The Research Problem and the Empirical Evidence

### 5.3 Donaldson's Study

#### 5.3.1 Research Question and Methodology

#### 5.3.2 Research Findings

5.3.2.1 Financial planning and the unexpected need for funds

5.3.2.2 The unexpected need and the resources of mobility

5.3.2.3 The evidence relating to strategy

### 5.4 The Hypotheses Formulated

### 5.5 The Research Strategy

### 5.6 Summary



### 5.1 Introduction

Defining the research problem; formulating the hypotheses to be investigated (where the research mode is primarily deductive), and choosing the research strategy are the first steps in setting up research.

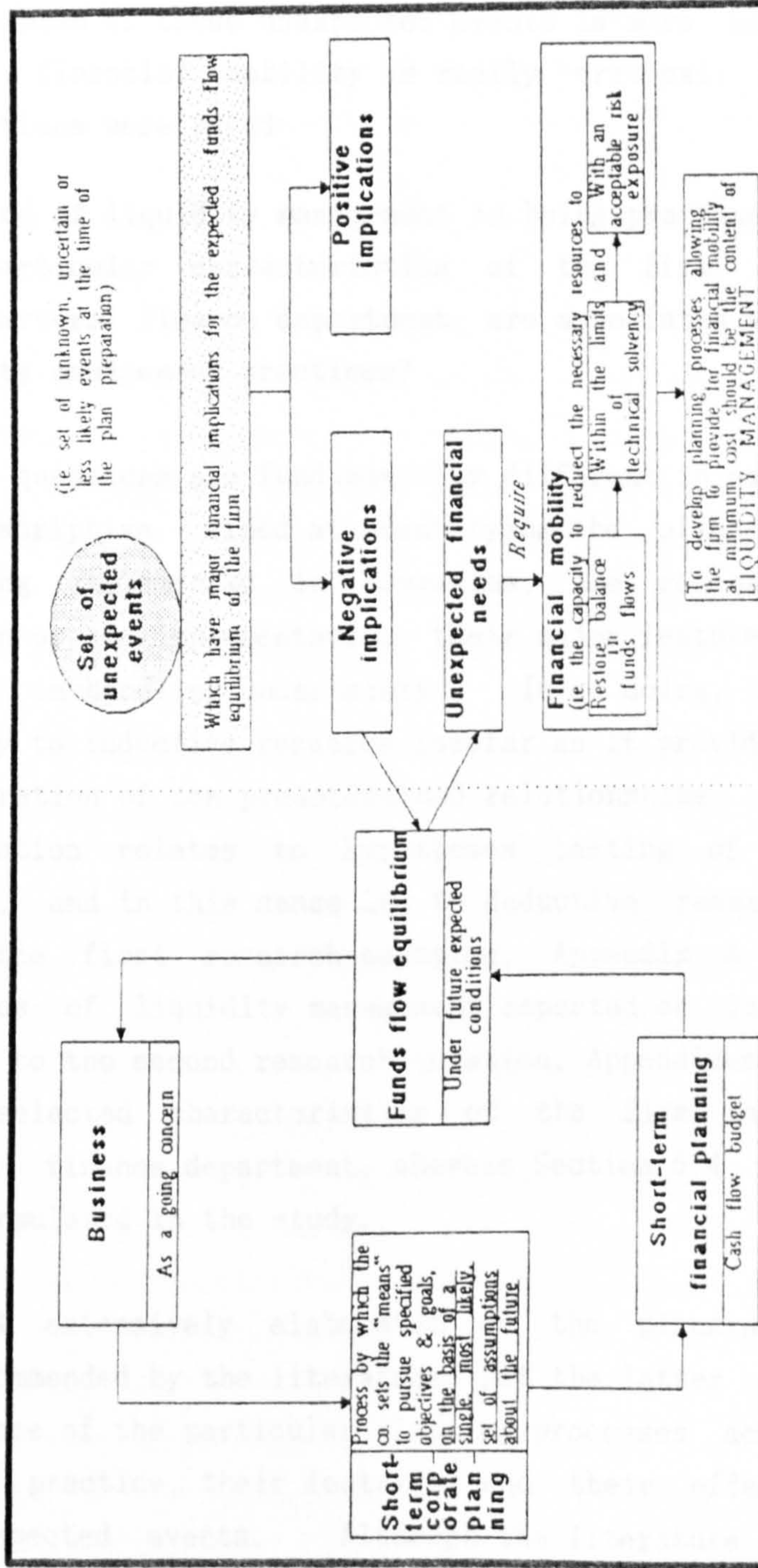
Section 5.2 introduces the research problem of the study. The section further states the research questions asked, and presents the empirical evidence available on the subject. Specifically, Section 5.3 reviews Donaldson's work on financial mobility. Section 5.4 presents the research hypotheses formulated in the study, and Section 5.5 discusses the choice of survey research as the strategy adopted in the study. The procedure used for selecting the population is also described here. Finally, a summary of the chapter is provided in Section 5.6.

### 5.2 The Research Problem and the Empirical Evidence

The theoretical framework presented in Part I is the basis of the model constructed in Exhibit 5.1. A dominant characteristic of this model is the explicit assumption of a planning horizon confined to the short-term while the literature review was set against an undefined planning period. Because the time horizon is irrelevant for the understanding and validity of the concepts introduced, it was simply ignored in the theoretical framework. But, for the purpose of introducing the research problem of the study, it was necessary to be specific about a time span.

Exhibit 5.1

Constructed model of the theoretical framework





In terms of the model, the objective of the study was to discover how companies, and in particular U.K.-based companies, handle the problem of unexpected events which have major negative implications for the expected funds flow equilibrium of the firm. The short-term was the planning period adopted, since it is within a one year horizon that the problem of these unexpected events is more acute and the existence of financial mobility is really critical. Two major research questions were posed:

- \* What kind of liquidity management is being practised?
- \* What particular characteristics of the firm, and of its (headquarters) finance department, are associated with specific liquidity management practices?

These two questions are fundamentally different in nature. The first is descriptive - aimed at identifying the planning processes actually being implemented in companies, the reasons for their implementation or non-implementation, their major features, and their effectiveness in handling uncertainty. In so doing, this question opened the way to inductive research insofar as it provided the basis for the generation of non-predetermined relationships. The second research question relates to hypotheses testing of anticipated relationships, and in this sense led to deductive research. With respect to the first research question, Appendix A.1 lists the characteristics of liquidity management reported on in the study. With respect to the second research question, Appendices A.2 and A.3 list the selected characteristics of the firm and of its (headquarters) finance department, whereas Section 5.4 presents the hypotheses formulated in the study.

Chapter 4 extensively elaborated on the planning processes commonly recommended by the literature, yet the latter has produced little evidence of the particular planning processes actually being developed in practice, their features, and their effectiveness in handling unexpected events. Although the literature is rich in empirical studies of cash management, few of them consider cash management practices and those that do, tend to focus exclusively on traditional early warning systems [e.g. Soldofsky and Schwartz, 1972]. Some evidence is available from surveys of the practice of corporate

and financial planning. Whilst studies by Neild [1973] and Grinyer and Wooller [1973] indicate that as early as the beginning of the 1970s some U.K. companies were already using financial simulation models as part of their planning processes, most studies in U.K. companies published by 1974 [e.g. Hewkin and Kempner, 1968; Denning and Lehr, 1971, 1972; Taylor and Irving, 1971; Grinyer and Norburn, 1974; Turner, 1974] provide little information on fundamental planning practices, particularly in relation to financial forecasting and planning. Overall, it is not possible to obtain from these studies a total view of financial planning processes, ranging from budgeting to long-range planning.

One study that provides such a view is that by Jones [1975]. The main conclusion of his survey is that the financial planning practices of the companies surveyed were largely unsophisticated, basic and simple. Few companies provided for uncertainty in their forecasts, the great majority relying on the production of single-figure estimates of the most likely outcome. Only just over 25 percent of the companies used a computer model. Forecast reviews were performed by almost all companies with an apparently reasonable frequency. Similarly, most companies operated a system of budgetary control. Since 1975, a considerable amount of data relating to company financial planning practices in the U.K. has been published. Studies by Grinyer and Wooller [1975; 1978], Higgins and Finn [1977], and Grinyer [1982] show a substantial growth in the use of financial simulation models over the years. Grinyer and Wooller [1975] report that most companies with simulation models used them as a fully integrated part of regular planning. In almost half of the companies, they also aided ad hoc decisions. Higgins and Finn [1977] found that the preparation of financial projections was the most common use of simulation models, followed by long-range planning and then the evaluation of policy alternatives. Use of simulation models appeared less common in short-range planning. This emphasis on the assessment of future problems and opportunities in long-range planning is also acknowledged in Harrison [1976] and Bhatti [1981]. Harrison [1976] reports that, due to the uncertain conditions of the time, most firms were endeavouring to avoid being locked into a single course of action. Under such circumstances, the tendency was to emphasize flexibility (particularly financial flexibility) through the



development of contingency plans and actions. As to Bhattu [1981], he reports that the majority of companies surveyed prepared contingency plans to meet unexpected adverse circumstances. The companies which did not prepare contingency plans were generally the smaller ones. Grinyer [1982] reports, in the meantime, that the application of financial simulation models to the evaluation of alternatives in long-term planning has been accompanied in recent years by the application of financial modelling to short and medium-term control of cash flows.

Numerous surveys of company financial planning practices in the U.S.A. have also been published since 1974. Rue [1974], Naylor and Schauland [1976], Kudla [1978], Ang and Chua [1979] and Boulton et al. [1982] refer to the increasing number of companies using financial simulation models to assist in long-range planning on a regular basis. Naylor [1981] states that nearly all of the Fortune 1000 companies were routinely using some form of financial simulation model by 1980. All these authors report that cash flow analysis was one of the leading applications of such models. In their survey, Naylor and Schauland [1976] also report that financial simulation models were used most often to evaluate alternative policies, the vast majority of these models being of the "what if" kind. Among the benefits perceived by planners with the utilization of such models, Naylor and Schauland [1976] and Ang and Chua [1979] found that the ability to explore more alternatives ranked highest, followed by a better and faster decision-making. In two recent studies, Linneman and Klein [1979] and Klein and Linneman [1981] state that multiple scenario analysis has become very much an integral part of the planning process in some companies. Apparently, most MSA users adopted the procedure after specific experiences of the vulnerability of forecasts based on conventional historical analysis. The perceived inadequacy of traditional practices for incorporating environmental change into the corporate planning and decision-making process seems, therefore, to be a common reason for the use of MSA. In a different study, however, Fahey et al. [1981] conclude that most organizations have not yet widely developed sophisticated systems of environmental scanning and forecasting, and integrated their output into the strategic planning process. In effect, they could not find evidence that contingency planning was being systematically used as a means of assessing

environmental assumptions and/or of developing alternative sets of assumptions. A number of reasons were identified for this situation, such as the pressure of day-to-day operating activities, the undeveloped state of the social sciences, the scarcity of appropriately trained personnel, etc.. One quarter of the managers interviewed also suggested that it was impossible and/or unnecessary to attempt to identify discontinuities within the environment since one could adapt to changes as they manifest themselves.

The evidence provided by the studies above does no more than suggest possible developments in liquidity management practices. In fact, during the literature search only one empirical study was found which produces specific evidence of the subject. This consists of a major field work conducted by Donaldson [1969b] in 15 American companies from 1966 to 1969. No replication of Donaldson's work was found in the American Ph.D. thesis literature. Also, no comparable work investigating British experience was found. In view of this situation, the results of the study can be compared only to those of Donaldson. It is fully recognized that there is a difference both in time and environment between the two researches, and that divergences in results may be due to both factors. However, identification of these factors is beyond the scope of any comparison, since the necessary controls for temporal and environmental differences were not introduced in the study. Lastly, it is important to emphasize that although the study is comparable to Donaldson's, it was designed to provide broader and more generalized conclusions than the latter. Not only is the range of topics covered in the study wider than in Donaldson's, but the methodology used is also distinctly different and further-reaching.



### 5.3 Donaldson's Study

#### 5.3.1 Research Question and Methodology

Donaldson [1969b] based his study on three major assumptions: corporate funds inflows and outflows vary over time; a deficiency of funds may develop from time to time regardless of whether profits are realized or not; and, those charged with maintaining a balance between inflows and outflows have imperfect advance knowledge of the nature, magnitude and timing of the need. In this context, he formulated one research question:

"How does ... a business respond to the knowledge that future funds flows are not precisely known and that from time to time major needs will arise that have not been fully anticipated?" [p.5]

In order to answer this question, he decided to examine the recent past of business firms as a means of collecting information on managerial expectations, and of reconstructing decisions concerning financial action in the face of uncertainty. Case analysis was the adopted research approach.

In view of the obvious problems inherent in the nature of the data relevant to the research, it was crucial to use multiple sources of evidence for the sake of data validity. Data collection methods comprised archival analysis and personal interview. Analysis of company records for the last five to ten years prior to the research included: analysis of formal forecasts, mainly of pro-forma balance sheets and income statements, and of cash flow projections, for the purpose of obtaining a systematic record of expectations which could be used to corroborate the recollections of those who had experienced the events; analysis of detailed monthly or quarterly-based financial statements to obtain a record of actual financial events to set alongside forecasts; and, finally, analysis of other company records - such as minutes of board meetings, memoranda, etc. - for the purpose of obtaining information on items such as precise order of events, priorities followed in particular decisions, mood and thinking of the time, personalities involved, etc..

Several considerations were taken into account in the selection of companies for the sample of the business population to be researched. The first and primary consideration was access to the kinds of archival data described above, most particularly access to formal forecasts. A second consideration was the type of unexpected need that had been faced by the firm. It was decided that a variety of causes of pressure on funds flows should be included, and firms selected with this requirement in mind. It was also required that the pressure on the balance of funds flows should have been substantial and sustained for some length of time in order to have affected the firm in a major way. A third consideration was that all four combinations of two characteristics - need for funds (low/high) and capacity to respond (low/high) should be represented. The feeling was that such a procedure would minimize the possible bias arising from a random selection which disregarded the mix of pressures and capacity to respond. A final consideration in the selection of the research sample was the desire to minimize the differences between companies that could be attributed to the characteristics of the industry they belonged to. The result was the selection of three or four companies from the same industry responding at about the same period of time to the same kind of financial problem. Ideally, these companies would each represent one of the sectors of the matrix - need for funds x capacity to respond. Overall, fewer than two dozen companies were chosen, corresponding to a wide range of size. Although there had been a tendency to exclude very small companies and to concentrate on firms with access to established capital markets, company size was not an important criterion in the selection. Ultimately, this model of company selection was only partially implemented due to certain observations which emerged from the pilot study.

One of these observations was that those companies whose recent experience placed them in the sectors of the matrix involving low need or high capacity to respond, had given little thought to a strategy of financial mobility. As a result, the composition of the research sample was changed in order to place a much heavier emphasis on companies falling in the high need/low capacity sector. Another observation was that data were often unavailable. As far as formal cash flow projections were concerned, it was found that companies did



not prepare them on a consistent basis, and that forecast horizons were frequently much shorter than expected. Furthermore, and most important, it was found that formal forecasts were only a partial representation of management's expectations.

### 5.3.2 Research Findings

Donaldson's findings fall into three main categories, each of which will now be considered in turn:

#### 5.3.2.1 Financial planning and the unexpected need for funds

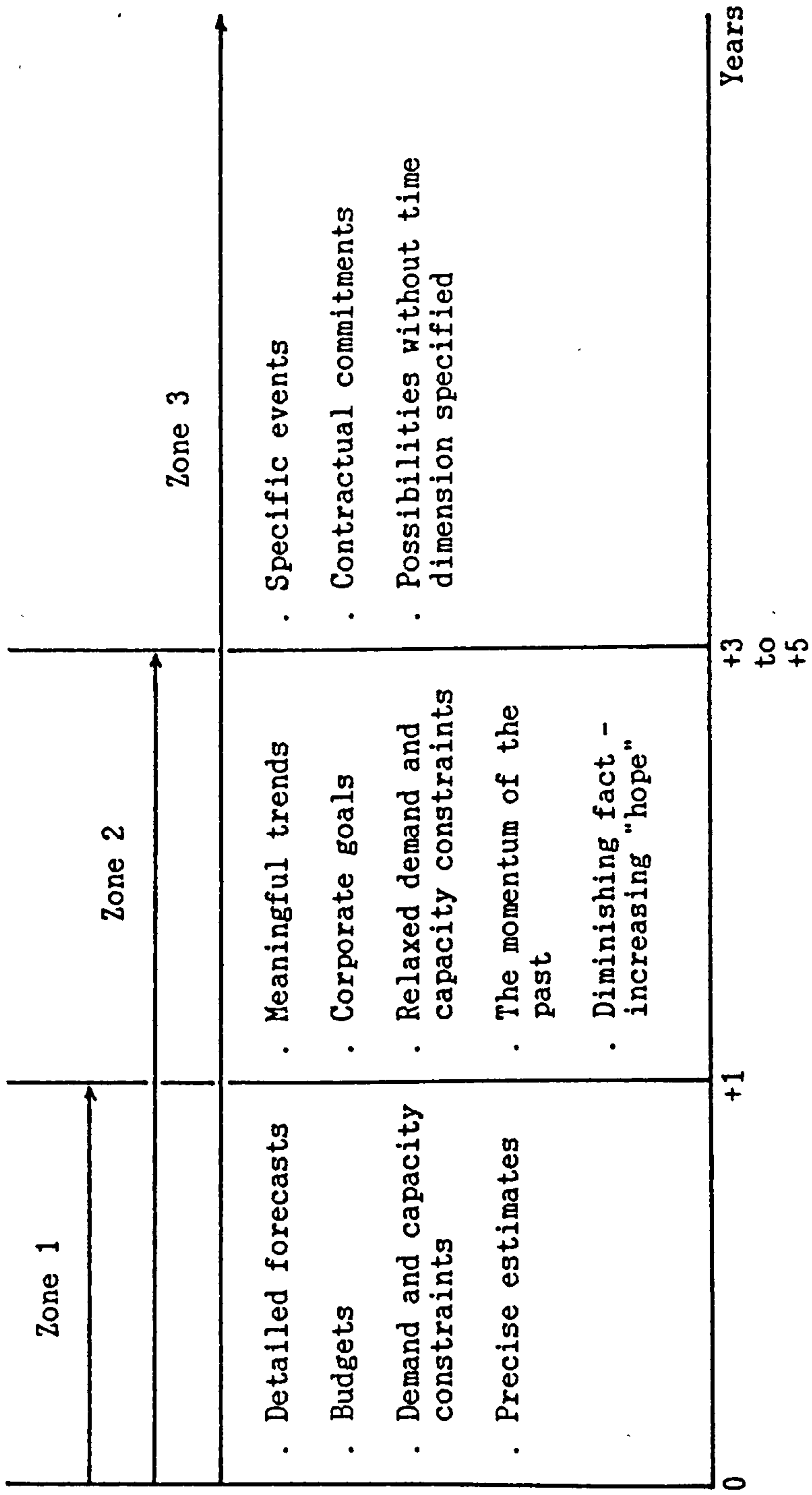
Information collected from the field sample of companies indicated a wide range of practices regarding the extent to which expectations of funds flows were systematically recorded and analysed. The evidence suggested that several factors might explain this diversity, such as the size and maturity of the company, the size of the firm's financial reserves, the size of the company's finance department, the age and background of the chief finance officer, and the experience of the firm in funds flow forecasting.

Despite this variety, the research was able to identify throughout the sample, three zones in the business horizon with significantly different characteristics. The three zones and their characteristics are presented in Exhibit 5.2.

Zone 1 is the immediate future, which is almost universally limited to the period one year hence. This is the period which receives all the attention of detailed business planning. From general economic forecasting through to the lowest level of company budgeting procedures, visibility in the zone 1 horizon is quite high. Generally, the company's productive capacity is fixed for the period, and the parameters of customer demand relatively predictable because consumption capacity is also fixed within limits. Furthermore, changes in market share are not likely to be large. On the expenditure side, budgeting conventions mean that at least once a year

Exhibit 5.2

Subdivisions of the planning horizon



Source: Adapted from Donaldson [1969b, p.175]



top management will conduct internal negotiations as to how the expected receipts will be spent. But, excepting unusual circumstances, behaviour on expenditures is relatively predictable.

Zone 2 is a time period usually between three and five years hence. Here, the characteristics of business planning are totally different from those of zone 1. In the zone 2 horizon, restrictions of capacity on both producer and consumer are substantially relaxed and the possibility of shifts in consumer demand, competitor action, and the company's own ability to respond to new opportunities is greatly increased. With a greater range of internal and external options, budgeting constraints lose much of their significance. The specification of corporate goals, also, becomes much less precise, frequently being expressed in terms of a universal desire for continued growth in sales, earnings or market share. Zone 2 is largely perceived in terms of trends rather than specific changes. These trends are a function more of goals than of known constraints. Zone 2 forecasts have real meaning only to the extent that trend lines based on the momentum of the past are relevant. How far ahead this momentum extends determines the precise time horizon of zone 2. The zone 2 forecast is also much more generalized than that of zone 1. It is not designed to set specific operating targets by specified dates, and it is not normally used as a yardstick for evaluating or compensating management. It is simply a planning device.

The financial implications of the zone 2 forecast are therefore necessarily different from those of the zone 1 forecast. Instead of a very detailed cash flow budget which is taken as a "certainty", the financial implications of zone 2 translate themselves in the estimate of an imprecise need for funds. Estimates of profit trends indicate future internally generated funds. If approximations of plant, working capital, and other expenditures called for by the corporate plan exceed internal generation, then, there is an expected deficit of funds to be externally provided for by an approximate date. Alternatively, the growth rate will have to be slowed down to be consistent with available funds.

Finally, zone 3 covers the period extending into the future beyond the range of significant trend data for the company. A few things are known about this period, primarily derived from contractual commitments made in the past. Information is likely to be in terms of possible events without a specific time dimension and probably with only a very general notion of financial magnitude. Preparation of an expected funds flow requirement for the zone 3 horizon is not possible.

To what extent, then, in each of the three zones did formal financial planning attempt to take account of the unexpected need for funds? Donaldson observed that in zone 1 the usual response to uncertainty about future funds requirements was to repeat the forecasting exercise several times, in the general belief that as significant dates became closer, the forecast would become more accurate. In zone 1, therefore, traditional early warning systems dominated. The problem of uncertainty about the future was also recognized in the forecasting methodology of zone 2 but in a quite different way. Here, formal contingency planning was vaguely carried out by testing some variations in the forecasts. Basically, two solutions were adopted - either to develop additional projections based on an "optimistic" and a "pessimistic" trend line, or to superimpose a cyclical fluctuation on the trend.

The difference in dealing with uncertainty between the two zones was largely the result of distinctly different purposes behind the two levels of planning. For the purpose of managing and coordinating an ongoing business, the future must at times be treated as a certainty, and action initiated as if the predicted events will actually occur. The typical zone 1 forecast was seen as such an action document. The inclusion of possible variations from the most probable outcome was considered an impediment to decisiveness and action. On the other hand, the zone 2 forecast was largely viewed as an exploratory exercise with fewer immediate action implications. Here, the acceptance of a range of events was more tolerable even though it could conflict with corporate goals. The practical effect of these considerations was to force contingency planning "underground" in zone 1 - to make it informal rather than formal, individual rather than group.



## 5.3.2.2 The unexpected need and the resources of mobility

Among the research sample of companies, the source of pressure on the balance of funds flows varied with each company and industry. On the other hand, the events confronting those companies at the time of the study could be classified into four main categories, according to their basic impact on the pattern of funds flows: the isolated and apparently random event causing a sudden change in inflows and outflows of definable limits in magnitude and duration; the interrelated and at times cumulative changes in the volume of sales and operations - fluctuations around a trend line; a basic change (increase) in the required scale of expenditure either because the business had moved to a higher trend line of sales and operations or because a higher level of expenditures was demanded to maintain the existing trend line; and, belated recognition of a seriously deficient competitive position which now demanded major strategic outlays in order to restore the desired profitability and growth.

In the sample of companies, the last two categories of events represented the most serious challenge to the balance in funds flows. Donaldson further noted that the categories of pressure on funds flows were not mutually exclusive and, in fact, tended to overlap during any given planning horizon. In particular, some of the so-called random events tended to be more likely under conditions of competitive weakness. Thus, vulnerability to a series of financial shocks may increase the likelihood of the series.

As to the resources for meeting such financial pressures - the resources of mobility - Donaldson's findings were as follows:

Short-term commercial bank borrowing:

In resource planning up to one year, the available short-term bank borrowing was widely regarded as the primary defence against the unexpected. Most finance officers placed considerable emphasis on the importance of cultivating a close relationship with the lending officer - a relationship usually regarded as a highly personal one, involving mutual trust and continuous communication. As a rule, normal resource planning worked on the basis that established lines of

credit and borrowing limits on unsecured bank debt allowed a comfortable margin of safety. Borrowing short-term on a specific pledge of assets was viewed as a potential emergency source but it was sufficiently distasteful as to be usually eliminated from a defined strategic role.

A highly important question addressed in the study was how the finance officers related free cash to short-term borrowing power in developing a strategy of financial mobility. In many companies, short-term debt capacity was found to be larger than free cash balances. In addition, short-term debt capacity tended to be regarded as more certain than free cash balances. In general, finance officers were found to be more disposed to rely for their own financial mobility on the off-the-balance-sheet resource which they alone knew best and which they personally negotiated. Of all business resources, the short-term banking relationship came closest to being a personal and private resource of the finance function rather than of the corporation as a whole. Finally, no clear picture was obtained in the sample as to a perceived difference between the cost of cash reserves and unused bank debt.

#### Modification of budgeted flows:

A second major resource of mobility consisted of the option of responding to an unexpected need by modifying the existing plan.

However, the option of modifying the inflow stream by accelerating the timing of inflows was seldom evident. Generally, companies took their cash inflow from sales as a given which was not subject to significant short-term manipulation. In fact, the only two types of action which were implemented at all were: - to separate the cash receipt from the shipment and sale date through some sort of negotiated prepayment arrangement, and - to draw on the potential sales of future planning periods and bring these into the present planning period by such devices as a price cut or an announced price increase to take effect in the future. Neither of these alternatives was favoured as a part of a normal strategy of financial mobility - the first corresponding to an overt confession of financial weakness, the second involving serious disturbance of market



relationships and possibly serious effects on income.

In contrast, the ability to avoid cash flow deficits by manipulating the expenditure horizon for various categories of expenditure was a widely and continuously used resource of mobility. Significant differences in the discretionary powers of management over the magnitude and timing of the flows, however, meant that the various categories of cash outflows played significantly different roles in a strategy of financial mobility. The evidence of the research was that financial and scale-related outflows played the most important role.

#### Liquidation of assets:

One management concept, widely accepted within the research sample, was that the sale of assets could not and should not be a significant part of a strategy of financial mobility. The arguments most frequently put forward were the following: liquidation of earning assets should be based on a deliberate evaluation of long-term earnings potential measured against alternative opportunities; at times of financial stringency, the company's bargaining position is weak; the liquidation of assets is so uncertain as to timing and magnitude of the funds released that it cannot be a part of any plan for mobility.

However, observation of several companies experiencing serious and sustained financial pressure clearly demonstrated that the liquidation of assets was a part of their strategy of mobility. This evidence suggests that there is a pressure to defer action until a financial emergency forces it, which would explain why liquidation of assets appeared to coincide with periods of financial strain as opposed to a more orderly process distributed over time.

#### Increments of long-term capital:

The long-term capital contract did not play an important role in a strategy of mobility. This was not surprising in the light of the normal emphasis on a planning horizon of one year.

The use of equity was very infrequent. It was recognized that the substantial lead time required on issue, and the general unpredictability of the common equity market made this resource rather unreliable as a defence against the unexpected. It was universally accepted, furthermore, that the sale of new common stock would lead to an immediate dilution of earnings per share and was, therefore, to be avoided unless there was a strong upward trend of earnings. In this context, companies that used common stock were really forced into it either because lenders made additional equity a prerequisite to new debt or because it was literally a last resort. In only one company did an issue of equity appear to be a free and deliberate choice as a means of gaining flexibility for the future.

The long-term debt contract, on the other hand, was looked on with more favour than equity for the purpose of dealing with uncertainty. In effect, the long-term debt contract is much more of a known quantity than equity, being a much more reliable component of a strategy of mobility. The common circumstances under which long-term debt played a role in financial mobility were where the company was funding one or several unexpected needs initially financed by internal trade-offs or by short-term borrowing, or where the company was anticipating an unspecified financial need. In either case, the reserve of long-term borrowing power was being used not so much as a resource in itself but rather as a means of restoring or increasing other resources of mobility.

#### 5.3.2.3 The evidence relating to strategy

Donaldson was able to identify common characteristics in the response by sample firms to unexpected needs for funds. On the basis of those characteristics, he portrayed a model of typical behaviour.

When a deficit emerges under conditions where its duration and magnitude are unclear, the initial response by firms tends to be an attempt to contain the effects within the financial area of the business, and to insulate operations from the shock of the event. To contain the deficit within the financial area means to consume



instant or short-term negotiable reserves, or to modify budgeted flows that are entirely within the discretion of the finance officer. In using these alternatives, finance officers try not to use any resource to its limit before the next resource is employed. Whether other action accompanies the response above depends on the identification of the nature of the need.

At some point, when the decline in instant and short-term negotiable reserves approaches the limits set by the established norms of the company and its bankers, the response tends to be the negotiation of a long-term loan. As part of a general strategy of mobility, this step is designed to continue to insulate the organization from the causes of the funds flow deficit and avoid a confrontation between budgeted commitments and unexpected needs. Here again, the tendency is for companies to remain well within accepted debt limits so that a reserve of long-term debt capacity is retained.

If the deficit in funds flows persists, companies try to reappraise their operations with a programme to increase efficiency and to minimize costs. The aim is to determine which funds can be internally released without interfering in any serious way with strategic outflows, or with current and future sales and earnings. Yet, the attempt to improve company efficiency leads to increasing resistance as the effort to find internally financial mobility clashes with the organizational cushions designed to provide operational mobility. The immediate result is a re-examination of the norms of financial policy which have set the boundaries on use of various reserves up to this point. The traditional debt policy is challenged and new levels considered, particularly as far as long-term debt is concerned. Whether or not a flow deficit continues to occur, the existence of new highs in borrowing tends to result for the first time in a serious examination of major reallocations of existing resources. This tends to be a time for re-assessment of long-term objectives and strategic outlays.

If a deficit still persists beyond this stage, the only alternative left to most companies is to curb outflows, inevitably reducing current sales and profits. Some residual secured short-

term borrowing may take place but this really amounts to a liquidation of the assets offered as security. Evidence of some companies indicates that the organization may still have some operational mobility.

The model just described is simply an attempt at generalization of behaviour in a sample of companies over a part of their history. There were, of course, many variations of this general pattern of response, and this is the result of the fact that decisions do not take place in a vacuum, but are strongly influenced by a variety of considerations, both external and internal, of which some are unique to the time and some are of more enduring influence. Overall, however, the pattern of response identified above was visible in the sample. Donaldson refers to it as "the strategy of least resistance". Based on a primary concern for ease of negotiation, this strategy first consumes reserves directly controlled by the finance officer, then proceeds to negotiate funds from familiar and friendly sources, and lastly negotiates with unfamiliar or hostile sources, external or internal. Closely related to the concern for ease of negotiation is the factor of predictability and certainty of the source. When these two concerns are taken together they provide a powerful motivation in the sequence of use. Observation strongly suggested them to be a dominant force in shaping the response to sequential deficits among sample firms.

#### 5.4 The Hypotheses Formulated

The major hypotheses formulated in the study are introduced in this section, following the preceding review of Donaldson's work. The hypotheses relate specific liquidity management practices to particular characteristics of the firm, and of its (headquarters) finance department.



The first group of hypotheses reads as follows:

H<sub>1</sub>: The implementation of early warning systems, the preparation of an inventory of the resources of liquidity, and the degree of complexity of that inventory are associated

- with non-financial characteristics of the firm, such as
  - the industry classification
  - the age of the firm
  - the degree of fragmentation in group turnover
  - the size of the firm, and
  - the degree of capital intensiveness
- with financial characteristics of the firm, such as
  - the level of return on investment
  - the degree of capital turnover
  - the amount of financial leverage
  - the firm's cash position
  - the proportion of internal cash flow generation
  - the proportion of operating cash flow generation
  - the proportion of investment in working capital
  - the proportion of capital investment
  - the overall unused borrowing capacity of the firm
  - the evolution of the firm's overall unused borrowing capacity
  - the degree of predictability of company's cash inflows, and
  - the degree of predictability of company's cash outflows
- and, with characteristics of the (headquarters) finance department, such as
  - the (group) senior executive in charge of the (headquarters) finance department
  - the size of the (headquarters) finance department
  - the extent of formal institutionalization of the cash function in the (headquarters) finance department, and
  - the percentage of (headquarters) finance department's time devoted to the management of cash (at group level).

The choice of these characteristics satisfied several criteria. Donaldson [1969b] suggests that the type of response to unexpected events varies with each company and industry. Hence the inclusion of industry classification with the non-financial characteristics of the firm. He also suggests [1969b] that the size and maturity of the company may explain the diversity in the recording and analysis of

funds flow expectations. This, together with Soldofsky and Schwartz' [1972] conclusion that the size of the firm has a direct impact on the development of cash management practices, led to the inclusion of size and age (as a surrogate for maturity) of the company with the non-financial characteristics of the firm. It is possible, on the other hand, that groups may have a lower exposure to the effects of unexpected events when subsidiaries individually make little contribution to group sales. Hence the need to consider a characteristic such as the degree of fragmentation in group turnover. Lastly, the degree of capital intensiveness was taken as a non-financial characteristic of the firm, influencing liquidity management. This followed Linneman and Klein's [1979] finding that users of multiple scenario analysis appear to concentrate in industries which are technologically sophisticated and which tend to have higher investment commitments.

The need to consider financial characteristics of the firm proceeded from the indication in Donaldson's [1969b] study that companies with a good financial profile or with little experience of negative financial surprises paid little attention to liquidity management. The selection of the first eight financial characteristics was mainly dictated by two studies - Chen and Shimerda [1981], and Gombola and Ketz [1983]. Chen and Shimerda [1981] provide evidence that each of the seven common factors defined in the Pinches et al. [1973; 1975] studies - Return on Investment, Financial Leverage, Capital Turnover, Short-term Liquidity, Cash Position, Inventory Turnover, and Receivables Turnover - represents a unique dimension in the description of financial characteristics of a business firm. Based on this evidence, it was decided to select for the study four of the seven characteristics mentioned above, namely level of return on investment, degree of capital turnover, amount of financial leverage, and firm's cash position. The degree of inventory turnover and the degree of receivables turnover were excluded on the grounds of being less important for the purpose concerned. The amount of short-term liquidity was not contemplated, given the criticisms that can be raised against the corresponding indicators (see Chapter 3). Meanwhile, four financial characteristics relating to cash flow were selected for the study. The justification for this was found in Gombola and Ketz' [1983]



article. Based upon the proposition that profitability differs conceptually from cash flow, these authors hypothesize the presence of a separate cash-flow factor in addition to the seven found by Pinches et al. [1973; 1975]. They conclude [Gombola and Ketz, 1983, p.113]: "The major difference between the present study and earlier studies of classification patterns for financial ratios lies in the identification of cash-flow measures as representing a separate dimension of firm performance. In previous studies, where net income plus depreciation and amortization is used as a proxy for cash flow, the resulting cash-flow ratios are closely associated with profitability ratios. When cash flow is measured as cash revenues from operations less cash expenses for operations, the cash-flow ratios load on a separate and distinct factor. This separate factor is not captured by any other ratio group, including profitability ratios. This result confirms distinct differences between profitability measures and cash-flow measures, and validates the separate purpose of the Statement of Changes in Financial Position (cash basis) from the Income Statement. Moreover, the result also suggests that cash-flow ratios may contain some information not found in profitability ratios. Therefore, cash-flow ratios should not be overlooked in predictive or descriptive studies involving financial ratios".

Since characteristics of the firm relating to its internal liquidity were incorporated in the study, it was decided also to take into account the amount of cash available to the firm from its debt and equity financing capacities (an indicator of its external liquidity). Hence the inclusion of the overall unused borrowing capacity of the firm and its evolution with the financial characteristics of the firm. Also included with financial characteristics was the degree of predictability of company's cash flows. The reliability of a firm's cash flow predictions is very much emphasized in the Gentry et al. [1979] article. Here, effective management of assets, liabilities and operations is seen to be highly dependent on cash flow predictability, working capital crises being inversely related to the predictability of cash inflows and outflows.

Finally, it is suggested by Donaldson [1969b] that the size of the company's finance department, and the age and background of the chief finance officer may be linked to the recording and analysis of funds flow expectations. This made it desirable to include in the study characteristics of the (headquarters) finance department, such as the (group) senior executive in charge, the size of the department, the extent of formal institutionalization of the cash function, and the percentage of time devoted to the management of cash (at group level).

H<sub>2</sub>: The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and the inventory of resources is associated

- with non-financial characteristics of the firm
- with financial characteristics of the firm
- and, with characteristics of the (headquarters) finance department.

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and the inventory of resources may be taken as an indicator of the general awareness on the part of top management of the issue of managing liquidity. The greater the participation, the greater the chance of a corporate approach to the problem of unexpected events.

The third and fourth groups of hypotheses of the study are as follows:

H<sub>3</sub>: The periodicity of cash flow budget revision is associated

- with characteristics of the cash flow budgeting system, such as
  - the number of years for which the cash flow budgeting system has been in operation
  - the objectives set for the cash flow budgeting system, and
  - the degree of commitment attached to cash budgets in general.



H<sub>4</sub>: The implementation of contingency planning (reactive and proactive) is associated

- with characteristics of the cash flow budgeting system, such as
  - the number of years for which the cash flow budgeting system has been in operation
  - the degree of commitment attached to cash budgets in general, and
  - the periodicity of cash flow budget revision
- and, with characteristics of the cash flow updating or forecasting system, such as
  - the preparation of cash flow updates or forecasts.

Donaldson [1969b] suggests that the range of practices regarding the recording and analysis of funds flow expectations may vary with the experience of the firm in funds flow forecasting. It was logical, therefore, to hypothesize in the study an association between the implementation of early warning systems and some of the characteristics of the cash flow budgeting and of the cash flow updating or forecasting systems. One of those characteristics was the number of years for which the cash flow budgeting system has been in operation. This characteristic was used as a surrogate for the experience of the firm in funds flow forecasting. Likewise, the implementation of traditional early warning systems, namely the preparation of cash flow budget revisions and the preparation of cash flow updates or forecasts, was used as a surrogate for the firm's experience in funds flow forecasting. On the other hand, the inclusion in the study of such a characteristic as the degree of commitment attached to cash budgets in general was due to Donaldson's [1969b] observation in his study that traditional early warning systems dominated in the short-term, contingency planning when existing being forced "underground". The reason for this situation appeared to lie in the atmosphere of commitment to a goal which dictated the zone 1 forecast. In such an atmosphere, preparing "what if" kinds of questions was viewed as signalling uncertainty and eroding organizational commitment.

The same reasons as before led to the formulation of the fifth group of hypotheses:

H<sub>5</sub>: The degree of reliance on the resources of liquidity is associated

- with non-financial characteristics of the firm
- with financial characteristics of the firm
- with characteristics of the cash flow budgeting system
- with characteristics of the cash flow updating or forecasting system
- and, with characteristics of contingency planning, such as
  - the number of years for which contingency planning has been carried out
  - the implementation of reactive contingency planning
  - the implementation of proactive contingency planning, and
  - the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans.

The inclusion of characteristics of contingency planning was due to the idea that the experience of the firm in carrying out contingency planning, the type of contingency planning carried out, and the degree of top management participation in the discussion of contingency plans may influence corporate attitude towards liquidity resources.

The sixth group of hypotheses reads as follows:

H<sub>6</sub>: The degree of acceptance of certain procedures as a means of responding to unexpected financial needs is associated

- with non-financial characteristics of the firm, such as
  - the size of the firm, and
  - the degree of capital intensiveness
- and, with financial characteristics of the firm, such as
  - the level of return on investment
  - the degree of capital turnover
  - the amount of financial leverage



- the firm's cash position
- the proportion of internal cash flow generation
- the proportion of operating cash flow generation
- the proportion of investment in working capital
- the proportion of capital investment
- the degree of interest coverage
- the degree of dividend coverage, and
- the amount of earnings per share.

For reasons of simplicity, the degree of acceptance of certain procedures, namely the revision or postponement of corporate objectives, the revision or postponement of corporate strategies, the violation of company dividend policy, and the violation of company debt policy, was hypothesized as being associated with only two non-financial characteristics of the firm. On the other hand, three additional financial characteristics of the firm were hypothesized as being associated with the degree of acceptance of such procedures. Those additional financial characteristics - degree of interest coverage, degree of dividend coverage, and amount of earnings per share - are identified in Pinches and Mingo [1973] as well as in Stevens [1973], and are generally accepted to influence certain decisions by the firm, such as the reduction in dividend payments.

The seventh group of hypotheses states:

H7: The preparation of an inventory of the resources of liquidity, and the degree of complexity of that inventory, are associated

- with characteristics of the cash flow budgeting system
- with characteristics of the cash flow updating or forecasting system
- with characteristics of contingency planning
- and, with characteristics of the response to unexpected financial needs, such as
  - the existence of a rationale for the deployment of resources, and
  - the degree of reliance on the resources of liquidity.

In the same way as features of funds flow forecasting were hypothesized as being associated with the preparation of an inventory of the resources of liquidity, and the degree of complexity of that inventory, so the existence of a rationale for the deployment of resources and the degree of reliance on the resources of liquidity were hypothesized as being linked to the preparation and the degree of complexity of such an inventory.

Finally, the last group of hypotheses of the study states that:

H<sub>3</sub>: The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and the inventory of resources is associated

- with characteristics of the cash flow budgeting system
- with characteristics of contingency planning
- with the degree of reliance on the resources of liquidity
- and, with the degree of complexity of the inventory of resources.

### 5.5 The Research Strategy

According to Kidder [1981, p.59], when "... in social research we want to be able to answer questions about the distribution of and relationships among characteristics of people or groups as they exist in their natural settings", survey research is the strategy to be used. This was the principle followed in the study, after taking into account the nature of the research questions being asked.

In survey research, the same type of information is collected from all or part of a population. It is because survey respondents answer the same questions that the incidence and distribution of characteristics can be assessed, and relationships among them can be explored. But because survey research is non-experimental (i.e. it



cannot make use of the techniques of group randomization and group control essential to experimental designs), it cannot go beyond the reporting of distributions and relationships to their interpretation - in other words, it cannot make causal inferences. Under these circumstances internal validity is simply not an issue. To the extent that in survey research one attempts causal interpretations, one must then be prepared to defend the internal validity of such conclusions. On the other hand, no other research strategy matches the strength of survey research in its potential for handling external validity, provided probability sampling is used [Kidder, 1981].

In selecting the population, the initial intention was to choose all public, U.K.-based companies making up the Financial Times Actuaries Equity Index for both Capital and Consumer Goods groups as at January 1, 1982. For statistical reasons as well as time considerations, it was decided to reduce the size of this original population by selecting only the five largest industry clusters in each of the two groups - Capital and Consumer Goods. This meant a total of 305 companies with 56 percent of them belonging to the Capital Goods group. Since the two groups involved were not evenly represented in the total of this population, it was decided to adjust their relative weights by extending to seven the number of industry clusters in the Consumer Goods group to be included in the population. By so doing, the overall number of companies was raised to 333, the participation of each group - Capital and Consumer Goods respectively - being 51 percent and 49 percent. Eventually, the number of elements in the population was further reduced due to the fact that four companies had been used for pilot test purposes, and 16 other companies had gone into insolvency, had merged or been acquired by others at the start of the survey. This reduction did not substantially disrupt the equilibrium as far as the participation of both groups in the population was concerned. The final size and composition of the study population are shown in Table 5.1.

Table 5.1

Size and composition of the study population

Financial Times:			Companies	
Major group classification	Industry number	Industry classification	Number	%
Capital Goods	2	. Building Materials	23	
	3	. Contract. & Constr.	28	
	4	. Electricals	27	
	6	. Mech. Engineering	63	
	9	. Motors	21	
			Sub-total	162
Consumer Goods	22	. Brewers & Distill.	19	
	25	. Food Manufacturing	18	
	26	. Food Retailing	15	
	29	. Leisure	20	
	33	. Packaging & Paper	13	
	34	. Stores	44	
	35	. Textiles	22	
		Sub-total	151	48.2
Total			313	100.0



## 5.6 Summary

It was the objective of the study to discover how U.K.-based companies handle the problem of unexpected events which have major negative implications for the expected funds flow equilibrium of the firm. The short-term was the planning period adopted. Two major research questions, fundamentally different in nature, were posed:

- \* What kind of liquidity management is being practised?
- \* What particular characteristics of the firm, and of its (headquarters) finance department, are associated with specific liquidity management practices?

If the first research question opened the way to inductive research, the second, by relating to hypotheses testing of anticipated relationships, led to deductive research.

Despite its recommendations concerning the content of liquidity management, the literature has produced little evidence of the particular liquidity management practices actually being implemented. In fact, during the literature search only one empirical study was found which produces specific evidence of the subject. This consists of a major field work conducted by Donaldson [1969b] in 15 American companies from 1966 to 1969. Particular attention was paid to Donaldson's work in the chapter, with emphasis being placed on the fact that although the study is comparable to Donaldson's, it was designed to provide broader and more generalized conclusions than the latter. Following the review of Donaldson's work, the major hypotheses formulated in the study were presented in the chapter.

Given the nature of the research questions being asked, survey research was the strategy adopted in the study. In selecting the population, the companies making up the Financial Times Actuaries Equity Index for both Capital and Consumer Goods groups as at January 1, 1982 were used. Eventually, 313 companies belonging to the five and seven largest clusters respectively in the Capital and Consumer Goods groups, comprised the population of the study.

## Chapter 6 DATA COLLECTION METHODS

### 6.1 Introduction

### 6.2 Data Collection Methods I - Questionnaire

#### 6.2.1 Preparation of the Questionnaire

##### 6.2.1.1 Planning the questionnaire

##### 6.2.1.2 Testing the questionnaire

##### 6.2.1.3 The final version

#### 6.2.2 Administration of the Questionnaire

### 6.3 The Research Sample

### 6.4 Data Collection Methods II - Analysis of Sample Companies' Annual Financial Reports

#### 6.4.1 The Selection of Financial Indicators

#### 6.4.2 The Archival Analysis

### 6.5 Summary



## 6.1 Introduction

Two methods, very different in nature, were used to collect data in the study: questionnaire and analysis of sample companies' annual financial reports.

The process involved in the preparation and administration of the questionnaire is described in Section 6.2. Section 6.3 reports on the research sample, the response rate obtained in the study, and analyses the possible response bias. Section 6.4 discusses the choice of certain financial indicators to measure 13 characteristics of the firm. The decomposition process of these financial indicators into first and second component elements, and the stage of gathering information on the latter from sample companies' annual financial reports are also described in this section. Finally, the chapter is summarized in Section 6.5.

## 6.2 Data Collection Methods I - Questionnaire

### 6.2.1 Preparation of the Questionnaire

A careful and rigorous approach to questionnaire design is essential [Kidder, 1981]. Accordingly, a substantial amount of time and effort in the study was allocated to the preparation of the questionnaire.

Questionnaire preparation comprises the stages of planning and testing. Planning the questionnaire involves organizing the way in which information on the characteristics will be collected. Testing the questionnaire involves the implementation of a pilot study

[Selltiz et al., 1965; Oppenheim, 1966; Moser and Kalton, 1971; Kidder, 1981].

#### 6.2.1.1 Planning the questionnaire

Planning the questionnaire implied 1) defining the questionnaire content, 2) organizing the content in a natural sequence, and 3) writing up the questionnaire.

The content was directly dictated by the one-star characteristics identified in Appendix A. Information on the other characteristics was already available (characteristics with no star) or could be obtained only after collecting information on the one-star characteristics (characteristics with two stars) or, was sought through a different method (characteristics with three stars). Once the content of the questionnaire had been defined, the characteristics selected were grouped into four main sections, each designed to characterize a relevant dimension of the research problem:

- . SECTION 1 - SHORT-TERM CASH FLOW PLANNING aimed at characterizing the company's cash flow planning systems - cash flow budgeting, and cash flow updating or forecasting (Appendix A.1 - I.1 and I.2);
- . SECTION 2 - PLANNING FOR UNCERTAINTY aimed at characterizing contingency planning, and the traditional early warning systems in handling uncertainty (Appendix A.1 - I.3, and II.1 to II.6);
- . SECTION 3 - PLANNING FINANCIAL RESOURCES aimed at characterizing the company's response to unexpected financial needs, and the inventory of resources (Appendix A.1 - III.1 to III.3);
- . SECTION 4 - GENERAL INFORMATION aimed at characterizing the firm itself, and its (headquarters) finance department (Appendix A.2 and Appendix A.3).

Before the questionnaire could be written, a decision had to be made concerning the sequence of topics within each section of the questionnaire. As Kidder [1981, p.161] indicates, such a sequence should adopt the best psychological succession of topics from the



point of view of the respondent. With this in mind, a sequence was produced which was believed to lead the respondent progressively through subject areas of increasing complexity.

The writing up of the questionnaire involved formulating the questions and deciding the questionnaire format, drawing on guidelines suggested by Payne [1951] and Kidder [1981]. The prime consideration in designing the questionnaire was ease of response in order to elicit the highest possible return rate. For this reason, fixed-alternative questions were formulated whenever possible [Oppenheim, 1966], using open-ended questions only when limited knowledge of the issues involved dictated this approach, or when the range of possible alternatives was too vast or too complex to be accommodated in closed form<sup>(1)</sup>. In their most sophisticated form, fixed-alternative questions make use of scales. The latter present a number of advantages which justified their use in the questionnaire. Simplicity is their main feature [Oppenheim, 1966]. Scales, moreover, enable several variables to be represented by a single score which reduces the complexity of the data; they also provide quantitative measures that facilitate statistical computation<sup>(2)</sup>. As regards the order of the questions within a topic, the questionnaire attempted to adopt a logical sequence taking into account possible conditioning effects of earlier questions [Moser and Kalton, 1971]. Finally, filter questions were used in order that the questionnaire could cover every possible situation. Normal precautions were taken in the use of this type of question as suggested by Sudman and Bradburn [1982].

#### 6.2.1.2 Testing the questionnaire

After the questionnaire was planned and a first draft was prepared, it was tested in a pilot study. The objective was to improve questionnaire content, structure and presentation in addition to ascertaining the reliability and validity of the questions. Oppenheim [1966] suggests the use of internal checks involving the formulation of the same question in different ways to control for the reliability of factual questions. As to attitude questions, controlling for reliability is effected by the use of sets of attitude

scales. Both practices obviously lead to an increase in questionnaire size. Notwithstanding, questions with the sole purpose of acting as checks on others, and sets of attitude scales were introduced on a random basis in the pilot study version of the questionnaire. Finally, to control for validity, Oppenheim [1966] proposes cross-checks against independent sources of information. Cross-checks were carried out during the pilot study interviews on those questions where validity seemed more problematic.

Four companies (see section 5.5) were selected for testing the questionnaire. The selection was based on geographical identity with Glasgow University in order to guarantee the best possible cooperation on the part of such firms. The pilot study version of the questionnaire was mailed to these companies with a covering letter explaining that the questionnaire was the subject of a test, and that the researcher was seeking advice. All four companies agreed to complete the questionnaire and to have a personal interview with the researcher. The interviews were conducted with the (headquarters) finance officer of each of the companies in question.

The largest part of each test interview was spent discussing the several relevant dimensions of the research problem, and probing the questionnaire to determine whether new questions should be added and others deleted, and whether the sequence of questions and topics was clear enough to the respondent. The interview was further intended to discover whether questions were correctly formulated, whether they were misleading or contained unclear terminology, and whether the choices provided for fixed-alternative questions included all relevant alternatives.

Presentation aspects were also discussed during each test interview. Sources such as Sudman and Bradburn [1982] and Oppenheim [1966] emphasize that in written questionnaires, layout, spacing, printing, choice of paper, and other features all have a significant influence on the level of response. The length of the questionnaire was another consideration brought for discussion. In the opinion of the respondents interviewed during the pilot study, the length of the questionnaire tested was not viewed as a serious obstacle to participation in the survey.



### 6.2.1.3 The final version

On the basis of the feed-back received from the pilot study, the final version of the questionnaire was constructed. No major alterations were introduced in this version as far as questionnaire content and structure were concerned, apart from the omission of those questions and sets of attitude scales which had been included in the first draft to check for reliability. Alterations in the final version were limited to the formulation of questions, particularly of those in SECTION 2. It became apparent during the pilot study that finance officers were more familiar with a different terminology regarding contingency planning than with the one drawn from the literature. The relevant questions were rephrased in order to incorporate such a terminology. At the suggestion of some participants in the pilot study, brief introductions were placed at the beginning of each section of the questionnaire as a means of reducing misunderstanding and improving the clarity of the questionnaire content.

The two forms of the final questionnaire - one for group, the other for non-group companies - are presented in Appendices B.1 and B.2 respectively. Besides the questionnaire, two covering letters were prepared, one signed by the head of the department where the research was being conducted, the other signed by the researcher (Appendix B.3). These letters provided a brief introduction to the research project and emphasized the relevance of its findings for current company practice. To motivate companies to cooperate in the survey, it was promised that the findings of the research would be made available, and a copy of the final report forwarded to each participant in due course. Confidentiality of the data was stressed and it was promised that results would be reported in aggregate form only.

### 6.2.2 Administration of the Questionnaire

Questionnaire administration involves the mailing of the questionnaire to the study population and the control of the returns.

Each company included in the study population was sent a copy of the questionnaire, the two covering letters, and a stamped, self-addressed return envelope. The covering letters were personally addressed to the company's (headquarters) finance officer, the latter being identified as the (group) senior executive in charge of the (headquarters) finance department. The name of the (headquarters) finance officer, his formal title, the complete name of the company, and its address were typed at the top of the covering letters. The full name and address of each company were found in The Times 1000 [1982-83] and checked against the information contained in the KBE [1983]. The name of the (headquarters) finance officer and his formal title were identified in either the KBE [1983] or in the company's latest financial reports. When in doubt about the address of the company or the identity of the (headquarters) finance officer, telephone calls were made to the companies in question. Although this was very time consuming, it was believed that the process of addressing the questionnaire to the person specifically responsible in the company for liquidity management would result in a higher response rate for the study.

The first batch of questionnaires was mailed in the beginning of August 1983. Four weeks later, a second request was mailed to those companies which had not yet responded, namely 173 firms (Table 6.1). The second request included a new covering letter (Appendix B.4) specially written for the purpose, and another copy of the questionnaire. Overall, 122 companies completed and returned the questionnaire. A letter of acknowledgement (Appendix B.5) for their participation in the study was sent to these companies. Simultaneously, 65 firms declined to participate in the study (either because it was not company policy to do so or because the workload at the time was very high) whereas 126 firms made no response to either request (Table 6.1).



Table 6.1

Breakdown of population firms' responses

Type of response	1st request		2nd request		Total	
	Number	%	Number	%	Number	%
. Agreed to participate	90	29	32	18	122	39
. Declined to participate	50	16	15	9	65	21
. Did not respond at all	173	55	126	73	126	40
Total	313	100	173	100	313	100

### 6.3 The Research Sample

The 122 companies that completed and returned the questionnaire made up the research sample of the study. According to Table 6.1, the level of participation corresponded to a response rate of 39 percent. This can be regarded as a fairly high return rate compared to the normal response in social science research - all the more so, considering the length of the questionnaire involved.

The response rates per industry can be obtained by comparing the industry classification of sample firms with the industry classification of population firms. Table 6.2 shows that response rates were generally higher in the Consumer Goods group than in the Capital Goods group, with the former displaying an average return rate of 44 percent compared to 35 percent for the latter. Group 9 - Motors with a response rate of 0 percent was mainly responsible for this lower average return rate. Group 9, therefore, was discarded from the study population. As a result, the response rate for the Capital Goods group increased to 40 percent while for the study, the overall response rate increased to 42 percent. Finally, the majority of industry clusters showed a response rate falling in the range of 36 to 46 percent. Four industry clusters, however, were the exception. Groups 26 - Food Retailing and 33 - Packaging and Paper presented exceptionally high return rates (67 and 54 percent respectively) whereas Groups 2 - Building Materials and 25 - Food Manufacturing presented fairly low return rates (26 and 33 percent respectively). These numbers show the extent of possible bias in the research results.



Table 6.2

Sample companies and response rates per industry

Major group classification	Financial Times:		Companies in sample (1)	Companies* in population (2)	Response rate per industry (1)/(2)
	Industry number	Industry classification			
Capital Goods	2	. Building Materials	6	23	26%
	3	. Contract. & Constr.	13	28	46%
	4	. Electricals	11	27	41%
	6	. Mech. Engineering	26	63	41%
	9	. Motors	0	21	0%
		Sub-total	56	162	35%
Consumer Goods	22	. Brewers & Distill.	7	19	37%
	25	. Food Manufacturing	6	18	33%
	26	. Food Retailing	10	15	67%
	29	. Leisure	9	20	45%
	33	. Packaging & Paper	7	13	54%
	34	. Stores	18	44	41%
35	. Textiles	9	22	41%	
		Sub-total	66	151	44%
		Total	122	313	39%

\* Values obtained from Table 5.1.

## 6.4 Data Collection Methods II - Analysis of Sample Companies' Annual Financial Reports

Information on three-star characteristics (Appendix A) was sought in the study through the analysis of sample companies' annual financial reports. Prior to this analysis, however, it was essential to select the financial indicators which would measure the 13 characteristics in question.

### 6.4.1 The Selection of Financial Indicators

Exhibit 6.1 presents the list of three-star characteristics identified in Appendix A and the corresponding financial indicators chosen in the study.

As far as the non-financial characteristics of the firm were concerned, the selection was relatively easy. Turnover and total assets are the two indicators commonly referred to in the literature to measure size of the firm [e.g. Altman, 1968; Deakin, 1972; Pinches and Mingo, 1973; Blum, 1974]. Since these two indicators can substitute for each other as a measure of the firm's size [Shalit and Sankar, 1977], the selection of turnover in the study was purely arbitrary. As to degree of capital intensiveness, Peles and Schneller [1979] propose the use of a ratio expressing the relationship between labour and capital inputs. In this regard, the ratio of fixed assets to number of employees of the firm was considered appropriate.

The choice of financial indicators to measure the first four financial characteristics of the firm was based on the seven-factor classification of important ratios for predicting company failure as developed by Chen and Shimerda [1981]. These authors use the results from the Pinches et al. [1973; 1975] studies, as well as supplemental results from a principal component analysis of 39 ratios, to assign to a seven-factor space all 34 financial ratios found useful in predicting company failure in seven empirical studies (Exhibit



Exhibit 6.1

List of 13 characteristics of the firm and corresponding financial indicators chosen in the study

Characteristics		Financial indicators
Non financial	. Size of the firm	$\frac{\text{TURNOVER}}{\text{FIXED ASSETS}} \times 1000$ $\text{N. OF EMPLOYEES}$
	. Degree of capital intensiveness	
Financial	. Level of return on investment	$\frac{\text{NET INCOME}}{\text{NET WORTH}} \times 100$
	. Degree of capital turnover	$\frac{\text{TURNOVER}}{\text{NET ASSETS}}$
	. Amount of financial leverage	$\frac{\text{TOTAL DEBT}}{\text{NET ASSETS}} \times 100$
	. Firm's cash position	$\frac{\text{LIQUID ASSETS}}{\text{CURRENT ASSETS}}$
	. Proportion of internal cash flow generation	$\frac{\text{INTERNAL CASH FLOW}}{\text{TOTAL CASH GEARING}} \times 100$
	. Proportion of operating cash flow generation	$\frac{\text{OPERATING CASH FLOW}}{\text{TOTAL CASH GEARING}} \times 100$
	. Proportion of investment in working capital	$\frac{\text{WORKING CAPITAL INV.}}{\text{TOTAL CASH GEARING}} \times 100$
	. Proportion of capital investment	$\frac{\text{CAPITAL EXPENDITURES}}{\text{TOTAL CASH PLOUGH-BACK}} \times 100$
	. Degree of interest coverage	$\frac{\text{EBIT}^*}{\text{INTEREST PAID}}$
	. Degree of dividend coverage	$\frac{\text{NET INCOME}}{\text{DIVIDENDS PROPOSED}}$
	. Amount of earnings per share	$\frac{\text{NET INCOME}}{\text{N. OF ORD. SHARES}} \times 100$

\* EBIT = Earnings before interest and taxes

6.2). To the extent that the four financial characteristics in question corresponded to four of the seven factors identified, the set of financial ratios assigned to each one of those factors provided the background in the study for the selection of the corresponding financial indicator. The ratios classified by the same factor are highly correlated, and the selection of one ratio to represent a factor can account for most of the information provided by all the ratios of that factor. In this connection, it would seem that the selection of any particular financial ratio to represent a factor would be a matter of indifference. But, this is not the case. In effect, each ratio contains common as well as unique information. The common information contained in a ratio is represented by the factor. The unique information is not shared by any other ratio in that factor. Therefore, the set of financial ratios to be selected in every instance should be such that the ratios capture most of the common information contained in their factors and, as a group, contain more of the unique information than any other set of financial ratios. Unfortunately, such a theory is yet to be developed [Chen and Shimerda, 1981]. Given the state of the art, four financial ratios, one in each of the four factors under scrutiny, were selected for the study on a totally ad hoc basis (Exhibit 6.2). A small variation of these financial ratios produced the financial indicators used in the study, namely net income to net worth, turnover to net assets, total debt to net assets, and liquid assets to current assets.

The measurement of the four financial characteristics of the firm relating to cash flow was made on the basis of the cash flow statement as displayed in Exhibit 3.6. The chosen financial indicators set the relationships that best reflect the characteristics to be measured. Finally, the financial indicators selected to measure the last three financial characteristics of the firm were directly provided by the literature. Pogue and Soldofsky [1969], Pinches and Mingo [1973], Barton [1977] and Weston and Brigham [1985] are unanimous in proposing the ratio of EBIT to interest paid as a measure of the degree of interest coverage; Stevens [1973], and Breen and Lerner [1973] suggest the ratio of net income to proposed dividends as a measure of the degree of dividend coverage; while, the ratio of net income to number of ordinary shares is generally accepted [e.g. Pinches and Mingo, 1973; Barton, 1977] as a measure of earnings per



Exhibit 6.2

Seven-factor classification of 34 financial ratios found useful in predicting company failure in seven empirical studies

Factors	Financial ratios	Empirical studies						
		Beaver [1966]	Altman [1968]	Deakin [1972]	Edmister [1972]	Blum [1974]	Elam [1975]	Libby [1975]
Return on Investment	. Net income/Sales						X	
	. Funds flow/ Net worth						X	
	. Funds flow/Total assets						X	
	. Net income/Total assets	X		X				X
	. Net income/Net worth						X	
	. EBIT/Sales						X	
	. EBIT/Total assets		X					
	. Net income/Common equity					X		
Capital Turnover	. Quick assets/Total assets			X				
	. Funds flow/Sales						X	
	. Current assets/Total assets			X				X
	. Net worth/Sales				X			
	. Sales/Total assets		X				X	
	. Working capital/Total assets	X	X	X				
Financial Leverage	. Total liabilities/Total assets	X		X			X	
	. Total liabilities/Net worth					X	X	
	. Long-term debt/Current assets					X	X	
	. Funds flow/ Total debt	X		X		X	X	
	. Funds flow/Current liabilities				X			
	. Retained earnings/Total assets		X					
Short-term Liquidity	. Current assets/Current liab.	X		X			X	X
	. Quick assets/Current liab.			X			X	
	. Current liab./Net worth				X			
	. Current liab./Total assets						X	
Cash Position	. Cash/Sales			X				
	. Cash/Total assets			X				X
	. Cash/Current liabilities			X			X	
	. No credit interval	X						
	. Quick flow					X		
Inventory Turnover	. Current assets/Sales			X				X
	. Inventory/Sales				X			
	. Sales/Working capital			X	X			
Receivables Turnover	. Quick assets/Inventory					X		
	. Quick assets/Sales			X				

\* EBIT = Earnings before interest and taxes

Source: Adapted from Chen and Shimerda [1981, p.57]

share.

#### 6.4.2 The Archival Analysis

In order that the study might capture an average rather than a particular profile of sample companies at a certain moment in time, it was decided that a five-year average of the selected financial indicators (corresponding to the last five years preceding the project) would be obtained. Since information on the financial indicators was not directly available in companies' annual financial reports, data were gathered instead on second component elements. These were identified in the study after decomposition of the financial indicators into first and second component elements (Appendices C.1 and C.2). The data were obtained from the financial reports of sample firms for the period 1978 to 1982. Such data were organized into five data sheets for every company in the study, one per year involved. The format of the data collection sheet used is presented in Appendix C.3, whereas a definition of second component elements essential in guaranteeing consistency in the gathering of the data is contained in Appendix C.4.

#### 6.5 Summary

Two methods were used to collect information in the study: questionnaire and analysis of sample companies' annual financial reports.

A substantial amount of time and effort in the study was allocated to the planning and testing of the questionnaire. Planning the questionnaire implied defining its content, organizing that content in a natural sequence, and writing up the questions. After the questionnaire was planned and a first draft was prepared, it was tested in a pilot study. The objective was to improve questionnaire content, structure and presentation. On the basis of the feed-back



received from the pilot study, the final version of the questionnaire was constructed. The administration of the questionnaire involved mailing it to the study population and controlling the returns. Overall, 122 companies completed and returned the questionnaire which corresponded to a response rate of 39 percent. These companies made up the research sample of the study.

Information on 13 characteristics of the firm was sought in the study through the analysis of sample companies' annual financial reports. Prior to this analysis, however, it was essential to select the financial indicators which would measure those characteristics. Since information on the financial indicators was not directly available in companies' annual financial reports, data were gathered instead on second component elements. The decomposition process of the financial indicators into first and second component elements as well as the stage of archival analysis were described in the chapter.

Footnotes

- (1) As a variation of an open-ended question, each respondent was asked to provide an organigram describing the organizational structure of the (headquarters) finance department.
- (2) For further discussion of scaling techniques see Nachmias and Nachmias [1981].



PART III ANALYSIS AND INTERPRETATION OF THE DATA

Chapter 7 DATA PROCESSING

Chapter 8 CHARACTERISTICS OF THE SAMPLE

Chapter 9 RESULTS AND CONCLUSIONS I

Chapter 10 RESULTS AND CONCLUSIONS II

Chapter 11 RESULTS AND CONCLUSIONS III

Chapter 12 FINAL CONCLUSIONS AND MAJOR IMPLICATIONS OF THE STUDY

## PART III ANALYSIS AND INTERPRETATION OF THE DATA

Part III describes the processing of the data (Chapter 7), and shows the statistical computation involved in the characterization of the sample (Chapter 8) and in the production of the research results (Chapters 9 to 11). At the same time, it undertakes the interpretation of such results in the context of the existing knowledge (Chapters 9 to 12).

It is important to emphasize that the reporting of the conclusions of the study follows a pattern which diverges from the traditional manner, in which each successive chapter of conclusions takes the reader through a progressive build-up process. Given the specific characteristics of the research problem of the study, such an approach to the reporting of conclusions is not feasible. The reporting pattern actually followed consists of drawing intermediate conclusions at the end of each chapter, each set of these conclusions covering a separate aspect of the problem. It is only in the final chapter that the results and intermediate conclusions are brought together and interrelated in a pyramidal process to draw the final conclusions of the study.



## Chapter 7 DATA PROCESSING

### 7.1 Introduction

### 7.2 The Data Matrix

#### 7.2.1 The Questionnaire Data Matrix

#### 7.2.2 The Financial Indicators Data Matrix

#### 7.2.3 The Final Data Matrix

### 7.3 The Statistical Model

#### 7.3.1 Descriptive Techniques

#### 7.3.2 Inferential Techniques - Testing of Hypotheses

#### 7.3.3 Correlation Analysis

#### 7.3.4 Comparison of Samples

### 7.4 Summary

### 7.1 Introduction

Data processing is the first stage of data analysis. Its purpose is to convert the information obtained through data collection methods into numerical form, and then to arrange it in an appropriate format that permits statistical analysis, ease of storage and access for future use [Kidder, 1981]. One possible lay-out, and probably the most frequently used in survey research, organizes the numerical data in matrix form. A data matrix may be defined as a  $n \times m$  table where rows represent the units of analysis or cases, columns represent the characteristics or variables under scrutiny, and cells, one at each intersection of a column and a row, represent the specific value assumed by each variable for each case.

The preparation of a data matrix requires the sequential execution of several well defined tasks. The first corresponds to the identification of both cases and variables. The second task includes the construction of the coding frame specifying how variables are to be coded. Given this set of rules, the researcher is ready to translate the information collected into numerical form. The last task consists of loading all numerical data into a computer and subsequently establishing a file to support the data matrix. Section 7.2 provides a characterization of the data matrix of the study and a description of the several steps involved in its preparation.

Statistical computation constitutes the second stage of data analysis. In social sciences, the choice of any statistical technique depends firstly on the nature of the specific question it is designed to answer, and secondly on the nature of the data to which it is to be applied [Nie et al., 1975]. A basic problem, however, is that often the choice is far from straightforward, requiring some arbitrary decision. If no rule is set, prior to undertaking the stage of statistical analysis, that guarantees the choice to be

uniform in every identical circumstance, the risk is run that inconsistencies occur at different places in the analysis. Statistical computation, therefore, should always be based on generic, pre-defined decision rules [Davis, 1971]. Section 7.3 presents the statistical model adopted in the study.

Finally, Section 7.4 summarizes the chapter.

## 7.2 The Data Matrix

The individual companies in the sample provided the cases in the data matrix of the study, while the characteristics present both in the questionnaire and in the list of financial indicators provided its variables. Due to the very distinct nature of these two types of characteristics, two separate data matrices were originally created: one for questionnaire data and the other for financial indicators data. The final data matrix resulted from the merger of the two.

### 7.2.1. The Questionnaire Data Matrix

The first step in the preparation of the questionnaire data matrix was to identify the variables. The typical procedure was to establish a one-to-one relationship between each characteristic present in the questionnaire and a variable to be identified. An exception was made in respect of those characteristics associated with multiple response. Limitations in the statistical package used in the study - SPSS Statistical Package for the Social Sciences - preclude a variable's taking on more than one value for each case [Hull and Nie, 1981]. Here, a different approach had to be taken. The resulting procedure was to identify several dichotomous variables, each corresponding to one of the several alternative responses available for the particular characteristic in question. In this regard, the organigram describing the organizational structure of the (headquarters) finance department of each sample company was analysed,



and the titles of senior and middle managers associated or potentially associated with cash management identified. Five broad title categories were subsequently defined in an attempt to account for the diversity encountered in the sample. The title categories produced were the following: treasurer, financial controller, cashier, corporate modeller, and planning and strategic manager. Note was also taken of the organizational layer where the original titles occurred. Only the first two layers below head of department were considered to be of interest to the study. As a result, ten dichotomous questionnaire variables were identified, each corresponding to the existence of one of the five title categories above in one of the two organizational layers selected.

At the end of this process, 224 variables in total were obtained from the questionnaire. An alphabetical list of these variables, with an indication of their location by question and section of the questionnaire, is presented in Appendix D.1. To this number, four extra-questionnaire variables were added for purposes of the study: variable CN - producing a company and a case identification number - was introduced to guarantee the confidentiality of the data; variable IC, introduced to reveal for each case its Financial Times industry classification; variable REQUEST, introduced to identify each case as either a questionnaire first request or second request; and, variable GROUP, introduced to determine whether or not a case was organized into group structure.

The next step in the preparation of the questionnaire data matrix was the development of the variables coding frame (Appendix D.2). The construction of this frame was guided by two generally recognized principles noted by Kidder [1981, p.302]:

"(1) Coding categories must be mutually exclusive; the same value should not be coded in more than one category for a single variable. (2) Coding categories should allow an exhaustive classification of all values that appear in a study. No values should be omitted for consideration, or "left out"."

Furthermore, the formulation of the coding frame took account of the nature of the questions supporting the variables concerned. For fixed-alternative questions, coding categories followed the range of

options already provided in the questions, and precodification was used. For open-ended questions, the actual answers by respondents were grouped (using the principles of content analysis) into broader categories delineated in terms of the theoretical rationale underlying the questions, and the coding established.

The next step involved the actual conversion of the information collected through the questionnaire into numerical form (coding). Since the accuracy of the research results is particularly sensitive to the accuracy of the data on which they are drawn, considerable care was given to this stage. In the case of a few companies, where some uncertainty existed in relation to some of the answers, clarification was sought by phoning the individuals who completed the questionnaire. As an additional measure to guarantee the reliability of the coding process, all coding was checked a second time. Once all questionnaire coded data were loaded into the computer, the same concern for reliability led to similar checks on computer data. A computer printout containing the latter was verified against questionnaire coded data.

The final step in the preparation of the questionnaire data matrix consisted in the generation and retention of an SPSS system file containing the matrix. As explained in Nie et al. [1975], an SPSS system file is obtained when the raw input data file is saved together with all the information that describes the data (including the file name, the name of the variables and their location in the file, the input medium on which the raw input data file resides, the number of cases, the missing-data values, the variable and value labels, etc.). Once the system file is created, both the data and the information it contains can be automatically accessed on all subsequent processing runs. The generation of the questionnaire system file FSPSSQ is described in Appendix D.3.

### 7.2.2 The Financial Indicators Data Matrix

The 13 characteristics of the firm measured by the financial indicators presented in Exhibit 6.1 constituted the variables for the financial indicators data matrix. The values taken on by these variables proceeded from the values assumed by the corresponding averaged financial indicators across sample firms. The calculation of the latter was the main step in the preparation of the financial indicators data matrix. A brief comment on the intermediate variables that had to be created for that purpose is presented in Appendix D.4. In Appendix D.5, the calculation of the values of the variables and the generation of the SPSS system file - FSPSSR - supporting the financial indicators data matrix are simultaneously described as these two steps developed in parallel.

### 7.2.3 The Final Data Matrix

The preparation of the final data matrix was a simple task once the previous two data matrices were created. In fact, the generation of the SPSS system file - FSPSS - containing the final data matrix was a simple matter of merging the two system files - FSPSSQ supporting the questionnaire data matrix, and FSPSSR supporting the financial indicators data matrix (Appendix D.6).

## 7.3 The Statistical Model

The identification of the level of measurement of each variable in the data matrix was a basic step prior to the construction of the statistical model adopted in the study. According to the traditional classification (Appendix E.1), most variables fell into the nominal, ordinal and ratio levels of measurement. The remaining variables, being dichotomous in nature, did not fit the adopted classification. However, as argued in Nie et al. [1975], a



dichotomy can always be treated as a nominal, ordinal or interval-level measure, the decision depending upon the particular situation.

As already mentioned, the choice of a particular statistical technique depends, first of all, on the nature of the specific question it is designed to answer. If the aim is to describe the distributional behaviour in the sample of the variables, then techniques in the field of descriptive statistics should be used. However, if the aim is to generalize the results obtained on the sample to the corresponding population, then techniques of inferential statistics should be employed. Second, the choice of a particular statistical technique depends on the nature of the data to which it is to be applied, that is on the level of measurement of the variables involved. In fact, each statistical technique is appropriate for data measured only at certain levels. More precisely, statistical techniques developed for a particular scale of measurement can always be used with higher level variables. They cannot be applied, however, to variables measured at a lower level [Nie et al., 1975]. These principles guided the construction of the statistical model.

### 7.3.1 Descriptive Techniques

As far as descriptive techniques are concerned, several procedures and statistics were applied in the study (Exhibit 7.1). In the selection of these procedures and statistics, a basic distinction between discrete and continuous variables played a critical role.

A variable is said to be discrete when it can be measured in terms of a limited (finite) number of values. On the other hand, a variable is said to be continuous when it can be measured in terms of an infinity of values in the range of an interval [Siegel, 1956]. In this sense, both nominal and ordinal-level variables are discrete variables. Interval and ratio-level variables, however, can be classified either as discrete or as continuous variables.

**Exhibit 7.1**

**Levels of measurement present in the study and descriptive procedures and statistics applied to each level**

Levels of measurement	Variable types	Characterization of the distribution in terms of:			
		Shape	Basic statistics	Measures of central tendency	Measures of dispersion
Nominal	Discrete	<ul style="list-style-type: none"> <li>. Absolute frequencies</li> <li>. Adjusted relative frequencies</li> </ul>	<ul style="list-style-type: none"> <li>. Proportion</li> </ul>	<ul style="list-style-type: none"> <li>. Mode</li> </ul>	/
		<ul style="list-style-type: none"> <li>. Absolute frequencies</li> <li>. Adjusted relative frequencies</li> <li>. Cumulative adjusted relative frequencies</li> </ul>	<ul style="list-style-type: none"> <li>. Proportion</li> <li>. Percentiles</li> </ul>	<ul style="list-style-type: none"> <li>. Mode</li> <li>. Median</li> </ul>	
Ratio	Continuous	<ul style="list-style-type: none"> <li>. Skewness coefficient</li> <li>. Kurtosis coefficient</li> </ul>	/	<ul style="list-style-type: none"> <li>. Arithmetic mean</li> </ul>	<ul style="list-style-type: none"> <li>. Range</li> <li>. Standard deviation</li> </ul>

On the basis of this distinction, the decision was taken to prepare one-way frequency distribution tables<sup>(1)</sup> for discrete variables, including both absolute and adjusted relative frequencies. When measured at the ordinal or ratio level, discrete variables were additionally provided with information regarding their cumulative adjusted relative frequencies. For continuous variables, the use of tabular reports is not feasible. Therefore, the decision was taken to characterize their distribution with the help of statistics such as the skewness and the kurtosis coefficients<sup>(2)</sup>.

The presentation of frequency distribution tables or of shape statistics, however, is generally recognized to be insufficient to describe a distribution. It is necessary to complement the analysis with statistics capable of conveying additional properties of the distribution. The use for such a purpose of two major classes of statistics - measures of central tendency or location, and measures of dispersion or variability - is usually recommended [e.g. Lapin, 1978]. The principal measures of central tendency and dispersion commonly regarded to be most appropriate for each different scale of measurement are discussed in Appendix E.2.

In the study, measures of central tendency and dispersion for continuous ratio-level variables were mainly reduced to the arithmetic mean and the standard deviation. Additionally, information on the range and on the minimum and maximum observation values taken on by these variables was also supplied. Given that the computerized statistical package used (SPSS) does not allow the calculation of either the median or the interquartile range for this type of variable, it was not possible to apply such statistics when distributions departed from normality.

Meanwhile, the proportion and the mode were the statistics consistently applied to both nominal and ordinal-level variables, including dichotomous variables. For ordinal-level data, the study further resorted to the use of percentiles, and sometimes of the median, taking advantage of the availability of cumulative adjusted relative frequencies.



A point should be made here about the manner in which the median was calculated in the study. Whenever this statistic was required to characterize an individual distribution, it was obtained by using the cumulative percentages to locate the category containing the middle case. However, when needed as a basis for comparison among several ordinal-level variables, the computation of this statistic was left to the corresponding SPSS programme. This programme uses the method of interpolation, and implicit in the latter is the assumption that the variable is continuous. The justification for such a contradiction lies in the fact that, for comparison purposes, the median calculated by the first process, although correct for the level of measurement in question, lacks sensitivity. It was in order to attain sensitivity, therefore, that a certain flexibility with respect to the assumptions underlying the calculation of the median by the interpolation process was accepted. The existence of decimal points in the value of the median is meaningful, provided the statistic is interpreted in comparative terms. Overall, there was a trade-off between sensitivity of the measure and strict adherence to its basic assumptions.

Finally, discrete ratio-level variables shared the statistics of both ordinal and continuous ratio-level variables. As they are discrete data, all the basic statistics (proportion and percentiles) and central tendency measures (mode and median) appropriate for ordinal-level data were applied to them, and as they are ratio-level data, the arithmetic mean, the range and the standard deviation were also applied to them. It should be emphasized, however, that all these measures of central tendency and dispersion were calculated on the basis of the original frequency distributions of the variables before aggregation of categories.

### 7.3.2 Inferential Techniques - Testing of Hypotheses

Making decisions about the defined population on the basis of the information collected in the sample, is the object of inferential analysis. A central feature is the testing of hypotheses, which may occur in several different contexts [Downie and Starry, 1977; Lapin,

1978]. In the study, the testing of hypotheses arose in connection with the subjects of correlation analysis and comparison of samples.

Independently of the subject in question, every statistical test conducted in the study was supported by a decision model specifying three main components: null hypothesis, level of significance and decision criterion. Appendix E.3 presents a brief summary of these concepts.

Null hypothesis. Since  $H_0$  is the crucial hypothesis and  $H_1$  is always the opposite of  $H_0$ , the option was taken that decision models in the study would present only the null hypothesis. Furthermore, tests were all formulated in the study in their non-directional form. The strong exploratory nature of the research resulting from the still embryonic state that characterizes the relevant literature made it advisable to opt for the non-directional test form. There are limitations associated with this form regarding the type of statistical inference that is permissible and fully justifiable. In non-directional tests, statistical inference cannot be taken further than the acceptance of the alternative hypothesis of difference. No statistical inference on the direction of the difference is valid since no statistical statement concerning the probable accuracy of that decision can be made [Downie and Starry, 1977]. However, on the basis of test statistics or other related indicators, it is acceptable to make suggestions about the possible direction of the difference, provided it is fully understood that such suggestions will have to be statistically tested in future research. As far as the reporting of test results is concerned, this is the approach that is followed.

Level of significance. Given that the crucial error in this kind of research is the Type I error, since it would lead the study to make erroneous claims concerning the existence of differences in the population, a relatively low level was sought for  $\alpha$ . Authors, such as Downie and Starry [1977] and Emory [1980], suggest that commonly used  $\alpha$  levels are 0.10, 0.05, 0.01 and 0.001 although sometimes lower as well as higher levels are used. Downie and Starry [1977], for instance, argue that any values of less than 0.50 are permissible. With a moderately low  $\alpha$  level in mind, the decision was taken to

accept a one-tailed significance level of 0.05 throughout the study. This means that for non-directional tests where two areas of rejection of the null hypothesis exist (two-tailed distributions), a level of significance of 0.10 was applied. Only in the special case of chi-square tests - which are always simultaneously non-directional [Downie and Starry, 1977] and one-tailed [Lapin, 1978] - was the 0.05 significance level applied. With respect to the potential implications of the selected level of significance on the probability of occurrence of Type II errors, it was assumed that the considerable size of the samples present in the study would keep such a probability at fairly low levels.

Decision criterion. The decision criterion described in the appendix was consistently applied in the study. Reference should be made here to the fact that attention is drawn to test results whose probability of occurrence falls slightly outside the adopted significance level up to the one-tailed probability level of 0.055. This does not represent a departure from the accepted decision criterion since, on no occasion, are those results declared to be statistically significant.

### 7.3.3 Correlation Analysis

The kind of correlation analysis conducted in the study was simple or bivariate correlation.

The existence of association between two variables implies that a covariation exists, but in no way suggests that variation in one variable is "caused" by variation in the other or vice-versa [Koutsoyannis, 1973; Lapin, 1978]. Since causality cannot be inferred from correlation, the use of words such as "dependent" and "independent" variable in the context of the correlation analysis of the study is dictated by a need for ease of reference to the variables involved, and by no means constitutes or implies a statement of functional relationship between the variables.



Correlation is affected by the measurement level of the variables involved. Whatever the measurement scale in question, however, the ultimate aim in correlation analysis is to produce a summary statistic capable of expressing how closely variables move together. The statistic may or may not convey information on the direction of the relationship [Nie et al., 1975; Lapin, 1978; Emory, 1980]. In the study, several correlation statistics were calculated from sample data. In addition, statistical tests determining the significance of each one of those statistics - i.e., determining the probability associated with the occurrence of a correlation coefficient as large as the one observed in the sample under the null hypothesis - were carried out.

Where association was tested for in the study, the data involved always failed to fit the assumptions of the Pearson model. For the most part, the data did not reach the interval-level of measurement, and in the few occasions where they did, it was the assumption of normality that could not be satisfied. For this reason, the study had to resort to nonparametric correlation statistics (Appendix E.4).

Basically, three distinct situations were faced when testing for association between variables measured at least at ordinal level. In each of these situations, a different decision was taken regarding the nonparametric measure of association to be used. When both variables were continuous or took on a large number of distinct categories so as to be characterized by a very small number of ties (if any) at each rank, the Spearman rank-order correlation coefficient was the selected measure of association. When both variables took on less than ten different categories (ten being a cut-off point arbitrarily set) with a resulting large number of ties occurring at each rank, crosstabulation analysis was performed, and the one-sample chi-square test of independence was chosen as the test of statistical significance. Phi, Cramer's V and the uncertainty coefficient (asymmetric) were then the selected measures of association<sup>(3)</sup>. In this situation, the disadvantages in using comparably weak nonparametric statistics for the measurement level of the variables involved, were deemed to be outweighed by the distortions that a particularly large number of ties would cause on both rank-order correlation coefficients. In a third situation, when one of the

variables took on less than ten different categories and the other was continuous or showed a large number of distinct categories with few or no ties at each rank, the Kendall rank-order correlation coefficient was chosen. Since this situation was also characterized by a large number of ties, crosstabulation analysis and the one-sample chi-square test of independence might have seemed appropriate. However, given that data on one of the variables extended over an unmanageably large number of categories, this decision would have required aggregation of categories. Not only would the definition of classes be purely arbitrary and time consuming, but also it would mean that a fair amount of information would be lost [Champion, 1970]. This argument was considered at length, and preference was given to a rank-order correlation coefficient despite the number of ties involved in the data. In these circumstances, Kendall's tau seemed to be the most appropriate choice.

Finally, one-sample chi-square tests of independence were used in the study not only in the situation referred to above but also whenever at least one of the intervening variables was a nominal-level variable. Phi for 2x2 tables, Cramer's V and the uncertainty coefficient (asymmetric) for nxm tables were the same selected measures of association.

Exhibit 7.2 summarizes the decision rules underlying the selection of correlation statistics in the study.

#### 7.3.4 Comparison of Samples

Statistical tests for the comparison of samples determine whether differences among sample statistics or distributions are due to random sampling fluctuations alone, or do in fact correspond to differences in the respective populations.

The choice of a specific test in this area should take into consideration three major factors [e.g. Siegel, 1956; Hull and Nie, 1981; Emory, 1980]:

Exhibit 7.2

Bivariate correlation statistics used in the study and decision rules underlying their selection

Bivariate correlation statistics	Decision rules
Spearman rank-order correlation coefficient ( $r_s$ )	Both variables measured at least at ordinal level, and both variables continuous, or taking on a large number of distinct categories.
Kendall rank-order correlation coefficient ( $\tau$ )	Both variables measured at least at ordinal level, and one of the variables taking on less than ten different categories, the other being continuous or showing a large number of distinct categories.
Chi-square statistic ( $\chi^2$ ) together with: . Phi . Cramer's V . Uncertainty coefficient (asymmetric)	. Both variables measured at least at ordinal level, and both variables taking on less than ten different categories. . At least one of the intervening variables measured at nominal level. . For 2x2 tables . For nxm tables



- the number of samples to be compared (two or k samples),
- the test design (related or independent samples), and
- the level of measurement of the variables involved (nominal, ordinal, interval or ratio).

Exhibit E.5.1 in Appendix E.5 shows the appropriate statistical tests to be applied in each of the 12 situations which can be identified when these three factors are simultaneously taken into account. The table, which is adapted from Siegel [1956] and Emory [1980], lists in each column, and cumulatively downward, the tests which are applicable to each level of measurement. On the other hand, Exhibit 7.3 reveals the four situations which were faced in the study and the specific tests used in each of them.

The Wilcoxon matched-pairs signed-ranks test was applied whenever two related samples were to be compared and the variables involved were measured on an ordinal scale. Preference was given to the Wilcoxon test over the sign test inasmuch as the former uses more information about the differences within pairs than the latter. To the extent that the former considers not only the direction of the differences but also their relative magnitude, it is a more powerful test than the latter [Siegel, 1956; Champion, 1970]. Siegel [1956, p.75], for instance, notes that "the power-efficiency of the sign test is about 95 per cent for  $N=6$  but it declines as the size of the sample increases to an eventual... efficiency of 63 per cent", whereas the power-efficiency of the Wilcoxon test is always around 95 percent even for small samples.

In similar circumstances but where k related samples were to be compared, Friedman's two-way analysis of variance (ANOVA) was used. This is an extension of the Wilcoxon matched-pairs signed-ranks test when more than two samples are involved.

The chi-square test of homogeneity for two independent samples was used when the intervening variables were nominal in measurement. The comments on small expected cell frequencies that were developed in Appendix E.4 for one-sample chi-square tests of independence, are applicable here and were implemented in the study.

**Exhibit 7.3**

**Statistical tests used in the study for the comparison of samples**

Levels of measurement	Statistical tests for the comparison of samples					
	Two-sample case			K-sample case		
	Related samples	Independent samples	Related samples	Related samples	Independent samples	
Nominal		Chi-square test of homogeneity for two independent samples				
Ordinal	Wilcoxon matched-pairs signed-ranks test	Mann-Whitney U test	Friedman two-way analysis of variance (ANOVA)			
Ratio						

When the intervening variables were ordinal in measurement, the comparison of two independent samples resorted to one of the most powerful nonparametric tests - the Mann-Whitney U test. This was the choice among five possible alternatives (Exhibit E.5.1). The reasons that led to the selection of the Mann-Whitney U test over the remaining alternatives are described next. Both the median test and the Mann-Whitney U test attempt to determine whether two independent groups differ in central tendency. Whereas the first considers the location of each observation value in relation to the combined median, the second considers the rank value of each observation and thus uses more of the information in the data. This makes it more powerful than the median test [Siegel, 1956]. In a different perspective, the Kolmogorov-Smirnov two-sample test judges whether two independent samples belong to the same population, on the basis of the agreement between the cumulative distributions of the two sets of sample values. The Kolmogorov-Smirnov two-sample test is also a powerful test. However, evidence indicates that it is weaker than the Mann-Whitney U test for samples where N is greater than 40. For small samples, the converse is true [Siegel, 1956; Champion, 1970]. Since in every instance in the study the combined sample size was above 40, the Mann-Whitney U test was given preference over the Kolmogorov-Smirnov two-sample test. The Wald-Wolfowitz runs test rejects the null hypothesis that the samples are drawn from the same population if the two sample distributions differ in any sort of way: central tendency, variability, skewness, etc.. This is also the major drawback of the test in the sense that when it can be concluded that the samples are significantly different, it is impossible to say in which respect they are so [Siegel, 1956; Champion, 1970]. In this context, the Mann-Whitney U test offers more precise information. Finally, the Moses test of extreme reactions is specifically designed to test the hypothesis that the members of one sample are extreme with respect to the members of the other sample. Although the power of the test is not known, it is generally accepted that when the test is used for its special purpose, it is more efficient than tests that are sensitive only to shifts in central tendency or in dispersion. If, on the other hand, the hypothesis to be tested deals with central tendencies - and this was always the case in the study - then a test based on the median or on mean ranks such as the Mann-Whitney U test is more efficient, and should be preferred to the Moses test [Siegel, 1956].



#### 7.4 Summary

The cases of the data matrix of the study comprised the individual companies in the sample, while the variables comprised the characteristics present both in the questionnaire and in the list of financial indicators. Due to the very distinct nature of these two types of characteristics, two separate data matrices were originally created: one for questionnaire data and the other for financial indicators data. The development of the variables coding frame, and the actual conversion into numerical form (coding) of the information collected through the questionnaire were the main steps in the preparation of the former matrix. The calculation of the values assumed by the averaged financial indicators across sample firms was, on the other hand, the main step in the preparation of the latter. The final data matrix resulted from the merger of the two matrices above.

Statistical computation was next carried out in the study on the basis of a previously constructed model which identified the particular statistical techniques to be applied, and specified the set of conditions or decisions rules leading to their selection. This model was presented in the chapter.

Footnotes

- (1) For variables taking on a number of discrete categories greater than ten, which is usually the case with discrete ratio-level variables, the frequency distribution tables were developed after the categories were grouped into classes or intervals.
- (2) The skewness and the kurtosis coefficients are shape statistics and both express, albeit in a different manner, the extent to which a distribution of cases approximates a normal curve. Both skewness and kurtosis assume at least interval-level data. For information on these two indicators see Nie et al. [1975] and Downie and Starry [1977].
- (3) Because these statistics are designed for nominal-level data, they do not provide information on the direction of the relationship. This information was obtained in the study by direct inspection of the data in the contingency tables.

## Chapter 8 CHARACTERISTICS OF THE SAMPLE

- 8.1 Introduction
- 8.2 Breakdown of Sample Companies According to Non-Financial Characteristics of the Firm
- 8.3 Breakdown of Sample Companies According to Financial Characteristics of the Firm
- 8.4 Breakdown of Sample Companies According to Characteristics of the (Headquarters) Finance Department
- 8.5 Summary



## Chapter 8 CHARACTERISTICS OF THE SAMPLE

### 8.1 Introduction

The present chapter examines sample firms according to major characteristics. The objective is to draw a picture of these companies to provide a better understanding of the results obtained in the study, and to feature the type of firm to which those same results can be extended.

Information about the characteristics in question was collected in the study through the questionnaire and from sample companies' financial reports. The questionnaire provided information about characteristics of the firm - such as age, degree of fragmentation in group turnover, overall unused borrowing capacity, degree of predictability of cash flows, etc. - and about characteristics of the (headquarters) finance department - such as size, (group) senior executive in charge, percentage of time devoted to cash management (at group level), etc.. SECTION 4 - "GENERAL INFORMATION" of the questionnaire was exclusively devoted to this purpose. Sample companies' financial reports provided information about characteristics of the firm such as size, degree of capital intensiveness, and financial situation in general.

The chapter starts with a breakdown of sample companies by industry classification, size, degree of capital intensiveness, and other non-financial characteristics of the firm (Section 8.2). The analysis of sample companies according to financial characteristics of the firm is conducted in Section 8.3. Section 8.4 deals with characteristics of the (headquarters) finance department, whereas Section 8.5 gives a short summary of the chapter.

## 8.2 Breakdown of Sample Companies According to Non-Financial Characteristics of the Firm

The distribution of sample companies by industry classification is given in Table 8.1. The table reveals that 54 percent belong to the Consumer Goods group, whereas the remaining 46 percent belong to the Capital Goods group. The industry with highest representation is Mechanical Engineering with 21 percent, followed in second and third places respectively by Stores with 15 percent, and by Contracting and Construction with 11 percent. At the other end, the industries with lowest representation are Building Materials and Food Manufacturing, both with 5 percent.

The statistics associated with the sample distributions of size (variable TURN) and degree of capital intensiveness (variable FAPEMP) are presented in Table 8.2. Companies are not normally distributed as far as size is concerned. In fact, the positive value of the skewness coefficient (2.5) indicates the presence of a distribution where most cases cluster to the left of the mean, or in other words, where most cases have an average turnover of less than £m 256. At the same time, the positive value of the kurtosis coefficient (5.4) reveals the leptokurtic character of the distribution, indicating that companies tend to concentrate on a spread of similar values of average turnover. Overall dispersion of the distribution, however, is quite reasonable. For a  $k$  equal to three standard deviations, the Tchebysheff theorem<sup>(1)</sup> shows that at least 89 percent of the cases fall within 76 percent of the entire range of the distribution. With regard to capital intensiveness, the statistics associated with its sample distribution reveal a curve that very substantially departs from normality. The distribution is highly positively skewed (3.2), showing a large predominance of degrees of capital intensiveness below £8 per employee. The positive value of the kurtosis coefficient (13.9) is extremely high, indicating very high peakedness of the curve and, therefore, very high concentration of companies on a spread of closely related degrees of capital intensiveness. Application of the Tchebysheff theorem to the distribution shows, furthermore, that the overwhelming majority of cases (89 percent for  $K=3$ ) lie just within 57 percent of the distribution range. Globally, variability

Table 8.1

## Industry classification

Variable IC

Financial Times:			Companies	
Major group classification	Industry number	Industry classification	Number	%
Capital Goods	2	. Building Materials	6	4.9
	3	. Contract. & Constr.	13	10.7
	4	. Electricals	11	9.0
	6	. Mech. Engineering	26	21.3
		Sub-total	56	45.9
Consumer Goods	22	. Brewers & Distill.	7	5.7
	25	. Food Manufacturing	6	4.9
	26	. Food Retailing	10	8.2
	29	. Leisure	9	7.4
	33	. Packaging & Paper	7	5.7
	34	. Stores	18	14.8
	35	. Textiles	9	7.4
	Sub-total	66	54.1	
Total			122	100.0



Table 8.2

Statistics associated with the sample distributions of variables TURN and FAPEMP

Statistics	Variables	TURN	FAPEMP
Shape statistics	Skewness	2.500	3.217
	Kurtosis	5.435	13.925
Measures of central tendency	Arithmetic mean	255.739	7.848
Measures of dispersion	Standard deviation	434.162	7.497
	Minimum	6.720	0.980
	Maximum	2041.859	52.871
	Range	2035.139	51.891

N = 120 for TURN  
 N = 119 for FAPEMP  
 N = number of valid cases

of the distribution is quite poor.

The distribution of companies according to age of the firm is presented in Table 8.3. This table shows that most cases (78 percent) have been operating for more than 30 years prior to the study. Also, most cases (94 percent) are organized into group structure, i.e. have at least one or more subsidiaries engaged in an operating (selling and/or productive) activity (Table 8.4). Yet in only 20 percent of these do their company headquarters carry out an operating activity as well. In the majority (80 percent), company headquarters simply play the role of the holding company (Table 8.5). Finally, the distribution of companies according to degree of fragmentation in group turnover is provided in Table 8.6. Information is given by the percentage of total group sales accounted for by the largest individual company (parent or subsidiary) within the group. The table reveals that the number of cases where a single company accounts for at least 50 percent of total group sales, is much the same as the number of cases where no individual company dominates the group in sales terms - 49 percent v. 51 percent respectively.

### 8.3 Breakdown of Sample Companies According to Financial Characteristics of the Firm

Eight out of the 11 financial characteristics of the firm present in the list of financial indicators (Exhibit 6.1) were selected to characterize the research sample. These financial characteristics include - level of return on investment (variable ROE), degree of capital turnover (variable TURPNA), amount of financial leverage (variable GEARNG), firm's cash position (variable LAPCA), proportion of internal cash flow generation (variable ICFPGR), proportion of operating cash flow generation (variable OCFPGR), proportion of investment in working capital (variable WCIPGR), and proportion of capital investment (variable CEXPPB). The statistics associated with their sample distributions are shown in Table 8.7.

Table 8.3

Age of the firm

Variable COEXIST

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The company has been operating:			
. For 5 years or less	0	0.0	0.0
. For more than 5 years up to 15 years	8	6.7	6.7
. For more than 15 years up to 30 years	19	15.8	22.5
. For more than 30 years	93	77.5	100.0
. Not determined	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120

Table 8.4

Organization into group structure

Variable GROUP

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	115	94.3	94.3
. No	7	5.7	100.0
	-----	-----	
Total	122	100.0	

N = 122



Table 8.5

## Role of company headquarters

Variable HQOPACT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Company headquarters carry out an operating activity	23	20.0	20.0
. Company headquarters do not carry out an operating activity	92	80.0	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 115

Table 8.6

## Degree of fragmentation in group turnover

Variable PERCSAL

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The percentage of total group sales accounted for by the largest individual company within the group is:			
. 90% or more	17	15.0	15.0
. Between 70 and 89%	15	13.3	28.3
. Between 50 and 69%	24	21.2	49.5
. Between 30 and 49%	26	23.0	72.5
. Between 10 and 29%	28	24.8	97.3
. Less than 10%	3	2.7	100.0
Not determined	2	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 113

Table 8.7

Statistics associated with the sample distributions of variables ROE to CEXPPB

Variables		ROE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CEXPPB
Shape statistics	Skewness	-0.698	2.664	0.469	2.322	-0.852	-0.631	1.019	0.232
	Kurtosis	2.035	9.025	-0.417	7.553	0.683	0.565	1.530	-0.477
Measures of central tendency	Arithmetic mean	11.749	2.633	20.439	0.120	75.889	63.906	16.535	45.061
	Standard deviation	9.335	1.862	13.026	0.129	14.528	16.955	21.173	15.124
Measures of dispersion	Minimum	-25.409	0.634	0.000	0.000	30.697	11.006	-26.492	8.543
	Maximum	35.619	12.904	57.243	0.811	99.524	97.091	98.000	78.663
	Range	61.028	12.270	57.243	0.811	68.827	86.086	124.491	70.119

N = 120 for all variables

The distribution of companies according to level of return on investment is revealed as only slightly negatively skewed (-0.7) and moderately more peaked than a normal curve (kurtosis=2.0). With only a small majority of cases with levels of return on investment greater than 12 percent (the mean of the distribution), and a moderate concentration of cases on particular values above that level, the sample is quite diversified as far as the characteristic in question is concerned. This can be confirmed by application of Tchebysheff's theorem which shows that for  $K=3$ , at least 89 percent of the observations spread over 85 percent of the distribution range. Similar features are exhibited by the sample distributions of two other characteristics - proportion of internal and proportion of operating cash flow generation. It should be noted that closeness to normality is higher in the case of these two distributions since the values of their kurtosis coefficients (0.7 and 0.6 respectively) are much nearer to zero. Even closer to normality are the sample distributions of amount of financial leverage and proportion of capital investment. This is indicated by the very small values of their skewness (0.5 and 0.2 respectively) and kurtosis (-0.4 and -0.5 respectively) coefficients. The almost perfect symmetry and the slight flatness of the curves express the idea that, despite a very mild tendency for firms to concentrate on gearing and relative capital investment levels below 20 percent and 45 percent respectively (the means of the two distributions), overall the sample is quite heterogeneous with respect to the two characteristics being analysed. In other words, companies take on a wide range of different gearing and relative capital investment levels with little concentration on any particular values. As to gearing levels, it is worth emphasizing that they range in the sample from zero, where the company is wholly equity financed, up to a maximum of 57 percent, where the use of debt and equity is nearly in balance. There are no cases, therefore, of companies where the proportion of debt to equity capital is so high as to be considered significantly disruptive.

Where symmetry of the curve is concerned, the sample distributions of degree of capital turnover and firm's cash position are similar to the sample distribution of size of the firm. In fact, the values assumed by their skewness coefficients are very much the same (2.7 and 2.3 respectively v. 2.5). They all reveal the presence of a curve



whose tail fairly extends towards the right. Yet with respect to peakedness of the curve, the two former distributions show high positive values of kurtosis, considerably above the value displayed by the latter (9.0 and 7.6 respectively v. 5.4). At the same time, variability of the cases over the range of those two distributions is fairly poor, and much smaller than the variability shown by the distribution of cases according to company size (for  $k=3$ , at least 89 percent of the cases fall within 62 and 63 percent of the range respectively v. 76 percent).

Finally, the distribution in the sample of proportion of investment in working capital is only moderately positively skewed and more peaked than a normal distribution (skewness=1.0 and kurtosis=1.5). Dispersion, according to Tchebysheff's theorem, is quite good, with at least 89 percent of the cases spreading over 86 percent of the whole distribution range.

A breakdown of sample companies according to four characteristics present in the questionnaire - namely the overall unused borrowing capacity of the firm, its evolution for the last five years preceding the study, and the degree of predictability of company's cash flows - complements the characterization of their financial profile. Table 8.8 reveals that 72 percent of the cases rate their overall unused borrowing capacity as more than moderate, with 43 percent regarding it as very large. Moreover, the majority (71 percent) refer to their overall unused borrowing capacity as having increased during the five years preceding the study. In only 16 percent is that capacity considered to have decreased. The other 12 percent regard it as having remained unchanged (Table 8.9). Finally, Tables 8.10 and 8.11 show how companies view the degree of predictability (both in terms of amount and timing) of their cash inflows and outflows. It is interesting to note the similarity between the two distributions. In both, around 60 percent of the firms consider the degree of predictability to be more than moderate, with approximately one quarter of the cases viewing it as very high indeed.

Table 8.8

Overall unused borrowing capacity of the firm

Variable BORCAPR

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Very small	9	7.5	7.5
. Moderate	4	3.3	10.8
. Very large	20	16.7	27.5
. Not determined	35	29.2	56.7
	52	43.3	100.0
	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120

Table 8.9

Evolution of the firm's overall unused borrowing capacity

Variable BORCAPEV

	Absolute frequency	Adj. relat. frequency (%)
. Increased	82	71.3
. Decreased	18	15.6
. Stable	14	12.2
. Others	1	0.9
. Not determined	7	MISSING
	-----	-----
Total	122	100.0

N = 115

Table 8.10

Degree of predictability of company's cash inflows

Variable CIPREDCT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Very low	4	3.3	3.3
.	5	4.1	7.4
. Moderate	42	34.7	42.1
.	42	34.7	76.8
. Very high	28	23.2	100.0
Not determined	1	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 121

Table 8.11

Degree of predictability of company's cash outflows

Variable COPREDCT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Very low	3	2.5	2.5
.	3	2.5	5.0
. Moderate	43	35.5	40.5
.	41	33.9	74.4
. Very high	31	25.6	100.0
Not determined	1	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 121



#### 8.4 Breakdown of Sample Companies According to Characteristics of the (Headquarters) Finance Department

The research sample is analysed in this section in terms of a number of characteristics of the (headquarters) finance department namely size, extent of formal institutionalization of the cash function, character of cash management carried out in the group, and percentage of time devoted to the management of cash (at group level).

With the exception of two companies, where head office administration is reported to be of such a small scale that a finance department is described as non-existent<sup>(2)</sup>, all other companies report the existence of a finance department (at headquarters level). According to Table 8.12, the majority of cases (58 percent) operate a medium-sized (headquarters) finance department. The statistics further indicate that in 50 percent of the cases, the number of senior and middle managers employed is five or less, four being the most frequent number. Meanwhile, 88 percent of the companies have a (group) Director as (headquarters) finance officer. In the remaining 12 percent, a (group) senior executive not at directorship level is in charge of the department (Table 8.13).

The distribution in the sample of title categories associated or potentially associated with cash management in the first two layers of the organizational structure of the (headquarters) finance department is presented in Table 8.14. The number of companies where the treasury function is specifically institutionalized at first level corresponds to 28 percent. Almost the same percentage formally exhibits the same function but at second level. On the other hand, 36 percent have the title category of financial controller in the first organizational layer of the finance department. Yet, only one company has a financial controller in the second layer. With respect to the title categories of cashier, and planning and strategic manager, there are relatively more companies holding these categories at the second than at the first level of the organizational structure of the finance department. This may be explained by the fact that certain title categories are more likely to be found in the first organizational level (such as that of financial controller) while

Table 8.12

## Size of the (headquarters) finance department

Variable PEOPLE

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The number of senior and middle managers employed is:			
. Three or less	26	23.2	23.2
. Four up to ten	65	58.0	81.2
. More than ten	21	18.8	100.0
Not determined	8	MISSING	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	
Mean	8.232	Median	5.079
Std. dev.	9.440	Kurtosis	15.276
Range	59.000	Minimum	1.000
		Mode	4.000
		Skewness	3.491
		Maximum	60.000

N = 112

Table 8.13

## (Group) senior executive in charge of the (headquarters) finance department

Variable HEADFDEP

	Absolute frequency	Adj. relat. frequency (%)
. A (group) Director	104	87.5
. The (Group) Treasurer	0	0.0
. The (Group) Fin. Controller	6	5.0
. The (Group) Chief Account.	7	5.9
. The Company Secretary	1	0.8
. Others	1	0.8
Not determined	1	MISSING
Not applicable	2	MISSING
	-----	-----
Total	122	100.0

N = 119

Table 8.14

Title categories associated or potentially associated with cash management in the first two layers of the organizational structure of the (headquarters) finance department

Title categories	Variables	Number of companies where:			N <sup>2</sup>	Percentage of occurrence
		They occur	They do not occur	Not determined/ Not applicable <sup>1</sup>		
In the first organizational layer:						
. Treasurer	TREAS1	28	72	22	100	28.0
. Financial controller	FINCONT1	35	63	24	98	35.7
. Cashier	CASHR1	4	94	24	98	4.1
. Corporate modeller	CORPMOD1	0	98	24	98	0.0
. Planning and strategic manager	PLSTRM61	4	94	24	98	4.1
In the second organizational layer:						
. Treasurer	TREAS2	20	47	55	67	29.9
. Financial controller	FINCONT2	1	63	58	64	1.6
. Cashier	CASHR2	7	57	58	64	10.9
. Corporate modeller	CORPMOD2	1	63	58	64	1.6
. Planning and strategic manager	PLSTRM62	5	60	57	65	7.7

<sup>1</sup> "Not applicable" refers to those companies where either a (headquarters) finance department or the particular layer of the organizational structure of the (headquarters) finance department is non-existent.

<sup>2</sup> N is the number of valid cases.



others are more likely to be found in the second or sometimes even lower organizational levels of the finance department (such as those of cashier, and planning and strategic manager). It is interesting to note that the title category of corporate modeller is generally fairly infrequent.

In order to measure the extent of formal institutionalization of the cash function in the (headquarters) finance department (variable TITLE), the number of title categories associated or potentially associated with cash management in the department was calculated. Tables 8.15 and 8.16 respectively give the number of these title categories present in the first and second organizational layers of the (headquarters) finance department. The majority of cases (58 percent) have at least one of the five title categories in question in the first organizational layer of the finance department. However, only 11 percent have more than one title category. In the second organizational layer, the number of cases where one or more title categories exist is lower than in the first layer (44 percent), the majority now having none of the title categories concerned. Furthermore, no company goes beyond two title categories. On the basis of the joint frequency distribution of variables TITLE1 and TITLE2 (Table 8.17), it is possible to see how the number of title categories spreads among companies when the two organizational layers of the (headquarters) finance department are taken together. In 27 percent of the cases, none of the five title categories exists in the organizational structure of the (headquarters) finance department. Forty two percent have one of the title categories in either one or the other of the two organizational layers, whereas 19 percent have one title category in both layers. Twelve percent have at least two title categories in one of the organizational layers. From this joint frequency distribution, the extent of formal institutionalization of the cash function in the (headquarters) finance department was obtained (Table 8.18).

In companies with group structure, cash management can be carried out in one of two ways: - mostly centralized, if the majority of the decisions are taken by the parent company which controls the amount of funds allocated to subsidiaries, or - mostly decentralized, if the majority of the decisions are taken by the subsidiary companies, the

Table 8.15

Extent of formal institutionalization of the cash function in the first layer of the organizational structure of the (headquarters) finance department

Variable TITLE1

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The number of title categories associated or potentially assoc. with cash management is:			
. None	41	41.8	41.8
. One	46	46.9	88.7
. Two	10	10.3	99.0
. Three	1	1.0	100.0
Not determined/Not applicable	24	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 98

Table 8.16

Extent of formal institutionalization of the cash function in the second layer of the organizational structure of the (headquarters) finance department

Variable TITLE2

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The number of title categories associated or potentially assoc. with cash management is:			
. None	36	56.2	56.2
. One	25	39.1	95.3
. Two	3	4.7	100.0
Not determined/Not applicable	58	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 64

Table 8.17

Joint frequency distribution of variables TITLE1 and TITLE2

		Variable TITLE2					
		Number of title categories assoc. or potentially associated with cash management					
		None	One	Two	Not det./Not applic.	Total	
Variable TITLE1	None	17 (26.6%)	12 (18.7%)	0	12	41	
	One	15 (23.5%)	12 (18.8%)	2 (3.1%)	17	46	
	Two	4 (6.2%)	1 (1.6%)	0	5	10	
	Three	0	0	1 (1.5%)	0	1	
	Not det./ Not applic.	0	0	0	24	24	
	Total	36	25	3	58	122	



Table 8.18

Extent of formal institutionalization of the cash function in the (headquarters) finance department

Variable TITLE

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
The number of title categories associated or potentially assoc. with cash management is:			
. None	17	26.6	26.6
. One	27	42.2	68.8
. Two	16	25.0	93.8
. Three	3	4.7	98.5
. Four	0	0.0	98.5
. Five	1	1.5	100.0
Not determined/Not applicable	58	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 64

latter enjoying a high level of independence as far as movement of funds is concerned. Table 8.19 reveals that 93 percent of the cases centralize their cash management which is in line with the procedure generally recommended [e.g. Searby, 1968; Pogue et al., 1970]. Centralization of cash decisions seems to be the most appropriate way of maximizing the efficiency of cash allocation while keeping costs at their lowest. Among these companies, three mention in addition that their procedure concerning cash management differs depending on the subsidiary's location. For domestic operating subsidiaries, cash management tends to be centralized, whereas subsidiaries operating abroad tend to be largely independent with respect to cash management.

Finally, most cases (54 percent) spend between 10 and 30 percent of the (headquarters) finance department's time dealing with cash matters (Table 8.20).

### 8.5 Summary

Sample companies can be examined according to major characteristics.

As far as industry classification is concerned, companies divide into approximately equal proportion between the two groups of Capital and Consumer Goods, with a slight predominance of the latter over the former. As for size and capital intensiveness, companies are not normally distributed, most of them exhibiting an average turnover below £m 256 and a degree of capital intensiveness below £8 per employee. Overall dispersion over the range, however, is quite reasonable in the first case but quite poor in the second. On the basis of the mode, the typical company involved in the study can be described as one with more than 30 years of existence prior to the study, organized into group structure with headquarters simply playing the role of the holding company, and no individual firm (parent or subsidiary) within the group prevailing in sales terms.

Table 8.19

Character of cash management carried out in the group

Variable CMFUNCT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Mostly centralized	105	92.9	92.9
. Mostly decentralized	8	7.1	100.0
Not determined	2	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 113

Table 8.20

Percentage of (headquarters) finance department's time devoted to the management of cash (at group level)

Variable TIMECM

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Less than 10%	36	30.0	30.0
. Between 10 and 29%	65	54.2	84.2
. Between 30 and 60%	16	13.3	97.5
. More than 60%	3	2.5	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120



The characterization of the research sample in terms of a financial profile reveals that companies are fairly normally distributed as regards return on investment, financial leverage, internal and operating cash flow generation, investment in working capital, and capital investment. However, with respect to capital turnover and cash position, the distribution of companies quite substantially departs from normality, being fairly positively skewed and highly peaked. Variability over the range is fairly poor. On the basis of the mode again, the typical company involved in the study rates its overall unused borrowing capacity as very large and considers it to have increased during the past five years preceding the study. As to the degree of predictability of its cash flows, this hypothetical firm regards it as being moderate or slightly more than moderate.

The mode may further be used to summarize the most common pattern among sample companies with respect to characteristics of the (headquarters) finance department. The typical company in the study can be described as one working with a medium-sized finance department whose (group) senior executive in charge is a (group) Director. Usually, there is one title category associated or potentially associated with cash management (most frequently a treasurer or a financial controller) in the organizational structure of the finance department. Cash management is mostly centralized, absorbing between 10 to 30 percent of the (headquarters) finance department's time.

Footnotes

- (1) Whereas the arithmetic mean possesses intuitive significance, the standard deviation is meaningful for the characterization of an individual distribution only when used in conjunction with the Tchebysheff theorem or the rule governing the variability of a normal distribution [Mendenhall and Reinmuth, 1978].
- (2) These firms have periodical meetings instead, involving a number of members of the parent board and other senior executives. One function of these meetings is to deal with financial matters. Subject to the decisions taken there, the control and handling of these matters are subsequently carried out by head office.

## Chapter 9 RESULTS AND CONCLUSIONS I

9.1 Introduction

9.2 The Cash Flow Budgeting System

9.3 The Cash Flow Updating or Forecasting System

9.4 Traditional Early Warning Systems in Handling  
Uncertainty

9.5 Conclusions



### 9.1 Introduction

The present chapter initiates the reporting of the results and conclusions of the study. The chapter deals with short-term cash flow planning systems (operated at group level) where short-term applies to any period of time up to one year.

Section 9.2 develops a characterization of the cash flow budgeting system across sample firms. First, major features of the system are explored. These include the number of years for which the system has been in operation, the objectives set for it, and the degree of commitment attached to cash budgets in general. Second, the period of time covered, and the intervals of division used in the preparation of the cash flow budget are identified. Finally, an analysis of the cash flow budget revision procedure is conducted. The character, frequency and nature of the revisions are described, and the results of tests of association performed between the periodicity of cash flow budget revision and major independent characteristics are reported.

Section 9.3 analyses the existence of a cash flow updating or forecasting system. First, companies are featured according to the number of years for which the system has been in operation, the objectives set for it, and the degree of commitment attached to cash flow updates or forecasts. The character and frequency of these updates or forecasts as well as the period of time covered by them are also described. Next, the section reports the results of tests carried out for the purpose of determining a) whether significant differences exist between major characteristics of the two systems of cash flow planning, and b) whether characteristics of the cash flow budgeting system significantly differ between companies where a system of cash flow updating or forecasting exists and companies where such a system is non-existent. Lastly, the main reasons for the preparation of cash flow updates or forecasts are explored. As a

result, two basic types of cash flow update or forecast are identified: one arising from a need for cash flow control in general, the other arising from a need to invest surplus funds on the money market. The major independent characteristics found to be associated with the preparation of each one of these types of update or forecast are reported.

In Section 9.4, the objective is to ascertain how effective companies perceive the two traditional early warning systems - cash flow budget revisions and cash flow updates or forecasts - to be in handling uncertainty.

Section 9.5, finally, provides the first conclusions of the study.

## 9.2 The Cash Flow Budgeting System

All sample firms with the exception of two operate a system of cash flow budgeting (at group level). Table 9.1 shows that a significant majority of companies (81 percent) have been budgeting for cash inflows and outflows for a considerable period of time (more than five years prior to the study). An analysis of the objectives set for the cash flow budgeting system (Table 9.2) indicates that planning the need for financing, and expressing in cash terms the objectives, strategies and plans of the business are the goals most frequently reported (78 percent and 76 percent of the cases respectively). The same analysis indicates, furthermore, that there is a substantially smaller population of cases (48 percent) assigning to the cash flow budgeting system the role of managing and controlling the cash position, than there is assigning to it any of the other three major roles. As to the degree of commitment attached to cash budgets in general (Table 9.3), most firms (64 percent) view it as more than moderate, 52 percent considering it to be very high indeed. On the other hand, only 4 percent attach a degree of commitment to cash budgets that is slightly below moderate. Comments provided by a few respondents suggest that the degree of commitment towards cash

Table 9.1

Number of years for which the cash flow budgeting system has been in operation

Variable CFBTIME

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. For 5 years or less	20	19.0	19.0
. For more than 5 years up to 10 years	32	30.5	49.5
. For more than 10 years up to 20 years	40	38.1	87.6
. For more than 20 years	13	12.4	100.0
Not determined	15	MISSING	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 105

Table 9.2

Objectives set for the cash flow budgeting system

	Number of responses	Percentage of responses	Percentage of cases
. To plan for business growth, investment in projects, introd. of new products, etc.	78	24.4	65.0
. To express in cash terms the objectives, strategies and plans of the business	91	28.5	75.8
. To plan the need for financing	93	29.2	77.5
. To manage and control the cash position	57	17.9	47.5
	-----	-----	-----
Total responses	319	100.0	265.8

N = 120



Table 9.3

Degree of commitment attached to cash budgets in general

Variable CFBCOMM

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Very low	0	0.0	0.0
.	5	4.1	4.1
. Moderate	38	31.7	35.8
.	15	12.5	48.3
. Very high	62	51.7	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120

Table 9.4

Period of time covered by the cash flow budget

Variable CFBHORZN

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Three months	2	1.7	1.7
. Six months	5	4.2	5.9
. One year	93	77.4	83.3
. Fifteen months	3	2.5	85.8
. Eighteen months	5	4.2	90.0
. Two years	10	8.3	98.3
. Three years	2	1.7	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120

budgets is very much a result of the more general commitment towards the overall operational budget.

The period of time covered by the cash flow budget, and the interval of division used in each of the stages over this time period are presented in Tables 9.4 and 9.5 respectively. In 77 percent of the companies, estimates of cash inflows and outflows are produced for the next 12 months ahead, whereas in 6 percent they are produced for shorter periods, usually three and six months. This is in accordance with the traditional concept of short-term as being any period of time up to one year. In 17 percent, however, the short-term extends in practice beyond the one-year limit, the cash flow budget covering periods of time up to 24 months or more (Table 9.4). With respect to the interval of division used in each of the stages over the period of time covered by the cash flow budget (Table 9.5), no company divides its cash flow budget by days, and only one firm reports using the week as the interval of division, but only up to six months ahead. Most companies' cash flow budgeting is on a monthly basis despite the fact that the proportion of firms using quarterly intervals increases as stages over the time horizon of the cash flow budget become more remote.

Out of the 119 valid cases (Table 9.6), only 15 percent do not revise their cash flow budget though they operate monitoring of the variances. All the other companies (85 percent) prepare cash flow budget revisions during the planning horizon. Twenty one percent do this updating occasionally, i.e. on the occurrence of some extraordinary event such as the implementation of a major unbudgeted programme (closure or sale of subsidiary, cash acquisition, etc.). The remaining 64 percent update regularly or, regularly and occasionally. Among these firms, the majority (51 percent) revise their cash flow budget every quarter, whereas 25 percent revise it monthly. The other 24 percent prepare the revisions every six months (Table 9.7). As to the nature of the revisions, Table 9.8 reveals that 61 percent of the companies that regularly prepare cash flow budget revisions operate a system of continuous roll-on where every period, in most cases the quarter (Table 9.9), cash flow estimates are projected a fixed number of months forward in order to maintain a whole planning period forecast.

Table 9.5

Interval of division used in each of the stages over the period of time covered by the cash flow budget

Stages over the period of time covered by the cash flow budget	Variables	Interval of division					Not determined	Not applicable
		Day	Week	Month	Quarter	Year		
. Up to first month	CFBDIV1		0.8%	84.2%			5.0%	10.0%
. Between first and third month, or up to third month	CFBDIV3		0.8%	84.2%	10.0%		5.0%	
. Between third and sixth month, or up to sixth month	CFBDIV6		0.8%	80.8%	12.5%		4.2%	1.7%
. Between sixth and twelfth month, or up to first year	CFBDIV12			75.0%	15.0%		4.2%	5.8%
. After first year	CFBDIV0			9.2%	7.5%			83.3%



Table 9.6

Character of the cash flow budget revisions

Variable CFBREV

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Non-existent	18	15.1	15.1
. Occasional	25	21.0	36.1
. Occasional and regular	6	5.0	41.1
. Regular	70	58.9	100.0
Not determined	1	MISSING	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 119

Table 9.7

Frequency of the cash flow budget revisions

Variable REVFREQ

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Six monthly	18	24.0	24.0
. Quarterly	38	50.7	74.7
. Monthly	19	25.3	100.0
. Weekly	0	0.0	100.0
Not determined	2	MISSING	100.0
Not applicable	45	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 75

Table 9.8

Nature of the cash flow budget revisions

Variable CFBROLOV

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Prepared on a continuous roll-over basis	46	60.5	60.5
. Not prepared on a continuous roll-over basis	30	39.5	100.0
Not determined	1	MISSING	100.0
Not applicable	45	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 76

Table 9.9

Timing of roll-over preparation

Variable ROLOVPRE

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Monthly	10	25.0	25.0
. Quarterly	28	70.0	95.0
. Six monthly	2	5.0	100.0
Not determined	7	MISSING	100.0
Not applicable	75	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 40

It was hypothesized in the study that the periodicity of revision of the cash flow budget would be related to major independent characteristics, namely features of the cash flow budgeting system, features of the firm, and features of the (headquarters) finance department (see Chapter 5). In order to test such hypotheses, tests of association were carried out in the study. These tests included one-sample chi-square tests of independence and Kendall's rank-order correlation tests. Prior to this step, it was essential to define a new variable that could measure the periodicity of cash flow budget revision. This variable, whose frequency distributions are presented in Table 9.10, was obtained from the merger of the two questionnaire variables measuring the character and frequency of the cash flow budget revisions. Exhibits 9.1 and 9.2 present the decision models underlying the tests performed, whereas Tables 9.11 and 9.12 produce the results obtained from these tests.

An association was first obtained between the periodicity of cash flow budget revision and the number of years for which the cash flow budgeting system has been in operation (Table 9.11). A Phi coefficient of 0.23 indicates that the relationship, significant at the one-tailed probability level of 0.040, is relatively strong. Furthermore, the relationship appears to be negative (Table F.1.1 in Appendix F.1). In fact, 75 percent of the companies where the preparation of cash budgets was introduced during the five years preceding the study have high periodicity of cash flow budget revision (i.e. every quarter or every month). This compares with a figure of 46 percent for those companies where the preparation of cash budgets was introduced more than five years previously. If the level of periodicity of cash flow budget revision is taken as an indicator of the degree of complexity of the cash flow budgeting system, it appears valid to state that firms which implemented their cash flow budgeting system more recently tend to have more complex budgeting forms.

Two other associations were obtained between the periodicity of cash flow budget revision and the objectives set for the cash flow budgeting system of planning the need for financing, and of managing and controlling the cash position (Table 9.11). The relationships are significant at the one-tailed probability level of 0.046 and 0.000 respectively. The strength of the two associations is not similar.



Table 9.10

Periodicity of cash flow budget revision

Variable CFBUPDT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Non-existent	18	15.3	15.3
. Occasional	25	21.1	36.4
. Six monthly	18	15.3	51.7
. Quarterly	38	32.2	83.9
. Monthly	19	16.1	100.0
Not determined	2	MISSING	100.0
Not applicable	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 118

## Exhibit 9.1

Decision model for the one-sample chi-square tests of independence between the periodicity of cash flow budget revision and major independent characteristics

### . NULL HYPOTHESES ( $H_0$ ):

The periodicity of cash flow budget revision (CFBUPDT) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the objectives set for the cash flow budgeting system (OBJPBGR1; OBJCSHT1; OBJPFIN1; OBJMCSH1)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the industry classification (IC)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADEFDEP)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

### . LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

### . DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.05$

## Exhibit 9.2

Decision model for the Kendall rank-order correlation tests between the periodicity of cash flow budget revision and major independent characteristics

. NULL HYPOTHESES ( $H_0$ ):

The periodicity of cash flow budget revision (CFBUPDT) is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 9.11

Results obtained from the one-sample chi-square tests of independence between the periodicity of cash flow budget revision and major independent characteristics

Periodicity of cash flow budget revision CFBUPDT	Major independent characteristics														
	CFBTIME	OBJPB6R1	OBJCSHT1	OBJPFIN1	OBJMCSH1	CF8COMM	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREOCT	COPREOCT	HEADFDEP	TIMECH
$\chi^2 = 4.20$	0.00	2.25	3.97	13.50	1.31	14.43	0.06	1.52	1.65	1.88	0.16	0.65	0.00	4.59	
One-tailed prob. $\alpha' = (0.040)^{\dagger}$	(1.000)	(0.133)	(0.046) <sup>‡</sup>	(0.000) <sup>‡‡</sup>	(0.518)	(0.154)	(0.800)	(0.468)	(0.649)	(0.171)	(0.923)	(0.723)	(0.971)	(0.101)	
df = 1	1	1	1	1	2	10	1	2	3	1	2	2	1	2	
N = 104	118	118	118	118	118	118	117	110	117	112	117	117	115	116	
Phi = 0.225			0.204	0.355											

<sup>†</sup> One-tailed probability significant at the 0.05 level

<sup>‡‡</sup> One-tailed probability significant at the 0.01 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
df = degrees of freedom  
N = number of valid cases

Table 9.12

Results obtained from the Kendall rank-order correlation tests between the periodicity of cash flow budget revision and major independent characteristics

Periodicity of cash flow budget revision CFBUPDT	Major independent characteristics											
	TURN	FAEMP	RDE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CXPPB	PEOPLE	TITLE
$\tau =$	0.149	0.035	-0.005	0.061	0.033	0.053	-0.013	-0.150	-0.097	0.111	0.050	0.187
Two-tailed prob. $\alpha' =$	(0.030) <sup>‡</sup>	(0.610)	(0.943)	(0.378)	(0.637)	(0.439)	(0.846)	(0.030) <sup>‡</sup>	(0.160)	(0.107)	(0.504)	(0.084) <sup>‡</sup>
N =	116	115	116	116	116	116	116	116	116	116	109	62

<sup>‡</sup> One-tailed probability significant at the 0.05 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient  
 $\alpha'$  = level of significance  
 N = number of valid cases

Phi coefficients of 0.20 and 0.36 respectively, indicate that the latter is stronger than the former. However, both associations appear to be positive which implies that companies which demand a more active role from their cash flow budgeting system tend to revise their cash flow budget more frequently. Sample data in Appendix F.1 (Tables F.1.2 and F.1.3) support this statement. In fact, 54 percent of the companies ascribing to the system of cash flow budgeting the objective of planning the need for financing show high periodicity of revision of the cash flow budget. At the same time, only 30 percent of the firms not assigning to the system such an objective show identical level of periodicity of cash flow budget revision (Table F.1.2.). These figures compare with 67 percent and 31 percent respectively, as far as the objective of managing and controlling the cash position is concerned (Table F.1.3.).

The periodicity of cash flow budget revision was also found to be associated with the size of the firm (Table 9.12). The association is established at the two-tailed probability level of 0.030 and shows a positive Kendall correlation coefficient of 0.15. This suggests that larger firms tend to have more complex cash flow budgeting systems than smaller firms. Possible explanations for this association lie either in the greater resources that larger companies can afford to allocate, or in the higher complexity usually involved in the management of these firms.

An association found between the periodicity of cash flow budget revision and the proportion of operating cash flow generation provides the financial scenario in this section (Table 9.12). The relationship (significant at the two-tailed probability level of 0.030) appears to be negative ( $\tau = -0.15$ ) which implies that companies with lower relative capacity to generate cash from operations tend to monitor their cash projections more closely and, therefore, to revise their cash flow budget more often. It should be noted that the relationship between the periodicity of cash flow budget revision and the proportion of capital investment (Table 9.12), though not statistically significant, is very much on the edge of the two-tailed 0.10 limit that was chosen as the cut-off point of statistical significance in the test. A positive Kendall correlation coefficient of 0.11 suggests that companies where the proportion of



capital expenditures is higher tend to have more frequent revisions of their cash flow budget.

Finally, an association was obtained between the periodicity of cash flow budget revision and the extent of formal institutionalization of the cash function in the (headquarters) finance department (Table 9.12). Significant at the two-tailed probability level of 0.084, the relationship appears to be positive ( $\tau=0.19$ ). This implies that companies where the cash function is more institutionalized tend to operate more complex systems of cash flow budgeting.

In sum, the results of the tests of association between the periodicity of cash flow budget revision and major independent characteristics reveal that the former is related, and apparently positively, to the size of the firm. They also reveal that two financial features of the firm - proportion of operating cash flow generation, and proportion of capital investment - are related to the periodicity of the revisions. Companies where the relative level of cash generated from operations is lower, and companies where the proportion of capital investment is higher, are likely to be more sensitive to deviations from their original cash projections. Not surprising that they appear to revise their cash flow budget more often. This may partially explain the apparently negative association between the periodicity of the cash flow budget revisions and the number of years for which the cash flow budgeting system has been in operation. The reason why long-established companies may recently have decided to start operating a system of cash flow budgeting may have to do with the development of situations of relative shortage of operating cash or of intensive relative capital growth, or with the evolution of companies into larger size classes. But, it may also have to do with an easier access to computerized systems of cash management. The results further reveal an apparently positive association between the periodicity of the cash flow budget revisions and two of the objectives set for the cash flow budgeting system, namely planning the need for financing, and managing and controlling the cash position. Lastly, the results of the tests of association reveal that one feature of the (headquarters) finance department - the extent of formal institutionalization of the cash

function - is apparently positively related to the periodicity of the cash flow budget revisions.

### 9.3 The Cash Flow Updating or Forecasting System

In addition to cash flow budgeting, 79 percent of the sample firms operate a system of cash flow updating or forecasting (Table 9.13). A significant majority of these firms (61 percent) introduced the preparation of cash flow updates or forecasts more than five years prior to the study (Table 9.14). The objectives set for the cash flow updating or forecasting system are presented in Table 9.15. If, on the one hand, all the firms regard the system as a tool to manage and control the cash position, on the other hand, only 47 percent consider it an instrument to plan the need for financing. Meanwhile, only 13 percent and 14 percent respectively view it as a means of planning for business growth, investment in projects, introduction of new products, etc., and as a way of expressing in cash terms the objectives, strategies and plans of the business. A few firms assign some additional objectives to the cash flow updating or forecasting system, the most frequently referred to being the maximization of the return on surplus funds on the money market. This purpose was taken as a particular aspect and was assimilated into the broader objective of managing the cash position. As to the degree of commitment attached to cash flow updates or forecasts (Table 9.16), most firms (75 percent) rate it as above moderate. Fifty two percent attach a very high commitment to them.

The character of the cash flow updates or forecasts is regular in 92 percent of the firms (Table 9.17). In the remaining 8 percent, updates or forecasts are produced only when major deviations are known or suspected, or when necessary for specific purposes or (group) Board meetings. In most companies where cash flow updates or forecasts are produced regularly, the month and the week are the most frequent times of preparation (Table 9.18). As to the nature of the period of time covered by the cash flow updates or forecasts (Table 9.19), 2 percent of the companies do not prepare their updates or

Table 9.13

## Existence of a cash flow updating or forecasting system

Variable UPDT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	96	78.7	78.7
. No	26	21.3	100.0
	-----	-----	
Total	122	100.0	

N = 122

Table 9.14

## Number of years for which the cash flow updating or forecasting system has been in operation

Variable UPDTTIME

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. For 5 years or less	33	39.3	39.3
. For more than 5 years up to 10 years	31	36.9	76.2
. For more than 10 years up to 20 years	17	20.2	96.4
. For more than 20 years	3	3.6	100.0
Not determined	12	MISSING	100.0
Not applicable	26	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 84



Table 9.15

Objectives set for the cash flow updating or forecasting system

	Number of responses	Percentage of responses	Percentage of cases
. To plan for business growth, investment in projects, introd. of new products, etc.	12	7.3	12.6
. To express in cash terms the objectives, strategies and plans of the business	13	7.9	13.7
. To plan the need for financing	45	27.3	47.4
. To manage and control the cash position	95	57.5	100.0
	-----	-----	-----
Total responses	165	100.0	173.7

N = 95

Table 9.16

Degree of commitment attached to cash flow updates or forecasts

Variable UPDTCOMM

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Very low	0	0.0	0.0
. Moderate	2	2.1	2.1
. Very high	22	22.9	25.0
. Not applicable	22	22.9	47.9
	50	52.1	100.0
	26	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 96

Table 9.17

Character of the cash flow updates or forecasts

Variable UPDTPRP

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Occasional	8	8.4	8.4
. Regular	87	91.6	100.0
. Not determined	1	MISSING	100.0
. Not applicable	26	MISSING	100.0
Total	122	100.0	

N = 95

Table 9.18

Frequency of the cash flow updates or forecasts

Variable UPDTPREP

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Daily	8	9.2	9.2
. Weekly	20	23.0	32.2
. Monthly	50	57.5	89.7
. Others	9	10.3	100.0
. Not determined	1	MISSING	100.0
. Not applicable	34	MISSING	100.0
Total	122	100.0	

N = 87

Table 9.19

Nature of the period of time covered by the cash flow updates or forecasts

Variable UPDTHRZA

	Absolute frequency	Adjusted relative frequency (%)
. Variable	2	2.2
. Decreasing	11	11.8
. Fixed	80	86.0
. Not determined	3	MISSING
. Not applicable	26	MISSING
Total	122	100.0

N = 93

forecasts for a definite period of time ahead, the time horizon varying according to circumstances. In 12 percent, the cash flow updates or forecasts extend until the end of the planning period covered by the cash flow budget which means that as time goes on, the horizon of the updates decreases. In 86 percent, the period of time ahead for which cash flow updates or forecasts are produced is always fixed, the system operating on a roll-over basis. Among these firms, the most common periods of time covered are between one and three months ahead, and one month or less ahead. These periods are reported by 35 percent and 34 percent of the cases respectively (Table 9.20). Another point still to be mentioned is that most companies whose cash flow updates or forecasts are prepared for a fixed time horizon ahead (89 percent) operate one single planning process. This means that these companies have only one time of preparation of the updates, one roll-on system and one interval of division (e.g. every week the firm projects its cash flows for the next three months on a weekly basis). The other 11 percent operate two distinct planning processes, with more than one time of preparation of the updates, two roll-on systems, and usually two different intervals of division (e.g. every week the firm projects its cash flows for the next month on a weekly basis, and every month the next quarter on a monthly basis) (Table 9.21).

For the purpose of determining whether significant differences exist between major characteristics of the cash flow budgeting system and major characteristics of the cash flow updating or forecasting system, Wilcoxon's matched-pairs signed-ranks tests were conducted on all the companies operating both systems of cash flow planning. Exhibit 9.3 presents the decision model underlying the tests as well as the major characteristics being compared, namely the number of years for which the systems have been in operation, the objectives set for them, and the degree of commitment attached to their plans. The results obtained from these tests are shown in Table 9.22.

Significant differences exist between the two systems as far as the number of years for which they have been in operation and the objectives set for them are concerned. In every instance, the difference is significant at a two-tailed probability level of less than 0.020. The indicators in Table 9.22 suggest that companies



Table 9.20

Period of time covered by the cash flow updates or forecasts

Variable UPDTHRZB

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. One month or less ahead	27	33.8	33.8
. Between 1 and 3 months ahead	28	35.0	68.8
. Between 3 and 6 months ahead	11	13.8	82.6
. Between 6 and 12 months ahead	13	16.2	98.8
. More than 12 months ahead	1	1.2	100.0
Not determined	3	MISSING	100.0
Not applicable	39	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 80

Table 9.21

Number of planning processes operated over the period of time covered by the cash flow updates or forecasts

Variable UPDTHRZC

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. One	71	88.8	88.8
. Two	9	11.2	100.0
Not determined	3	MISSING	100.0
Not applicable	39	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 80

Exhibit 9.3

Decision model for the Wilcoxon matched-pairs signed-ranks tests between major characteristics of the cash flow budgeting system and major characteristics of the cash flow updating or forecasting system

. NULL HYPOTHESES ( $H_0$ ):

There is no difference between the cash flow budgeting system and the cash flow updating or forecasting system with respect to

- . the number of years for which they have been in operation (CFBTIME v. UPDTTIME)
- . the objectives set for them (OBJPBGR1 v. OBJPBGR2; OBJCSHT1 v. OBJCSHT2; OBJPFIN1 v. OBJPFIN2; OBJMCSH1 v. OBJMCSH2)
- . the degree of commitment attached to their plans (CFBCOMM v. UPDTCOMM)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$

Table 9.22

Results obtained from the Wilcoxon matched-pairs signed-ranks tests between major characteristics of the cash flow budgeting system and major characteristics of the cash flow updating or forecasting system

Comparison between:	N	- Ranks		+ Ranks		z	2-tailed prob. $\alpha'$
		n <sub>1</sub>	Mean	n <sub>1</sub>	Mean		
CFBTIME v. UPDTTIME	79	36	19.93	3	20.83	-4.570	(0.000)**
OBJPBGR1 v. OBJPBGR2	93	1	27.50	53	27.50	-6.156	(0.000)**
OBJCSHT1 v. OBJCSHT2	93	0	0.00	60	30.50	-6.736	(0.000)**
OBJPFIN1 v. OBJPFIN2	93	9	21.00	32	21.00	-3.129	(0.002)**
OBJMCSH1 v. OBJMCSH2	93	63	32.00	0	0.00	-6.901	(0.000)**
CFBCOMM v. UPDTCOMM	94	16	21.78	26	21.33	-1.288	(0.198)

\*\* One-tailed probability significant at the 0.01 level

Symbols: N = number of valid cases  
n<sub>1</sub> = number of negative differences  
n<sub>2</sub> = number of positive differences  
z = standard score  
 $\alpha'$  = level of significance



have been operating their cash flow budgeting system for a longer period of time than their cash flow updating or forecasting system. In other words, updates or forecasts have been introduced subsequent to cash budgets. Furthermore, they also suggest that the cash flow budgeting system is more often associated with the first three objectives of planning for business growth, expressing in cash terms the objectives, strategies and plans of the business, and planning the need for financing than the system of cash flow updating or forecasting. The latter, on the other hand, appears to be more often associated with the objective of managing and controlling the cash position than the former.

No significant difference was found between the degree of commitment attached to cash budgets in general, and the degree of commitment attached to cash flow updates or forecasts. Controlling for the periodicity of cash flow budget revision in the Wilcoxon test applied to this pair of variables revealed, however, an interesting result. That is, in companies with low periodicity of cash flow budget revision, there is in fact a significant difference, at the two-tailed probability level of 0.067, between the degree of commitment attached to cash budgets and the degree of commitment attached to cash flow updates or forecasts. It appears that companies where the cash flow budget is not revised so often tend to attach a higher degree of commitment to cash flow updates or forecasts than to cash budgets. In companies with high periodicity of cash flow budget revision, however, the difference between degrees of commitment is not significant (two-tailed probability of 0.858).

Mann-Whitney's U tests were next performed in order to determine whether characteristics of the cash flow budgeting system significantly differ between companies where a system of cash flow updating or forecasting exists and companies where such a system is non-existent. Exhibit 9.4 presents the hypotheses stated for the tests, and Table 9.23 shows the results obtained.

No significant difference was found between the two groups of firms with respect to the number of years for which their cash flow budgeting system has been in operation, the first two objectives set for it, and the degree of commitment attached to cash budgets in

Exhibit 9.4

Decision model for the Mann-Whitney U tests between companies where a system of cash flow updating or forecasting exists and companies where such a system is non-existent. A comparison in terms of major characteristics of their cash flow budgeting system

. NULL HYPOTHESES ( $H_0$ ):

Companies where a system of cash flow updating or forecasting exists (UPDT) and companies where such a system is non-existent (no UPDT) are identical with respect to

- . the number of years for which their cash flow budgeting system has been in operation (CFBTIME)
- . the objectives set for their cash flow budgeting system (OBJPBGR1; OBJCSHT1; OBJPFIN1; OBJMCSH1)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$

Table 9.23

Results obtained from the Mann-Whitney U tests between companies where a system of cash flow updating or forecasting exists and companies where such a system is non-existent. A comparison in terms of major characteristics of their cash flow budgeting system

Companies where a system of cash flow updating or forecasting exists v. companies where such a system is non-existent	Major characteristics of their cash flow budgeting system					
	CFBTIME	OBJPBGR1	OBJCSHT1	OBJPFIN1	OBJMCSH1	CFBCOMM
UPDT	N = 81 Mean rank = 54.28	94 58.65	94 58.77	94 62.96	94 69.21	94 59.88
no UPDT	N = 24 Mean rank = 48.69	26 67.19	26 66.77	26 51.62	26 29.00	26 62.75
Two-tailed probability $\alpha'$ =	-0.829 (0.407)	-1.342 (0.180)	-1.400 (0.161)	-2.034 (0.042)*	-6.032 (0.000)**	-0.409 (0.682)

\* One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols: N = number of valid cases in each sample

z = standard score

$\alpha'$  = level of significance



general. The only differences that were found relevant from a statistical point of view concern the objectives of planning the need for financing, and of managing and controlling the cash position (two-tailed probabilities of 0.042 and 0.000 respectively). A comparison of the mean ranks of the two groups suggests that companies where cash flow updates or forecasts are not prepared tend more often to associate the two objectives above with their cash flow budgeting system than companies where the updates or forecasts are produced.

This being so, and because of the association found between the periodicity of cash flow budget revision and the two objectives of planning the need for financing and of managing and controlling the cash position (see section 9.2), it was hypothesized that cash flow updates or forecasts would be implemented as substitutes for cash flow budget revisions and vice-versa. In other words, a significant negative relationship between the preparation of cash flow updates or forecasts and the periodicity of cash flow budget revision was postulated. Where updates or forecasts were produced, the periodicity of the revisions would tend to be low; where updates or forecasts were not prepared, the periodicity of the revisions would tend to be high.

A one-sample chi-square test of independence was performed to test this hypothesis. For a table with one degree of freedom, the corrected chi-square obtained was 0.00 significant at the one-tailed probability level of 1.000. This result which is indicative of total independence between the two variables does not support the hypothesis above. It means, in fact, that the proportion of companies revealing low and high periodicity of cash flow budget revision among those preparing cash flow updates or forecasts is exactly the same as among those not producing them. No evidence was found, therefore, that updates or forecasts and cash flow budget revisions act as substitutes for each other.

The main reasons for the preparation of cash flow updates or forecasts are presented in Table 9.24.

Table 9.24

Main reasons for the preparation of cash flow updates or forecasts

Variable UPDTRES

	Absolute frequency	Adjusted relative frequency (%)
. The occurrence of a particular major event	3	3.4
. The need for cash flow control in general	63	70.8
. The need to invest surplus funds on the money market	21	23.6
. Other reasons	2	2.2
Not determined	7	MISSING
Not applicable	26	MISSING
	-----	-----
Total	122	100.0

N = 89

Three percent of the firms report, as the primary reason for the preparation of cash flow updates or forecasts, the occurrence of a particular major event sometime in their history. Either a temporary cash shortage situation or a real liquidity crisis made them recognize the importance of such cash flow projections, and led to their implementation.

Seventy one percent of the firms identify the preparation of cash flow updates or forecasts with a general need for cash flow control. Given the volatility of the business environment, budgets become rapidly out of date. In this context, cash flow updates or forecasts are the fundamental tool that simultaneously ensures permanent monitoring and control of cash flows, and constant forward thinking. The former allows the company to flag deviations and to act accordingly, the latter to produce a current forecast reflecting actual developments in the business. A detailed breakdown of the several answers included in this category reveals that companies differ as to the specific cash flows upon which they place the emphasis for control. Some firms are particularly sensitive to fluctuations in the level of cash flows linked to sales and working capital; other firms are more sensitive to the need to make the best use of available borrowing facilities, to minimize interest costs and to monitor closely the level of gearing; others, still, emphasize the fluctuations in the level of cash flows related to major capital expenditure projects and specific business requirements.

The third main reason for the preparation of cash flow updates or forecasts - the need to invest surplus funds on the money market - is referred to by 24 percent of the firms. The common argument among these firms is that short-term surplus funds should not be left idle considering the significant impact that interest on cash can have on the company's profit or loss. Cash flow updates or forecasts play the important role of keeping cash resources under review so that any surplus funds that arise due to the irregular pattern of funds flows can be invested to produce the best possible return on the money market.



Other reasons for the preparation of cash flow updates or forecasts are considered irrelevant given the very small number of companies that mention them.

On the whole, Table 9.24 reveals that there are essentially two distinct arguments to justify the preparation of cash flow updates or forecasts - one for cash control purposes, and the other for cash investment purposes. As a result, the hypotheses formulated in the study concerning the preparation of cash flow updates or forecasts (see Chapter 5) had to be adjusted so as to accommodate the presence of two basic types of cash flow update or forecast. In order to identify the major independent characteristics associated with the preparation of each one of them, two new variables were introduced, each one taking on two values: one value representing the preparation of cash flow updates or forecasts for the specific purpose in question, the other value representing the non-preparation of any kind of updates or forecasts. The two variables were then correlated to the selected independent characteristics. The tests of association performed included one-sample chi-square tests of independence and Kendall's rank-order correlation tests. Exhibits 9.5 and 9.6 provide the decision models supporting the tests, and Tables 9.25 and 9.26 show the results produced.

A first association was found between company size and the preparation of cash flow updates or forecasts irrespective of their specific purpose (Table 9.26). The relationship is significant at the two-tailed probability level of 0.006 in the case of updates or forecasts prepared for cash control purposes, and is significant at the two-tailed probability level of 0.036 in the case of updates or forecasts prepared for cash investment purposes. The strength of the association is very similar, and the direction of the relationship is apparently the same, in both cases. The preparation of cash flow updates or forecasts appears to become more common as firms increase in size.

On the other hand, certain independent characteristics were found to be exclusively associated with the preparation of a particular type of cash flow update or forecast.

## Exhibit 9.5

Decision model for the one-sample chi-square tests of independence between the preparation of cash flow updates or forecasts and major independent characteristics

. NULL HYPOTHESES ( $H_0$ ):

A. The preparation of cash flow updates or forecasts for cash control purposes (CONTROL) is independent of

- . the industry classification (IC)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

B. The preparation of cash flow updates or forecasts for cash investment purposes (CM) is independent of

- . the same as above

. LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.05$

## Exhibit 9.6

Decision model for the Kendall rank-order correlation tests between the preparation of cash flow updates or forecasts and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

A. The preparation of cash flow updates or forecasts for cash control purposes (CONTROL) is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

B. The preparation of cash flow updates or forecasts for cash investment purposes (CM) is independent of

- . the same as above

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 9.25

Results obtained from the one-sample chi-square tests of independence between the preparation of cash flow updates or forecasts and major independent characteristics

Preparation of cash flow updates or forecasts for:	Major independent characteristics									
	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADFDEP	TIMECM	
CONTROL $\chi^2 =$ One-tailed prob. $\alpha' =$ df = N =	10.30 (0.415) 10 89	0.00 (1.000) 1 87	1.70 (0.427) 2 81	3.70 (0.054) 1 87	0.01 (0.916) 1 84	2.54 (0.280) 2 88	1.83 (0.400) 2 88	0.24 (0.624) 1 88	3.82 (0.051) 1 88	
	CM $\chi^2 =$ One-tailed prob. $\alpha' =$ df = N =	16.18 (0.095) 10 47	0.15 (0.698) 1 47	2.18 (0.337) 2 43	0.00 (1.000) 1 47	0.00 (1.000) 1 46	1.34 (0.512) 2 46	0.20 (0.903) 2 46	0.14 (0.708) 1 45	0.35 (0.554) 1 47

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
 df = degrees of freedom  
 N = number of valid cases

Table 9.26

Results obtained from the Kendall rank-order correlation tests between the preparation of cash flow updates or forecasts and major independent characteristics

Preparation of cash flow updates or forecasts for:	Major independent characteristics											
	TURN	FAPEMP	RDE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CEXPB	PEOPLE	TITLE
. CONTROL	0.242	-0.084	0.057	0.167	0.201	-0.029	-0.049	-0.020	-0.186	0.064	-0.061	0.121
Two-tailed prob. $\alpha'$ = N =	(0.006) <sup>††</sup> 88	(0.344) 87	(0.516) 88	(0.058) <sup>†</sup> 88	(0.023) <sup>†</sup> 88	(0.742) 88	(0.577) 88	(0.819) 88	(0.035) <sup>†</sup> 88	(0.464) 88	(0.525) 81	(0.345) 49
. CH	0.255	0.013	0.255	0.130	-0.008	0.133	0.208	0.242	-0.180	0.000	-0.244	0.053
Two-tailed prob. $\alpha'$ = N =	(0.036) <sup>†</sup> 47	(0.915) 47	(0.036) <sup>†</sup> 47	(0.285) 47	(0.949) 47	(0.275) 47	(0.087) <sup>†</sup> 47	(0.047) <sup>†</sup> 47	(0.140) 47	(0.999) 47	(0.069) <sup>†</sup> 42	(0.778) 27

<sup>†</sup> One-tailed probability significant at the 0.05 level

<sup>††</sup> One-tailed probability significant at the 0.01 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient  
 $\alpha'$  = level of significance  
 N = number of valid cases

Financial characteristics of the firm such as the level of return on investment, and the proportion of cash flow generation (both internal and from operations) are specifically related to the preparation of cash flow updates or forecasts for cash investment purposes (Table 9.26). The association is established at the two-tailed probability level of 0.036 for the level of return on investment, and at the two-tailed probability levels of 0.087 and 0.047 respectively for the proportion of internal and operating cash flow generation. In all three instances, the Kendall correlation coefficients suggest a substantial positive association. This implies that companies preparing updates or forecasts for cash investment purposes are most frequently those with higher return on investment, and those with larger relative generation of cash, both internal and from operations.

Other financial characteristics of the firm are specifically linked to the preparation of cash flow updates or forecasts for cash control purposes. One of these financial features is the amount of financial leverage held by the firm. Table 9.26 shows that there is a substantially strong association, established at the two-tailed probability level of 0.023, between the level of gearing and the preparation of updates or forecasts for cash control purposes. The sign of the correlation coefficient suggests that the larger the amount of financial leverage, the higher the probability that companies do prepare such updates or forecasts. This association appears consistent with the almost significant relationship between the preparation of cash flow updates or forecasts for cash control purposes and the overall unused borrowing capacity of the firm (Table 9.25). Although outside the 0.05 significance limit imposed on the test, attention is drawn to this relationship and its possible negative direction (Appendix F.1 - Table F.1.4).

Two more financial characteristics of the firm are exclusively associated with the preparation of cash flow updates or forecasts for cash control purposes: the degree of capital turnover, and the proportion of working capital investment in the firm (Table 9.26). In both cases, the relationship is significant at a two-tailed probability level of less than 0.060. And though the strength of the association does not reach the same level as for the amount of



financial leverage, it is still high in both cases. The basic difference between the two relationships appears to lie in the direction of the association. The positive correlation coefficient ( $\tau=0.17$ ) obtained between the degree of capital turnover and the preparation of updates or forecasts for cash control purposes suggests that the latter are more frequently found in companies where the rate of activity is higher. In contrast, the negative correlation coefficient ( $\tau=-0.19$ ) obtained between the proportion of working capital investment in the firm and the preparation of updates or forecasts for cash control purposes suggests that these are more frequently found in companies with larger experience in working capital disinvestment.

Among the characteristics of the (headquarters) finance department, only one was found to be related to the preparation of cash flow updates or forecasts for cash investment purposes. This characteristic - size of the finance department - is associated with the preparation of this type of update or forecast at the two-tailed probability level of 0.069 (Table 9.26). The relationship appears negative, implying that (headquarters) finance departments where updates or forecasts for cash investment purposes are prepared tend to be the ones generally smaller in size. Similarly, only one feature of the (headquarters) finance department is possibly related to the preparation of cash flow updates or forecasts for cash control purposes. This feature is the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (Table 9.25). The relationship is only significant at the one-tailed probability level of 0.051 but because this is so close to the 0.05 significance limit accepted as the cut-off point in the test, particular emphasis is given to it. The corresponding contingency table (Appendix F.1 - Table F.1.5) suggests the presence of a positive relationship between the variables.

In sum, the results of the tests of association between the preparation of cash flow updates or forecasts and major independent characteristics reveal that, as far as size of the firm is concerned, both types of update or forecast appear to be more common among larger firms. Additionally, these results reveal that certain independent characteristics, both of the firm and of the (headquarters) finance

department, are specifically related to the preparation of a particular type of cash flow update or forecast. Companies with higher levels of return on investment, and a higher relative capacity to generate cash (both internally and from operations) appear to develop cash flow updates or forecasts mainly for cash investment purposes. Since cash is not a problem for these companies, small-sized (headquarters) finance departments are likely to dominate. The apparently negative association found between the preparation of cash flow updates or forecasts for cash investment purposes and size of the (headquarters) finance department is, therefore, not surprising. On the other hand, companies with higher levels of gearing, lower overall external financing capacity, higher rates of activity, and higher proportion of working capital disinvestment appear to develop cash flow updates or forecasts mainly for cash control purposes. The variety of characteristics associated with the preparation of such updates or forecasts appears to match the diversity of answers given by respondents concerning the specific cash flows upon which they place the emphasis for control (see previous comments on Table 9.24). Finally, since these companies are likely to allocate more time to cash management, the apparently positive relationship between the preparation of cash flow updates or forecasts for cash control purposes and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) is not unexpected.

In order to ascertain how the two types of cash flow update or forecast vary with respect to major external and internal characteristics, a final series of tests - chi-square test of homogeneity for two independent samples and Mann-Whitney's U tests - were carried out. The hypotheses for the tests are described in Exhibit 9.7. Table 9.27 provides the results obtained. Significant differences were found between updates or forecasts prepared for cash control purposes and updates or forecasts prepared for cash investment purposes with respect to their frequency, and the period of time covered. Comparison of mean ranks suggests that the former tend to be prepared less frequently, and for longer periods of time than the latter. In both situations, significance was obtained at a two-tailed probability level of less than 0.02. Furthermore, there is a significant difference between the two groups as far as the

## Exhibit 9.7

Decision model for the chi-square test of homogeneity and the Mann-Whitney U tests between cash flow updates or forecasts prepared for cash control purposes and cash flow updates or forecasts prepared for cash investment purposes. A comparison in terms of major external and internal characteristics of the updates or forecasts

### . NULL HYPOTHESES ( $H_0$ ):

Cash flow updates or forecasts prepared for cash control purposes (CONTROL) and cash flow updates or forecasts prepared for cash investment purposes (CM) are identical with respect to

- . their character (UPDTPRP)
- . their frequency (UPDTPREP)
- . the nature of the period of time covered (UPDTHRZA)
- . the period of time covered (UPDTHRZB)
- . the number of planning processes operated over the period of time covered (UPDTHRZC)
- . the number of years for which they have been in operation (UPDTPRZ)
- . the objectives set for them (OBJPGR2; OBJCSHT2; OBJPFIN2; OBJMCSH2)
- . the degree of commitment attached to them (UPDTCOMM)

### . LEVEL OF SIGNIFICANCE:

- . For the chi-square test of homogeneity:  
One-tailed probability  $\alpha = 0.05$
- . For the Mann-Whitney U tests:  
Two-tailed probability  $\alpha = 0.10$

### . DECISION CRITERION:

- . For the chi-square test of homogeneity:  
Reject  $H_0$  if  $\alpha' \leq 0.05$
- . For the Mann-Whitney U tests:  
Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 9.27

Results obtained from the chi-square test of homogeneity and the Mann-Whitney U tests between cash flow updates or forecasts prepared for cash control purposes and cash flow updates or forecasts prepared for cash investment purposes. A comparison in terms of major external and internal characteristics of the updates or forecasts

Cash flow updates or forecasts prepared for cash control purposes v. cash flow updates or forecasts prepared for cash investment purposes	Major external and internal characteristics of the updates or forecasts										
	UPDTPRP	UPDTPREP	UPDTHRZA	UPDTHRZB	UPDTHRZC	UPDTTIME	UPDTCOMM	08JPBGRZ	08JCSHT2	08JPFIN2	08JMC5H2
$\chi^2$ test of homogeneity											
One-tailed probability			1.18 (0.278)								
$\alpha'$ =			1								
df =			86								
N =											
Mann-Whitney U tests											
. UPDT (CONTROL)	N = 63	57									
Mean rank =	42.00	42.74									
. UPDT (CM)	N = 21	20									
Mean rank =	44.00	28.35									
z =	-0.680	-2.794									
Two-tailed probability $\alpha'$ =	(0.497)	(0.005)**									

\* One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols: For the  $\chi^2$  test of homogeneity:

$\chi^2$  = chi-square statistic

$\alpha'$  = level of significance

df = degrees of freedom

N = number of valid cases

For the Mann-Whitney U tests:

N = number of valid cases in each sample

z = standard score

$\alpha'$  = level of significance

objective of planning the need for financing is concerned (two-tailed probability of 0.069). Again, the comparison of mean ranks signals the direction of the relationship, and suggests that updates or forecasts for cash control purposes are more often associated with the objective above than updates or forecasts for cash investment purposes.

#### 9.4 Traditional Early Warning Systems in Handling Uncertainty

It is the aim of this section to analyse each one of the traditional early warning systems - cash flow budget revisions and cash flow updates or forecasts - as far as handling the uncertainty underlying the short-term cash flow planning process is concerned. This is done by analysing how effective they are seen to be by companies participating in the study. The effectiveness of each method is judged in relation both to unexpected events which are currently producing major negative deviations from the expected cash flows of the firm, and to unexpected events which threaten to produce such deviations.

With respect to cash flow budget revisions, only 45 percent of the companies consider them to be more than moderately effective in handling unexpected events which, having occurred, are currently producing major negative deviations from expected cash flows. Thirty two percent view them as moderately effective, whereas 13 percent do not regard them as being effective at all (Table 9.28). On the other hand, the majority of companies (53 percent) consider them to be more than moderately effective in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm. Twenty nine percent view cash flow budget revisions as moderately effective for this purpose, whereas only 8 percent do not regard them as being effective at all (Table 9.29).

Table 9.28

Effectiveness of cash flow budget revisions in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm

Variable RCFBCOP

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	12	12.8	12.8
.	10	10.6	23.4
. Moderate	30	31.9	55.3
.	24	25.6	80.9
. High	18	19.1	100.0
Not determined	3	MISSING	100.0
Not applicable	25	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 94

Table 9.29

Effectiveness of cash flow budget revisions in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm

Variable RCFBPLAN

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	7	7.5	7.5
.	10	10.8	18.3
. Moderate	27	29.0	47.3
.	29	31.2	78.5
. High	20	21.5	100.0
Not determined	3	MISSING	100.0
Not applicable	26	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 93



This analysis led to a test to determine whether a significant difference exists in the way in which companies view the effectiveness of cash flow budget revisions in handling both situations. A Wilcoxon matched-pairs signed-ranks test was performed, revealing the existence of a significant difference at the two-tailed probability level of 0.084 (Exhibit 9.9 and Table 9.33). Test indicators suggest that cash flow budget revisions are considered more effective in handling unexpected events which threaten to produce major negative deviations, than in handling unexpected events which are currently producing such deviations.

In order to determine whether the effectiveness of cash flow budget revisions in handling uncertainty is associated with the periodicity of the revisions, two one-sample chi-square tests of independence were carried out. The hypotheses for these tests are stated in Exhibit 9.8, and the results obtained are presented in Table 9.30. An association was found between the periodicity of cash flow budget revision and the effectiveness of revisions in handling unexpected events which threaten to produce major negative deviations. The association is established at the one-tailed probability level of 0.013, with a Cramer V coefficient of 0.31 and an uncertainty coefficient (asymmetric) of 0.05. The corresponding contingency table (Appendix F.1 - Table F.1.6) reveals that 71 percent of the companies for which cash flow budget revisions are less than moderately effective for this purpose, do have low periodicity of cash flow budget revision. On the other hand, most companies that regard cash flow budget revisions as being moderately or more than moderately effective for the same purpose (67 percent and 69 percent respectively), show high periodicity of cash flow budget revision. This suggests the relationship to be positive, i.e. the more frequent the cash flow budget revisions, the more effective they tend to be considered in handling prospective negative deviations. The same cannot be stated about the effectiveness of cash flow budget revisions in handling current negative deviations. In this case, no evidence was found that the periodicity of cash flow budget revision is related to the effectiveness of the revisions in handling such deviations.

## Exhibit 9.8

Decision model for the one-sample chi-square tests of independence between the effectiveness of cash flow budget revisions in handling uncertainty and the periodicity of the revisions

. NULL HYPOTHESES ( $H_0$ ):

- . the effectiveness of cash flow budget revisions in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm (RCFBCOP) is independent of the periodicity of the revisions (CFBUPDT - see section 9.1)
- . the effectiveness of cash flow budget revisions in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm (RCFBPLAN) is independent of the periodicity of the revisions (CFBUPDT - see section 9.1)

. LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.05$

Table 9.30

Results obtained from the one-sample chi-square tests of independence between the effectiveness of cash flow budget revisions in handling uncertainty and the periodicity of the revisions

Effectiveness of cash flow budget revisions in:	Periodicity of the revisions (CFBUPDT)
<p>. handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm</p> <p style="text-align: right;"> <math>\chi^2 = 4.46</math>            One-tailed probability <math>\alpha' = (0.108)</math>  <math>df = 2</math>  <math>N = 93</math> </p>	
<p>. handling unexpected events which threaten to produce major negative deviations from the expected cash flows of the firm</p> <p style="text-align: right;"> <math>\chi^2 = 8.70</math>            One-tailed probability <math>\alpha' = (0.013)^*</math>  <math>df = 2</math>  <math>N = 92</math> </p>	
<p style="text-align: right;">Cramer's V = 0.307</p> <p style="text-align: right;">Uncertainty coefficient (asymmetric with RCFBPLAN dependent) = 0.046</p>	

\* One-tailed probability significant at the 0.05 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
 $df$  = degrees of freedom  
 $N$  = number of valid cases



The effectiveness of cash flow updates or forecasts in handling uncertainty is shown in Tables 9.31 and 9.32. For 61 percent of the companies, cash flow updates or forecasts are more than moderately effective in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm. Among the remaining 39 percent, 13 percent consider them to be less than moderately effective (Table 9.31). In comparison, 52 percent regard the cash flow updates or forecasts as more than moderately effective in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from expected cash flows. Twenty four percent rate them as less than moderately effective (Table 9.32).

As with the cash flow budget revisions, a Wilcoxon matched-pairs signed-ranks test was conducted to compare the effectiveness of cash flow updates or forecasts in handling both situations. The hypothesis underlying the test is defined in Exhibit 9.9. Table 9.33 not only reveals that there is a significant difference at the two-tailed probability level of 0.002, but also implies that cash flow updates or forecasts tend to be viewed as more effective in handling the former situation than in handling the latter.

The final part of this section looks at the advantages generally gained from the preparation of cash flow updates or forecasts. Table 9.34 shows that a better understanding of the potential effect of events upon cash flows is the advantage most frequently reported by companies (73 percent). A faster response to events on the part of the company, and an earlier recognition of their emergence are the two advantages next most frequently reported (with 63 percent and 60 percent respectively). A lesser need to hold large amounts of instant reserves is mentioned by 53 percent. All the remaining advantages are referred to by less than half of the cases.

It would be worthwhile to compare how cash flow updates or forecasts and cash flow budget revisions differ with respect to the advantages generally gained from their preparation. This could be done by conducting Wilcoxon's matched-pairs signed ranks tests, which would look for significant differences in the advantages to companies preparing both cash flow budget revisions and cash flow updates or

Table 9.31

Effectiveness of cash flow updates or forecasts in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm

Variable UPDTCOP

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	6	6.8	6.8
.	5	5.7	12.5
. Moderate	23	26.1	38.6
.	26	29.6	68.2
. High	28	31.8	100.0
Not determined	3	MISSING	100.0
Not applicable	31	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 88

Table 9.32

Effectiveness of cash flow updates or forecasts in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm

Variable UPDTPLAN

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	7	8.1	8.1
.	14	16.1	24.2
. Moderate	21	24.1	48.3
.	24	27.6	75.9
. High	21	24.1	100.0
Not determined	3	MISSING	100.0
Not applicable	32	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 87

Exhibit 9.9

Decision model for the Wilcoxon matched-pairs signed-ranks tests between the effectiveness of traditional early warning systems in handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm and their effectiveness in handling unexpected events which threaten to produce such deviations

. NULL HYPOTHESES ( $H_0$ ):

There is no difference between

- . the effectiveness of cash flow budget revisions in handling both situations (RCFBCOP v. RCFBPLAN)
- . the effectiveness of cash flow updates or forecasts in handling both situations (UPDTCOP v. UPDTPLAN)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 9.33

Results obtained from the Wilcoxon matched-pairs signed-ranks tests between the effectiveness of traditional early warning systems in handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm and their effectiveness in handling unexpected events which threaten to produce such deviations

Comparison between:	N	- Ranks		+ Ranks		z	2-tailed prob. $\alpha'$
		n <sub>1</sub>	Mean	n <sub>1</sub>	Mean		
RCFBCOP v. RCFBPLAN	91	9	13.00	18	14.50	-1.730	(0.084)*
UPDTCOP v. UPDTPLAN	85	23	16.61	7	11.86	-3.075	(0.002)**

\* One-tailed probability significant at the 0.05 level  
 \*\* One-tailed probability significant at the 0.01 level

Symbols: N = number of valid cases  
 n<sub>1</sub> = number of negative differences  
 n<sub>2</sub> = number of positive differences  
 z = standard score  
 $\alpha'$  = level of significance

Table 9.34

Advantages generally gained from the preparation of cash flow updates or forecasts

	Number of responses	Percentage of responses	Percentage of cases
. Better informed view of the likelihood of an event's occurring	30	9.6	33.7
. Better understanding of the potential effect of events upon cash flows	65	20.9	73.0
. Better understanding of how different areas in the company interact	19	6.1	21.3
. Earlier recognition of the emergence of an event	53	17.1	59.6
. Faster response to events on the part of the company	56	18.0	62.9
. Greater confidence in the effectiveness of the response to events	36	11.6	40.4
. Lesser need to hold large amounts of instant reserves	47	15.1	52.8
. Other advantages: better utilization of resources/ actual control of cash flows/ confidence with bankers, etc.	5	1.6	5.6
	-----	-----	-----
Total responses	311	100.0	349.4

N = 89

forecasts. Such an analysis was not possible in the study since the necessary data were not gathered. Yet, it is suggested that this analysis be given consideration in future studies.

### 9.5 Conclusions

Two basic forms of short-term cash flow planning are generally described in the literature [e.g. Hartley, 1976]: cash flow budgeting, and cash flow updating or forecasting. The difference between these forms reflects itself in their distinctive supporting systems. Cash flow budgeting is supported by a system which, besides the preparation of an initial estimate of the firm's future cash inflows and outflows at the beginning of every year (the cash flow budget), may comprise the preparation of several subsequent estimates over the planning period (the cash flow budget revisions). Overall, the cash flow budget and its revisions are commonly understood as cash budgets. Cash flow updating or forecasting is supported by a system which comprises either the preparation of updates of the cash flow budget or the preparation of cash flow forecasts.

All sample firms with the exception of two operate a system of cash flow budgeting (at group level). In addition, most of them (79 percent) operate a system of cash flow updating or forecasting. A comparison between the cash flow budgeting system and the cash flow updating or forecasting system in terms of the number of years for which they have been in operation, suggests that the introduction in firms of updates or forecasts has been subsequent to the implementation of cash budgets.

The first major conclusion of the study, however, is that the two short-term cash flow planning systems diverge not only from an operational point of view but also as far as their objectives and their external characteristics are concerned.



In effect, the results produced in the study suggest that the cash flow budgeting system is more often associated with the three objectives of planning for business growth, expressing in cash terms the objectives, strategies and plans of the business, and planning the need for financing than the system of cash flow updating or forecasting. The latter, in turn, appears to be more often associated with the objective of managing and controlling the cash position. Only where companies do not prepare cash flow updates or forecasts does the cash flow budgeting system appear to be more often associated with this last objective. These results are consistent with the recommendations by Hartley [1976]. He states [p. 51]: "The ultimate object of preparing the short-term cash forecasts must be to guide appropriate and timely management action towards improved control of cash flows". Yet the availability of cash transcends the preparation of cash flow updates or forecasts; the existence of the firm depends upon continued cash flow to meet the firm's needs as it develops and grows. In other words, future development and growth depend upon operational actions and plans, but these are to no avail if the firm runs out of cash in the meantime. Hence the importance of cash flow budgeting. According to Hartley [1976, p.36], the object of the latter is "... to indicate the financial consequences of future strategic courses of action and to assist in ... financial planning".

Hartley [1976] also argues that, since the two cash flow planning systems serve such different objectives, they should use a different format - the cash flow budgeting system covering longer periods of time, using longer intervals of division, and being operated less frequently than the system of cash flow updating or forecasting. Such an argument is confirmed by the results of the study. In most companies (94 percent), the cash flow budget is produced for the next 12 months or more ahead. Furthermore, most companies' cash flow budgeting is on a monthly basis, although the proportion of firms using quarterly intervals increases as stages over the period of time covered by the cash flow budget become more remote. On the basis of the mode, the typical company in the sample revises its cash flow budget regularly, usually every quarter, and conducts the revisions on a continuous roll-over basis. On the other hand, most companies (92 percent) produce cash flow updates or forecasts regularly. Of

these, 81 percent report the month and the week as the most frequent times of preparation. The period of time covered by the cash flow updates or forecasts is fixed for the majority of firms (86 percent), the system operating on a roll-over basis. Most of these firms (69 percent) prepare the cash flow updates or forecasts for periods of time up to three months ahead only. Another result of the study, which supports the argument above, is that companies which demand a more active role from their cash flow budgeting system, such as managing and controlling the cash position, appear to revise their cash flow budget more frequently. Overall, these results run in parallel with the results obtained from a survey of cash management practices carried out by Soldofsky and Schwartz [1972] in 200 American companies. Such results show that daily and weekly information was used for managing the cash position, while monthly and longer projections were used in the planning process.

If the two short-term cash flow planning systems differ as to their objectives and as to their external characteristics, the same cannot be concluded about the degree of commitment attached to their plans. A significant difference between the cash flow budgeting system and the cash flow updating or forecasting system was found only when controlling for the periodicity of revision of the cash flow budget. Even so, the difference exists only in companies where the periodicity of revision is low. In these cases, a higher degree of commitment appears to be attached to cash flow updates or forecasts than to cash budgets.

Two traditional methods of handling the uncertainty surrounding the short-term cash flow planning process are consistently mentioned in the literature [e.g. Donaldson, 1969a; Donaldson, 1969b]. The first consists of cash flow budget revisions following updates in the assumptions, objectives and strategies stated in the overall operational budget. The second consists of cash flow updates or forecasts.

The literature seems to suggest that these two methods are used interchangeably (see 4.3.3.1). The fact, however, that the two corresponding cash flow planning systems serve different objectives apparently refutes this suggestion. Furthermore, a test carried out



in the study shows no support for such a suggestion. In effect, when the preparation of cash flow updates or forecasts was tested against the periodicity of cash flow budget revision in order to determine whether the two methods acted as substitutes for each other, it was found that the proportion of firms revealing low and high periodicity of cash flow budget revision among those preparing cash flow updates or forecasts was exactly the same as among those not producing them. It appears, therefore, that traditional early warning systems, contrary to what the literature seems to imply, are not used interchangeably since they serve different purposes while handling the uncertainty underlying the short-term cash flow planning process. In the context of what has been said, it is possible to argue that cash flow updates or forecasts are mainly aimed at the management and control of cash. Cash flow budget revisions, in turn, are mainly aimed at the planning of cash. The apparently positive association found in the study between the periodicity of cash flow budget revision and the objective set for the system of planning the need for financing reinforces this conclusion.

What major characteristics of the firm, and of the (headquarters) finance department, then, are related to the implementation of traditional early warning systems?

Tests of association conducted in the study reveal first that the implementation of both methods is related to the size of the firm. The periodicity of cash flow budget revision appears to increase as firms become larger. The preparation of cash flow updates or forecasts appears to become more common as firms increase in size. This has probably to do with the greater resources available to larger companies, or with the higher complexity usually involved in the management of these firms. Whatever the case, these results support Soldofsky and Schwartz' [1972] conclusion that smaller firms have less developed cash management practices than larger firms.

In a second stage, the same tests of association reveal that the implementation of the two methods is related to different financial characteristics of the firm and to different characteristics of the (headquarters) finance department.



As far as the preparation of cash flow budget revisions is concerned, companies where the relative level of cash generated from operations is lower, and companies where the proportion of capital investment is higher, are likely to be more sensitive to deviations from their original cash projections and to be more aware of the need for cash planning. Not surprising that they appear to revise their cash flow budget more often. Companies where the cash function is more institutionalized in the (headquarters) finance department also appear to revise their cash flow budget more frequently.

As to the preparation of cash flow updates or forecasts, the conclusions that can be drawn from the tests of association performed in the study are particularly relevant. Companies with higher levels of return on investment, and a higher relative capacity to generate cash (both internally and from operations) appear to develop cash flow updates or forecasts mainly for cash investment purposes. Such companies seem prone to systematic positive deviations from their expected cash flows. Hence the importance for them of managing and controlling cash through cash flow updates or forecasts, so that any surplus funds that arise can be invested to produce the best possible return on the money market. Since cash is not a problem for these companies, small-sized (headquarters) finance departments are likely to dominate. The apparently negative association found in the study between the preparation of cash flow updates or forecasts for cash investment purposes and size of the (headquarters) finance department is, therefore, not surprising.

On the other hand, companies with higher rates of activity, higher levels of gearing and lower overall external financing capacity appear to develop cash flow updates or forecasts mainly for cash control purposes. These are companies for which negative deviations from their expected cash flows (e.g. due to fluctuations in the level of sales and working capital) appear to be either more frequent or more troublesome. A point which is made in Soldofsky and Schwartz [1972], is that there are companies which never seem to experience any excess funds for investment. It is important for these companies, therefore, to prepare cash flow updates or forecasts for managing and controlling cash, so that any shortage of funds can be identified and corrective action can be implemented as early as possible.

Furthermore, since these companies are likely to resort to their working capital as a means of generating additional funds, the apparently negative association obtained in the study between the preparation of cash flow updates or forecasts for cash control purposes and the proportion of working capital investment in the firm is not surprising. Also not surprising, since these companies are likely to allocate more time to cash management, is the apparently positive association obtained in the study between the preparation of cash flow updates or forecasts for cash control purposes and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level).

Overall, the results of the study indicate a duality of purpose as far as cash flow updates or forecasts are concerned: investing surplus funds on the money market on the one hand, and controlling major negative fluctuations in the level of cash flows on the other. Yet as the same results indicate, only a minority of firms are exposed to systematic positive deviations from their expected cash flows. A comparison between the two basic types of cash flow update or forecast suggests that updates or forecasts for cash control purposes are prepared less frequently, and for longer periods of time, than updates or forecasts for cash investment purposes. Moreover, as might be expected, the former appear to be associated more often with the objective of planning the need for financing than the latter.

In summary, it is concluded that companies frequently resort, in the short-term, to traditional methods of handling the uncertainty surrounding their cash flow planning process. In this regard, Donaldson's [1969b] conclusion is confirmed. It is also concluded that the use of such methods is very much linked, as hypothesized, to company size, to financial characteristics of the firm and to characteristics of the (headquarters) finance department. Finally, it is concluded that the implementation of such methods is not exclusively confined to companies with experience of negative deviations from expected cash flows and a bad financial profile. Companies where unexpected financial needs are simply more frequent (e.g. firms with high rates of activity) or more troublesome (e.g. firms with heavy capital expenditure programmes) also appear to implement them. In this respect, the study provides more thorough



conclusions than Donaldson's [1969b]. The study goes further still by showing that the preparation of cash flow updates or forecasts also appears to be a common practice in companies prone to systematic positive deviations from expected cash flows.

One subject which is not dealt with in the literature, is that of the effectiveness of the traditional early warning systems in handling the uncertainty underlying the short-term cash flow planning process. To throw some light on this subject, the study analysed how effective both methods are seen to be in relation both to unexpected events which are currently producing major negative deviations from the expected cash flows of the firm, and to unexpected events which threaten to produce such deviations. The tests performed suggest that cash flow updates or forecasts are viewed as more effective in handling the former than the latter. Cash flow budget revisions in turn, tend to be viewed as more effective in handling unexpected events which threaten to produce major negative deviations, than in handling unexpected events which are currently producing such deviations. Besides, the more frequent the cash flow budget revisions, the more effective they appear to be considered in handling prospective negative deviations.

Finally, the advantages generally gained from the preparation of cash flow updates or forecasts were analysed in the study. A better understanding of the potential effect of events upon cash flows, a faster response to events on the part of the company, and an earlier recognition of their emergence, are the three advantages most frequently reported by firms. This result is surprising since the literature [e.g. Hartley, 1976] recognizes that traditional early warning systems lack the diagnostic capacity and the fast response capacity which are essential in dealing with unexpected events (see 4.3.3.2).



## Chapter 10 RESULTS AND CONCLUSIONS II

10.1 Introduction

10.2 Contingency Planning in General

10.3 Reactive Contingency Planning

10.4 Proactive Contingency Planning

10.5 Conclusions

### 10.1 Introduction

The present chapter reports the results and conclusions of the study on contingency planning (at group level).

Section 10.2 characterizes contingency planning in general. First, the reasons for not carrying out any form of contingency planning are explored. Second, information on contingency planning irrespective of its form is analysed. This includes identifying a) the main reasons for carrying out contingency planning, b) who in the company took the initiative of carrying it out, c) the number of years for which it has been carried out, d) whether it makes use of a computer simulation model, and e) the extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of contingency plans. Also, the advantages generally gained from the preparation of contingency plans are identified and compared to the advantages generally gained from the preparation of cash flow updates or forecasts.

Section 10.3 examines reactive contingency planning. The types of unexpected event leading to reactive contingency planning and the effectiveness of the latter in handling uncertainty are analysed. Next, the results of tests performed to identify major independent characteristics which relate to the implementation of reactive contingency planning are reported.

Section 10.4 starts by describing the reasons why firms do not carry out proactive contingency planning. Then, the system implemented by those companies which do carry out such planning is characterized. Some of the aspects analysed include the identification of the cash flow plans at the level of which proactive contingency planning is carried out, the determination of the range of alternative values tested on the variables involved in the sensitivity analysis, whether or not the firm develops a strategy of

response, and the effectiveness of proactive contingency planning in providing for financial mobility at minimum cost. At the end of the section, the results of tests of association performed between the implementation of proactive contingency planning and major independent characteristics are reported.

Finally, Section 10.5 provides the conclusions of the study on the subject.

### 10.2 Contingency Planning in General

In 77 percent of the sample companies, there is some form of contingency planning (Table 10.1).

The reasons for not carrying out any form of contingency planning among the remaining 23 percent are presented in Table 10.2. Out of a total of 72 responses, 1 percent report that the idea of introducing contingency planning was never considered. Thirty eight percent report that the idea was considered but was never implemented since the occurrence of unexpected events is not seen as a relevant problem - either because the future is reasonably predictable (17 percent) or because cash can be obtained with very few restrictions (21 percent). Fifty four percent report that the occurrence of unexpected events is seen as a relevant problem. Contingency planning was never implemented however, because it is not regarded as being effective (13 percent), because the traditional early warning systems are considered to be adequate to handle the problem (22 percent), or because contingency planning is viewed as being impracticable, too costly, sophisticated, and time-consuming (19 percent). Seven percent specify other reasons, namely that contingency planning is not appropriate to the type of business in question, it is incapable of being developed within the present planning facilities of the company, and it is not as good an approach to the problem as keeping a sufficient amount of readily available resources. Overall, the three reasons most frequently reported are: the traditional early warning systems (cash flow budget revisions and/or cash flow updates



Table 10.1

Implementation of some form of contingency planning

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	94	77.0	77.0
. No	28	23.0	100.0
	-----	-----	
Total	122	100.0	

N = 122

Table 10.2

Reasons for not carrying out any form of contingency planning

	Number of responses	Percentage of responses	Percentage of cases
. The company has never considered the idea	1	1.4	3.6
. The problem of occurrence of unexpected events is not relevant to the company because:			
. The future is reasonably predictable	12	16.7	42.9
. Cash can be obtained with very few restrictions	15	20.8	53.6
. Contingency planning does not help to improve response to unexpected events	6	8.4	21.4
. Contingency planning is more effective at the level of the individual company within the group than at group level	3	4.2	10.7
. Traditional early warning systems are adequate to handle the problem	16	22.2	57.1
. Contingency planning is impracticable	4	5.6	14.3
. Contingency planning is too costly and/or sophisticated	5	6.9	17.9
. Contingency planning is too time-consuming	5	6.9	17.9
. Other reasons	5	6.9	17.9
	-----	-----	-----
Total responses	72	100.0	257.1

N = 28

or forecasts) are adequate to handle the problem of unexpected events (57 percent of the cases); the problem of unexpected events is not relevant to the company since cash is not a restrictive factor (54 percent); the problem of unexpected events is not relevant to the company since the future is reasonably predictable (43 percent).

Where there is some form of contingency planning (77 percent of the sample firms), the main reasons for carrying it out are shown in Table 10.3. For 37 percent of the companies, the need to check the financial feasibility of certain courses of action in response to major deviations from expected cash flows is the principal reason. Suggested examples of such deviations include new acquisitions, new capital expenditure plans, variations from anticipated sales volume, variations in budgeted retail price levels, etc.. In 24 percent, it is the need to ensure consistent and effective control of resource allocation given the pressure to monitor gearing levels, borrowing limits, cost of borrowed money, etc.. In 20 percent, contingency planning is carried out because it is regarded as the logical complement to cash flow projections, whereas in 10 percent it is the nature of the business - such as seasonality, capital intensiveness, high market competition, high risk or high cash flow volatility - that requires it. In 6 percent, it was the occurrence of a major financial crisis in the past that motivated the implementation of contingency planning. For 3 percent, it was the opportunity provided by the availability of a computer-based financial simulation model that led to its implementation.

In the majority of the firms which use some form of contingency planning (67 percent), it was the (headquarters) finance officer who took the initiative to carry out such planning. In only 24 percent, the initiative lay with a (group) Director above the (headquarters) finance officer, or with the Group or Board of Directors as a whole (Table 10.4). With respect to the number of years for which contingency planning has been carried out (Table 10.5), most firms (53 percent) have more than five years experience prior to the study. Despite the large proportion of companies carrying out contingency planning, Table 10.6 reveals that only a small number of firms (30 percent) use a computer simulation model. It is also found that in most cases where a computer simulation model is used, the model is



Table 10.3

Main reasons for carrying out contingency planning

Variable WFREAS

	Absolute frequency	Adjusted relative frequency (%)
. Nature of the business	8	10.1
. The need to ensure consistent and effective control of resource allocation	19	24.1
. The need to check the financial feasibility of certain courses of action in response to major deviations from expected cash flows	29	36.7
. The occurrence of a major financial crisis in the past	5	6.3
. Logical complement to cash flow projections	16	20.3
. Opportunity provided by the availability of computer-based financial simulation models	2	2.5
Not determined	15	MISSING
Not applicable	28	MISSING
Total	122	100.0

N = 79

Table 10.4

Who in the company took the initiative to carry out contingency planning

Variable WFWHO

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. The Group or Board of Directors	8	12.1	12.1
. A (group) Director above the (HQ) finance officer	8	12.1	24.2
. The (HQ) finance officer	44	66.7	90.9
. A (group) senior executive below the (HQ) finance officer	6	9.1	100.0
Not determined	28	MISSING	100.0
Not applicable	28	MISSING	100.0
Total	122	100.0	

N = 66



Table 10.5

Number of years for which contingency planning has been carried out

Variable WFTIME

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. For 1 year or less	2	3.2	3.2
. For more than 1 year up to 5 years	27	43.6	46.8
. For more than 5 years	33	53.2	100.0
Not determined	32	MISSING	100.0
Not applicable	28	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 62

Table 10.6

Use of a computer simulation model in carrying out contingency planning

Variable WFCOMPUT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Contingency planning resorts to:			
. An optimizing model	8	9.2	9.2
. A satisficing model	18	20.7	29.9
. Contingency planning does not resort to a computer simulation model	61	70.1	100.0
Not determined	7	MISSING	100.0
Not applicable	28	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 87

only a satisficing and not an optimizing one.

As to the participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans, Table 10.7 presents the percentage of cases where each senior manager is called on to participate, and the extent of his participation. The (Group) Managing Director is not only the senior manager called on to participate by the largest proportion of companies (93 percent), but also the one whose participation is the most extensive (Mdn=3.3). Next in frequency are the (Group) Divisional Directors and the subsidiary company finance officer, both called on to participate by 81 percent of the firms. The extent of their participation, however, is not similar, the latter having a more extensive participation (Mdn=2.7) than the former (Mdn=2.5). The (Group) Marketing Director is called on to participate by a smaller number of companies (77 percent) but the extent of his participation is generally higher (Mdn=2.9) than the one of the subsidiary company finance officer. The (Group) Production Director, the subsidiary company Directors and, in particular, the (Group) R & D Director are the senior managers less commonly called on and with smaller medians of participation. Other senior managers participating in the discussion of contingency plans, such as the Chairman, project and functional managers, are referred to by a few firms. In all these cases, the extent of participation tends to be very high.

For the purpose of providing for each firm a measure of the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans, a new variable was created. Its calculation was based both on the number of senior managers participating in the discussion and on the extent of their participation. The variable in question was obtained by relating each particular company to the case of a hypothetical firm in which all senior managers listed in Table 10.7 were considered to participate very extensively in the discussion of contingency plans. This being so, the degree of top management participation in the discussion of contingency plans is measured for each company, not in absolute but in relative terms, the variable assuming values from a minimum of 0.2, where no participation exists at all, up to a maximum of 1.0, where the participation is total. Given the large number of

Table 10.7

Extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of contingency plans

Senior managers outside the (headquarters) finance department	Variables	Number of companies where:			N <sup>2</sup>	Percentage of participation	Median <sup>3</sup> of participation
		They are called on to participate in the discussion of contingency plans	They are not called on to participate in the discussion of contingency plans	Not determined/Not applicable <sup>1</sup>			
• (Group) Marketing Director	WFDSCHMD	34	10	50	44	77.3	2.857
• (Group) Production Director	WFDSOCPD	20	9	65	29	69.0	2.500
• (Group) R & D Director	WFDSORCD	10	13	71	23	43.5	2.125
• (Group) Managing Director	WFDSOCHMD	75	6	13	81	92.6	3.250
• (Group) Divisional Directors	WFDSOCDVD	47	11	36	58	81.0	2.545
• Subsidiary company Directors	WFDSOCSDD	46	22	26	68	67.6	2.400
• Subsidiary company finance officer	WFDSOCSFD	51	12	31	63	81.0	2.727
• Others: Chairman/Project managers/Functional managers	WFDSOCHOTH	9	-	-	9	100.0	3.200

<sup>1</sup> "Not applicable" refers to those companies where the manager in question is non-existent.

<sup>2</sup> N is the number of valid cases.

<sup>3</sup> The median of participation was calculated on the basis of the ratings provided by firms on a four-point scale (Very little to Very extensively).



discrete categories taken on by the variable, classes of categories were defined so that its frequency distributions could be projected in Table 10.8. Out of 49 valid cases - those for which the variable could be calculated - 55 percent show a degree of top management participation in the discussion of contingency plans that is moderate or less than moderate.

The association between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans, and major independent characteristics, namely features of the cash flow budgeting system and of contingency planning, features of the firm, and features of the (headquarters) finance department, was hypothesized in the study (see Chapter 5). One-sample chi-square tests of independence, Kendall's and Spearman's rank-order correlation tests were performed in order to test the hypotheses raised. Exhibits 10.1 to 10.3 present the decision models for the tests, and Tables 10.9 and 10.10 show the results obtained.

No association was found between the degree of top management participation in the discussion of contingency plans and any of the features, either of the cash flow budgeting system or of contingency planning (Table 10.9). As far as the non-financial features of the firm are concerned, company size was the only one found to be related to the degree of top management participation in the discussion of contingency plans (Table 10.10). The relationship is significant at the two-tailed probability level of 0.056. A Spearman correlation coefficient of -0.28 suggests that smaller firms tend to show higher degrees of top management participation in the discussion of contingency plans than larger firms. Among the financial features of the firm, only the overall unused borrowing capacity of the company was found to be associated with the degree of top management participation in the discussion of contingency plans (two-tailed probability of 0.036). The Kendall correlation coefficient drawn for this relationship (-0.24) implies that companies with lower levels of overall unused borrowing capacity tend to show higher degrees of top management participation in the discussion of contingency plans (Table 10.9).

Table 10.8

Degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans

Variable WFPART

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Moderate or less ( $\leq 0.6$ )	27	55.1	55.1
. More than moderate ( $> 0.6$ )	22	44.9	100.0
Not determined	45	MISSING	100.0
Not applicable	28	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 49

## Exhibit 10.1

Decision model for the one-sample chi-square tests of independence between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART) is independent of

- . the industry classification (IC)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)

. **LEVEL OF SIGNIFICANCE:**

One-tailed probability  $\alpha = 0.05$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.05$



## Exhibit 10.2

Decision model for the Kendall rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . who in the company took the initiative to carry out contingency planning (WFWHO)
- . the number of years for which contingency planning has been carried out (WFTIME)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$

### Exhibit 10.3

Decision model for the Spearman rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans and major independent characteristics

. NULL HYPOTHESES ( $H_0$ ):

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART) is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$





Table 10.10

Results obtained from the Spearman rank-order correlation tests between the degree of participation of senior managers outside the (HQ) finance department in the discussion of contingency plans and major independent characteristics

Degree of participation of senior managers outside the (HQ) finance department in the discussion of contingency plans WFPART	Major independent characteristics											
	TURN	FAPEMP	ROE	TURPNA	GEARNG	LAPCA	ICFP6R	OCFP6R	WCIP6R	CXPPB	PEOPLE	TITLE
$r_s = -0.275$	0.224	-0.055	0.014	-0.034	-0.228	-0.125	-0.155	0.174	-0.156	-0.122	-0.101	
Two-tailed prob. $\alpha' = (0.056)^*$	(0.122)	(0.706)	(0.922)	(0.815)	(0.115)	(0.392)	(0.287)	(0.232)	(0.284)	(0.419)	(0.617)	
N = 49	49	49	49	49	49	49	49	49	49	46	27	

\* One-tailed probability significant at the 0.05 level

Symbols:  $r_s$  = Spearman rank-order correlation coefficient

$\alpha'$  = level of significance

N = number of valid cases

Table 10.11 presents the advantages generally gained from the preparation of contingency plans. Only two advantages are reported by more than 50 percent of the cases. They include a better understanding of the potential effect of events upon cash flows - reported by the vast majority of 86 percent - and a faster response to events on the part of the company - reported by a small majority of 52 percent. For 41 percent, the preparation of contingency plans provides a better informed view of the likelihood of an event's occurring, whereas for 38 percent, it offers a greater confidence in the effectiveness of the response to events. For 35 percent, the preparation of contingency plans increases the likelihood of achieving an earlier recognition of the emergence of an event. All the other advantages are reported by less than 30 percent of the cases.

From this point, a series of Wilcoxon's matched-pairs signed-ranks tests were performed. These were aimed at determining whether significant differences exist between contingency plans and cash flow updates or forecasts, with regard to the advantages they generally provide. The decision model for the tests and the corresponding results are shown in Exhibit 10.4 and Table 10.12 respectively.

No significant difference was found between the two methods of handling uncertainty in relation to providing a better informed view of the likelihood of an event's occurring, a better understanding of how different areas in the company interact, or even, a greater confidence in the effectiveness of the firm's response to events. On the other hand, it was found that the two methods significantly differ with respect to the remaining advantages. It appears that companies more often tend to gain a better understanding of the potential effect of events upon cash flows from the preparation of contingency plans than from the preparation of cash flow updates or forecasts. This difference is significant at the two-tailed probability level of 0.079. Meanwhile, it appears that companies more often tend to achieve an earlier recognition of the emergence of an event and a faster response to it from the preparation of cash flow updates or forecasts, than from the preparation of contingency plans (two-tailed probabilities of 0.018 and 0.074 respectively). It also appears that the preparation of cash flow updates or forecasts tends more often to provide companies with a lesser need to hold large

Table 10.11

Advantages generally gained from the preparation of contingency plans

	Number of responses	Percentage of responses	Percentage of cases
. Better informed view of the likelihood of an event's occurring	32	13.3	40.5
. Better understanding of the potential effect of events upon cash flows	68	28.3	86.1
. Better understanding of how different areas in the company interact	16	6.7	20.3
. Earlier recognition of the emergence of an event	28	11.7	35.4
. Faster response to events on the part of the company	41	17.1	51.9
. Greater confidence in the effectiveness of the response to events	30	12.5	38.0
. Lesser need to hold large amounts of instant reserves	23	9.6	29.1
. Other advantages: planning of resources/confidence with bankers, etc.	2	0.8	2.5
	-----	-----	-----
Total responses	240	100.0	303.8

N = 79



## Exhibit 10.4

Decision model for the Wilcoxon matched-pairs signed-ranks tests between the advantages generally gained from the preparation of contingency plans and the advantages generally gained from the preparation of cash flow updates or forecasts

### . NULL HYPOTHESES ( $H_0$ ):

There is no difference between contingency plans and cash flow updates or forecasts with respect to the following advantages generally gained from their preparation:

- . better informed view of the likelihood of an event's occurring (WFLKHD v. UPDTLKHD)
- . better understanding of the potential effect of events upon cash flows (WFEFCT v. UPDTEFCT)
- . better understanding of how different areas in the company interact (WFINTR v. UPDTINTR)
- . earlier recognition of the emergence of an event (WFEMRG v. UPDTEMRG)
- . faster response to events on the part of the company (WFRESP v. UPDTRESP)
- . greater confidence in the effectiveness of the response to events (WFCONF v. UPDTCONF)
- . lesser need to hold large amounts of instant reserves (WFCASH v. UPDTCASH)

### . LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

### . DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$

Table 10.12

Results obtained from the Wilcoxon matched-pairs signed-ranks tests between the advantages generally gained from the preparation of contingency plans and the advantages generally gained from the preparation of cash flow updates or forecasts

Comparison between:	N	- Ranks		+ Ranks		z	2-tailed prob. $\alpha'$
		n <sub>1</sub>	Mean	n <sub>1</sub>	Mean		
WFLKHD v. UPDTLKHD	58	7	8.50	9	8.50	-0.440	(0.660)
WFEFCT v. UPDTEFCT	58	4	8.50	12	8.50	-1.758	(0.079)*
WFINTR v. UPDTINTR	58	9	10.00	10	10.00	-0.201	(0.841)
WFEMRG v. UPDTEMRG	58	18	12.00	5	12.00	-2.372	(0.018)**
WFRESP v. UPDTRESP	58	17	12.50	7	12.50	-1.786	(0.074)*
WFCONE v. UPDTCONE	58	8	7.00	5	7.00	-0.734	(0.463)
WFCASH v. UPDTCASH	58	14	9.00	3	9.00	-2.343	(0.019)**

\* One-tailed probability significant at the 0.05 level  
 \*\* One-tailed probability significant at the 0.01 level

Symbols: N = number of valid cases  
 n<sub>1</sub> = number of negative differences  
 n<sub>2</sub> = number of positive differences  
 z = standard score  
 $\alpha'$  = level of significance

amounts of instant reserves than does the preparation of contingency plans (two-tailed probability of 0.019). In other words, these results suggest that the only advantage that companies assign to contingency plans over cash flow updates or forecasts is a better understanding of the potential impact of events upon cash flows. The remaining three advantages are regarded as being associated with the preparation of cash flow updates or forecasts, contingency plans bringing no real contribution in this respect.

The final part of this section analyses the use of contingency planning, not at group level but at either parent or subsidiary company level. Table 10.13 shows that the large majority of firms (60 percent) do not carry out any form of contingency planning at parent company level. However, at subsidiary company level (Table 10.14), the number of firms carrying out contingency planning is approximately the same as those not doing so - 49 percent against 51 percent.

Two one-sample chi-square tests of independence performed (Exhibit 10.5 for the decision model and Table 10.15 for the results), reveal that there is a highly significant relationship (at the one-tailed probability level of 0.000) between the implementation of contingency planning at group level and the implementation of contingency planning at individual company level - either parent or subsidiary. The two associations appear to be fairly strong (Phi coefficients of 0.47 and 0.37 respectively) and to share the same direction. The contingency table for the first relationship (Appendix F.2 - Table F.2.1) reveals that 100 percent of the companies which do not use contingency planning at group level do not carry out such planning at parent company level either. This compares with 84 percent at subsidiary company level (Appendix F.2 - Table F.2.2). The reverse situation, however, does not occur among firms which use contingency planning at group level. Although most of these firms carry out contingency planning at individual company level, these are a small majority (53 percent and 59 percent respectively). A considerable number of firms still carry out contingency planning solely at group level.



Table 10.13

Implementation of contingency planning at parent company level

Variable WFPC

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	36	39.6	39.6
. No	55	60.4	100.0
Not determined	24	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 91

Table 10.14

Implementation of contingency planning at subsidiary company level

Variable WFSC

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	50	49.0	49.0
. No	52	51.0	100.0
Not determined	13	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 102

Exhibit 10.5

Decision model for the one-sample chi-square tests of independence between the implementation of contingency planning at group level and the implementation of contingency planning at individual company level

<p><b>. NULL HYPOTHESES (<math>H_0</math>):</b>          The implementation of contingency planning at group level (WF) is independent of the implementation of contingency planning</p> <p>. at parent company level (WFPC)          . at subsidiary company level (WFSC)</p> <p><b>. LEVEL OF SIGNIFICANCE:</b>          One-tailed probability <math>\alpha = 0.05</math></p> <p><b>. DECISION CRITERION:</b>          Reject <math>H_0</math> if <math>\alpha' \leq 0.05</math></p>
---

Table 10.15

Results obtained from the one-sample chi-square tests of independence between the implementation of contingency planning at group level and the implementation of contingency planning at individual company level

Implementation of contingency planning at group level WF	Implementation of contingency planning at individual company level	
	WFPC	WFSC
One-tailed prob.	$\chi^2 = 17.99$ $\alpha' = (0.000)^{**}$	$12.39$ $(0.000)^{**}$
	df = 1	1
	N = 91	101
Phi =	0.471	0.373

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $\chi^2$  = chi-square statistic      df = degrees of freedom  
 $\alpha'$  = level of significance      N = number of valid cases

### 10.3 Reactive Contingency Planning

The distribution of sample firms according to different forms of contingency planning is depicted in Table 10.16. This table shows that, with the exception of one company for which information is missing, all 93 firms that carry out some form of contingency planning implement contingency planning identified as reactive.

Given that reactive contingency planning is carried out only when companies are confronted with the real situation of a specific unexpected event, the identification of the types of event leading to such planning was the first step in the analysis. In this respect, Table 10.17 shows that the overwhelming majority of cases (93 percent) carry out reactive contingency planning for unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm. A smaller but still significant majority (78 percent) carry out reactive contingency planning for unexpected events which, having occurred, are currently producing such deviations. A few cases (12 percent) additionally carry out reactive contingency planning for unexpected events which are currently producing or threatening to produce major positive deviations from the expected cash flows of the firm.

The next step in the analysis consisted in determining how effective companies consider reactive contingency planning to be in handling uncertainty. Fifty two percent regard reactive contingency planning as moderately or less than moderately effective in handling unexpected events which are currently producing major negative deviations. The remaining 48 percent view it as more than moderately effective, 15 percent regarding it as highly effective (Table 10.18). On the other hand, a larger proportion of firms (58 percent) regards reactive contingency planning as more than moderately effective in handling unexpected events which threaten to produce major negative deviations. In this case also, more firms (21 percent) perceive it as highly effective (Table 10.19).



Table 10.16

Forms of contingency planning

Implementation of proactive contingency planning (WFAS)	Implementation of reactive contingency planning (WFPD)			Total	%
	Yes	No	Not determined		
Yes	57	0	1	58	61.7
No	36		0	36	38.3
Total	93	0	1	94	100.0

N = 94

Table 10.17

Types of unexpected event leading to reactive contingency planning

	Number of responses	Percentage of responses	Percentage of cases
. Events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm	69	42.3	77.5
. Events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm	83	50.9	93.3
. Other events: unexpected events which are currently producing or threatening to produce major positive deviations from the expected cash flows of the firm	11	6.8	12.4
Total responses	163	100.0	183.1

N = 89

Table 10.18

Effectiveness of reactive contingency planning in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm

Variable WFPDACTD

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	0	0.0	0.0
. Moderate	13	20.3	20.3
. High	20	31.3	51.6
. Not determined	21	32.8	84.4
. Not applicable	10	15.6	100.0
	9	MISSING	100.0
	49	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 64

Table 10.19

Effectiveness of reactive contingency planning in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm

Variable WFPDFUTD

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	0	0.0	0.0
. Moderate	12	15.6	15.6
. High	20	26.0	41.6
. Not determined	29	37.6	79.2
. Not applicable	16	20.8	100.0
	10	MISSING	100.0
	35	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 77

In order to find out whether a significant difference exists in the way in which companies view the effectiveness of reactive contingency planning in handling both situations, a Wilcoxon matched-pairs signed-ranks test was performed (Exhibit 10.6 and Table 10.20). It appears that companies tend to consider reactive contingency planning to be more effective in handling unexpected events which threaten to produce major negative deviations, than in handling unexpected events which are currently producing such deviations (two-tailed probability of 0.091).

The final step in the analysis involved testing the association between the implementation of reactive contingency planning and major independent characteristics, as hypothesized in the study (see Chapter 5). For the purpose, one-sample chi-square tests of independence and Kendall's rank-order correlation tests were performed. The decision models providing the framework for the tests are shown in Exhibits 10.7 and 10.8. The results of the tests are presented in Tables 10.21 and 10.22.

An association was found between the implementation of reactive contingency planning and the degree of commitment attached to cash budgets in general (one-tailed probability of 0.003) (Table 10.21). A Cramer V coefficient of 0.31 and an uncertainty coefficient (asymmetric) of 0.10 suggest a relatively strong association. The corresponding contingency table (Appendix F.2 - Table F.2.3) reveals that 63 percent of the firms where the degree of commitment to cash budgets is moderate or less than moderate implement reactive contingency planning. This percentage increases substantially (71 percent and 90 percent) among companies where the commitment to cash budgets is higher and where, therefore, the occurrence of unexpected events is more likely to be regarded as a disturbing factor. This suggests that the association between the variables involved is positive.

On the other hand, no significant relationship was obtained between the implementation of reactive contingency planning and either the periodicity of cash flow budget revision or the preparation of cash flow updates or forecasts (Table 10.21). Since the hypothesis of independence cannot be rejected, it is fair to expect reactive



Exhibit 10.6

Decision model for the Wilcoxon matched-pairs signed-ranks test between the effectiveness of reactive contingency planning in handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm and its effectiveness in handling unexpected events which threaten to produce such deviations

<p><b>. NULL HYPOTHESIS (<math>H_0</math>):</b>          There is no difference between the effectiveness of reactive contingency planning in handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm (WFPDACTD) and its effectiveness in handling unexpected events which threaten to produce such deviations (WFPDFUTD)</p> <p><b>. LEVEL OF SIGNIFICANCE:</b>          Two-tailed probability <math>\alpha = 0.10</math></p> <p><b>. DECISION CRITERION:</b>          Reject <math>H_0</math> if <math>\alpha' \leq 0.10</math></p>
--

Table 10.20

Result obtained from the Wilcoxon matched-pairs signed-ranks test between the effectiveness of reactive contingency planning in handling unexpected events which are currently producing major negative deviations from the expected cash flows of the firm and its effectiveness in handling unexpected events which threaten to produce such deviations

Comparison between:	N	- Ranks		+ Ranks		z	2-tailed prob. $\alpha'$
		n <sub>1</sub>	Mean	n <sub>1</sub>	Mean		
WFPDACTD v. WFPDFUTD	60	5	10.60	14	9.79	-1.690	(0.091)*

\* One-tailed probability significant at the 0.05 level

Symbols: N = number of valid cases  
 n<sub>1</sub> = number of negative differences  
 n<sub>2</sub> = number of positive differences  
 z = standard score  
 $\alpha'$  = level of significance

## Exhibit 10.7

Decision model for the one-sample chi-square tests of independence between the implementation of reactive contingency planning and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The implementation of reactive contingency planning (WFPD) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the periodicity of cash flow budget revision (CFBUPDT - see Chapter 9)
- . the preparation of cash flow updates or forecasts (UPDT)
- . the industry classification (IC)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

. **LEVEL OF SIGNIFICANCE:**

One-tailed probability  $\alpha = 0.05$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.05$

## Exhibit 10.8

Decision model for the Kendall rank-order correlation tests between the implementation of reactive contingency planning and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The implementation of reactive contingency planning (WFPD) is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 10.21

Results obtained from the one-sample chi-square tests of independence between the implementation of reactive contingency planning and major independent characteristics

Implementation of reactive contingency planning WFPD	Major independent characteristics												
	CFBTIME	CFBCOMM	CFBUPDT	UPDT	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADFDEP	TIMECH
$\chi^2 =$	1.32	11.69	0.27	0.06	14.79	3.11	1.99	2.00	0.04	3.69	0.30	0.08	5.60
One-tailed prob. $\alpha' =$	(0.516)	(0.003) <sup>**</sup>	(0.604)	(0.800)	(0.140)	(0.078)	(0.370)	(0.368)	(0.840)	(0.055)	(0.861)	(0.776)	(0.018) <sup>*</sup>
df =	2	2	1	1	10	1	2	2	1	1	2	1	1
N =	105	119	117	121	121	119	112	119	114	120	120	118	119
Phi =			-										0.238
Cramer's V =			0.313										-
Uncert. coeff. (asymmetric with WFPD dependent) =			0.096										-

\* One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
df = degrees of freedom  
N = number of valid cases

Table 10.22

Results obtained from the Kendall rank-order correlation tests between the implementation of reactive contingency planning and major independent characteristics

Implementation of reactive contingency planning WFPD	Major independent characteristics											TITLE
	TURN	FAPEMP	ROE	TURPNA	GEARNG	LAPCA	ICFP6R	OCFP6R	WCIP6R	CEXPP8	PEOPLE	
$\tau =$	0.032	-0.107	-0.250	-0.112	0.177	-0.112	-0.126	-0.199	-0.020	-0.108	0.211	0.270
Two-tailed prob. $\alpha' =$	(0.670)	(0.156)	(0.001)**	(0.138)	(0.019)**	(0.138)	(0.094)*	(0.009)**	(0.792)	(0.151)	(0.009)**	(0.022)*
N =	119	118	119	119	119	119	119	119	119	119	111	63

\* One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient

$\alpha'$  = level of significance

N = number of valid cases

contingency planning not to relate to the same characteristics of the firm and of the (headquarters) finance department, as the two traditional early warning systems. The expectation is confirmed in the case of the non-financial features of the firm. Company size, which relates to the implementation of both traditional early warning systems, does not do so to the implementation of reactive contingency planning. The latter appears to be carried out in companies, irrespective of their size group (Table 10.22). The expectation is not confirmed in the case of the financial features of the firm, and of the features of the (headquarters) finance department. Here, some overlapping occurs between the characteristics that relate to the implementation of reactive contingency planning and the characteristics that relate to the implementation of the two traditional early warning systems. This overlapping is best described through a stepwise examination of the significant relationships found between the implementation of reactive contingency planning and the independent features mentioned above.

An association was obtained between the implementation of reactive contingency planning and a financial characteristic of the firm - the proportion of operating cash flow generation (Table 10.22). The relationship is significant at the two-tailed probability level of 0.009 and shows a Kendall correlation coefficient of -0.20. This suggests that reactive contingency planning tends to be carried out in companies where the relative capacity to release cash from operations is lower. At the same time, another association was found between the implementation of reactive contingency planning and a characteristic of the (headquarters) finance department - the extent of formal institutionalization of the cash function (Table 10.22). The association is established at the two-tailed probability level of 0.022. A tau coefficient of 0.27 suggests this association to be positive. The larger the extent of formal institutionalization of the cash function in company (headquarters), the higher the probability that companies do carry out reactive contingency planning.

The relationships just described indicate that the implementation of reactive contingency planning is associated, and apparently in the same direction, with two of the characteristics referred to in Chapter 9 as being related to the periodicity of cash flow budget revision.



The proportion of operating cash flow generation of the firm, and the extent of formal institutionalization of the cash function in the (headquarters) finance department represent the overlapping area, in terms of independent characteristics, between the implementation of reactive contingency planning and the periodicity of cash flow budget revision.

Other significant relationships establish the association between the implementation of reactive contingency planning and two independent characteristics - the amount of financial leverage (Table 10.22), and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (Table 10.21). The first association, established at the 0.019 two-tailed probability level, appears to be positive ( $\tau=0.18$ ). This implies that companies which carry out reactive contingency planning tend to be the ones with higher levels of gearing. The second association, established at the one-tailed probability level of 0.018, also appears to be positive, as conveyed by the corresponding contingency table (Appendix F.2 - Table F.2.4). This table reveals that 76 percent of the companies carrying out reactive contingency planning assign 10 percent or more of their (headquarters) finance department's time to the management of cash (at group level). Simultaneously, among companies not carrying out reactive contingency planning, the proportion of (headquarters) finance departments assigning less than 10 percent, and those assigning 10 percent or more of their time to the management of cash (at group level) is precisely the same - 50 percent.

In this respect, the implementation of reactive contingency planning is associated, and apparently in the same direction, with two of the characteristics referred to in Chapter 9 as being related to the preparation of updates or forecasts for cash control purposes. The implementation of reactive contingency planning and the preparation of cash flow updates or forecasts for cash control purposes overlap, as far as the independent characteristics of financial leverage of the firm and percentage of (headquarters) finance department's time devoted to the management of cash (at group level) are concerned.

Tables 10.21 and 10.22 reveal that the implementation of reactive contingency planning is still associated with some further financial features of the firm, and one more feature of the (headquarters) finance department. These financial features include the level of return on investment, and the proportion of internal cash flow generation (Table 10.22). Both characteristics appear negatively associated with the dependent variable (tau coefficients of -0.25 and -0.13 respectively) which implies that companies which carry out reactive contingency planning, tend to be those with lower levels of return on investment and those with smaller relative capacity to generate cash internally. These relationships are significant at the two-tailed probability level of 0.001 and 0.094 respectively. Size is the last feature of the (headquarters) finance department found to be associated with the implementation of reactive contingency planning (two-tailed probability of 0.009) (Table 10.22). A Kendall correlation coefficient of 0.21 suggests that the association is positive, and that companies carrying out reactive contingency planning tend to be the ones with larger (headquarters) finance departments.

It is notable that among the independent characteristics found to be associated with the implementation of reactive contingency planning, the last three to be analysed - level of return on investment, proportion of internal cash flow generation, and size of the (headquarters) finance department - together with the proportion of operating cash flow generation, were all referred to in Chapter 9 as being associated with the preparation of updates or forecasts for cash investment purposes. Yet, a similar type of overlapping as previously described, between the implementation of reactive contingency planning and both the periodicity of cash flow budget revision and the preparation of cash flow updates or forecasts for cash control purposes, does not occur here. In fact, though there is correspondence with respect to the nature of the independent characteristics involved, the direction of the association between the implementation of reactive contingency planning and each one of those characteristics, is apparently the opposite of the one between the preparation of cash flow updates or forecasts for cash investment purposes and the same characteristics.



Finally, although outside the 0.05 significance limit, attention is drawn to a possible association between the implementation of reactive contingency planning and the degree of predictability of company's cash inflows (Table 10.21). A negative relationship between the variables is suggested by the corresponding contingency table (Appendix F.2 - Table F.2.5).

#### 10.4 Proactive Contingency Planning

Table 10.16 shows that 62 percent, out of the 94 companies that carry out some form of contingency planning, implement contingency planning identified as proactive. The remaining 38 percent confine their planning activity exclusively to the implementation of reactive contingency planning. A breakdown of the reasons presented by these firms for not carrying out the former (Table 10.23) reveals that no single reason is given by a majority of cases. The absence of any benefit in planning a priori for specific events whose probability is small or uncertain, is the reason most frequently offered (44 percent of the firms). All the other reasons are presented by less than 30 percent of the firms. The idea that the implementation of this form of contingency planning is an impracticable task since the range of alternatives is almost without limit is reported by 29 percent. The belief that this form of contingency planning is more effective at the level of the individual company within the group than at group level is reported by 27 percent. The arguments that the implementation of proactive contingency planning is counterproductive for organizational performance, too costly and/or sophisticated, and too time-consuming are mentioned by an even smaller percentage of firms. A few additional reasons are presented by some companies, for example: regular revisions of the cash flow budget make this contingency planning unnecessary; cash funding is not a problem, therefore, contingency planning is restricted to profit, and where appropriate, to return on investment impact; the time scale is too short to warrant the implementation of such planning; too wide a variation exists between types of business; at group level, the implications of major alternatives are generally clear and obvious, which means that



Table 10.23

Reasons for not carrying out proactive contingency planning

	Number of responses	Percentage of responses	Percentage of cases
. The company has never considered the idea	0	0.0	0.0
. The company does not see any use in planning a priori for specific events whose probability is small or uncertain	15	23.4	44.1
. Proactive contingency planning is more effective at the level of the individual company within the group than at group level	9	14.1	26.5
. Proactive contingency planning is:			
. An impracticable task since the range of alternatives is almost without limit	10	15.6	29.4
. Counterproductive for organizational performance	8	12.5	23.5
. Too costly and/or sophisticated	4	6.3	11.8
. Too time-consuming	8	12.5	23.5
. Other reasons	10	15.6	29.4
	-----	-----	-----
Total responses	64	100.0	188.2

N = 34

proactive contingency planning is unnecessarily complicated; the business is mainly long-term and, therefore, not vulnerable to short-term deviations in cash flows.

With regard to the 62 percent carrying out proactive contingency planning, Table 10.24 shows that the large majority implement it at the level of the cash flow budget and its revisions (76 percent and 71 percent respectively). The number of companies implementing proactive contingency planning at the level of cash flow updates or forecasts is only 50 percent. This same information is differently displayed in Table 10.25. This table reveals that 45 percent of the firms implement proactive contingency planning at the level of two types of cash flow plan. Implementation of proactive contingency planning at the level of the cash flow budget and its revisions is the most common combination, being referred to by 33 percent. Thirty-eight percent implement proactive contingency planning at the level of one type of cash flow plan, the most frequently mentioned being the cash flow budget (19 percent) and the cash flow updates or forecasts (12 percent). Seventeen percent implement proactive contingency planning at the level of all three types of cash flow plan.

The extent of disclosure of proactive contingency plans within the company, is provided in Table 10.26. In no case are such plans communicated to the group or company in general. On the other hand, in most cases (90 percent) they are disclosed at directorship level. In the majority of companies (56 percent) also, proactive contingency plans are communicated to the (group) senior executives below the (headquarters) finance officer. They are communicated less commonly to the subsidiary company finance officer (32 percent), to the subsidiary company Directors (22 percent), and to the (group) senior executives below director level outside the (headquarters) finance department (16 percent).

A comparison of the extent of disclosure within the company between proactive contingency plans and the cash flow plans to which they apply, led to the preparation of a series of Wilcoxon matched-pairs signed-ranks tests. The decision model for these tests is presented in Exhibit 10.9 and the results obtained are shown in Table 10.27. With the exception of the Group or Board of Directors (two-

Table 10.24

Cash flow plans at the level of which proactive contingency planning is carried out

Cash flow plans	Variables	Number of companies where:			N <sup>2</sup>	Percentage carrying out proactive contingency planning at the level of:
		Proactive contingency planning is carried out at the level of:	Proactive contingency planning is not carried out at the level of:	Not determined/ Not applicable <sup>1</sup>		
• The cash flow budget	WFCFBAS	44	14	0	58	75.9
• Cash flow budget revisions	WRCFBAS	36	15	7	51	70.6
• Cash flow updates or forecasts	WFUPDTAS	24	24	10	48	50.0

<sup>1</sup> "Not applicable" refers to those companies where the particular cash flow plan is not prepared.

<sup>2</sup> N is the number of valid cases.



Table 10.25

Number of types of cash flow plan at the level of which proactive contingency planning is carried out

Variable NCFP

	Absolute frequency	Adjusted relative frequency (%)	
. At the level of <u>one</u> type of cash flow plan:			
. The cash flow budget	11	19.0	} 38%
. Cash flow budget revisions	4	6.9	
. Cash flow updates or forecasts	7	12.1	
. At the level of <u>two</u> types of cash flow plan:			
. The cash flow budget and cash flow budget revisions	19	32.7	} 44.8%
. The cash flow budget and cash flow updates or forecasts	4	6.9	
. Cash flow budget revisions and cash flow updates or forecasts	3	5.2	
. At the level of <u>three</u> types of cash flow plan	10	17.2	
Not determined	64	MISSING	
	-----	-----	
Total	122	100.0	

N = 58

Table 10.26

People in the company to whom proactive contingency plans are communicated

People in the company	Variables	Number of companies where:			N <sup>2</sup>	Percentage of communication
		Proactive contingency plans are communicated to:	Proactive contingency plans are not communicated to:	Not determined/Not applicable <sup>1</sup>		
• Group or Board of Directors	WFASBD	51	6	1	57	89.5
• The (HQ) finance officer	WFASFD	57	0	1	57	100.0
• (Group) senior executives below the (HQ) finance officer	WFASSEIN	32	25	1	57	56.1
• (Group) senior executives below director level outside the (HQ) finance department	WFASSEOU	9	48	1	57	15.8
• Subsidiary company Directors	WFASSD	10	35	13	45	22.2
• Subsidiary company finance officer	WFASSFD	14	30	14	44	31.8
• Group or company in general	WFASGEN	0	57	1	57	0.0

<sup>1</sup> "Not applicable" refers to those companies where the particular category of people is non-existent.

<sup>2</sup> N is the number of valid cases.

## Exhibit 10.9

Decision model for the Wilcoxon matched-pairs signed-ranks tests between people in the company to whom proactive contingency plans and the cash flow plans to which they apply are communicated.

. **NULL HYPOTHESES ( $H_0$ ):**

There is no difference between proactive contingency plans and the cash flow plans to which they apply with respect to the following people in the company to whom they are communicated:

- . the Group or Board of Directors (WFASBD v. CFPBD)
- . the (headquarters) finance officer (WFASFD v. CFPFD)
- . the (group) senior executives below the (headquarters) finance officer (WFASSEIN v. CFPSEIN)
- . the (group) senior executives (below director level) outside the (headquarters) finance department (WFASSEOU v. CFPSEOU)
- . the subsidiary company Directors (WFASSD v. CFPSD)
- . the subsidiary company finance officer (WFASSFD v. CFPSFD)
- . the group or company in general (WFASGEN v. CFPGEN)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 10.27

Results obtained from the Wilcoxon matched-pairs signed-ranks tests between people in the company to whom proactive contingency plans and the cash flow plans to which they apply are communicated

Comparison between:	N	- Ranks		+ Ranks		z	2-tailed prob. $\alpha'$
		n <sub>1</sub>	Mean	n <sub>1</sub>	Mean		
WFASBD v. CFPBD	56	6	4.00	1	4.00	-1.690	(0.091)*
WFASFD v. CFPFD	56	0	0.00	0	0.00	0.000	(1.000)
WFASSEIN v. CFPSEIN	56	6	5.00	3	5.00	-0.889	(0.374)
WFASSEOU v. CFPSEOU	56	10	6.00	1	6.00	-2.401	(0.016)**
WFASSD v. CFPSD	44	6	4.50	2	4.50	-1.260	(0.208)
WFASGEN v. CFPGEN	56	0	0.00	0	0.00	0.000	(1.000)

\* One-tailed probability significant at the 0.05 level  
 \*\* One-tailed probability significant at the 0.01 level

Symbols: N = number of valid cases  
 n<sub>1</sub> = number of negative differences  
 n<sub>2</sub> = number of positive differences  
 z = standard score  
 $\alpha'$  = level of significance

tailed probability of 0.091) and the (group) senior executives below director level outside the (headquarters) finance department (two-tailed probability of 0.016), no other significant difference was found between proactive contingency plans and the cash flow plans to which they apply with respect to the extent of their disclosure within the company. As to the significant differences obtained, Table 10.27 reveals that proactive contingency plans appear to be less commonly disclosed to the Group or Board of Directors, and to the (group) senior executives below director level outside the (headquarters) finance department, than the cash flow plans to which they apply.

Most firms carrying out proactive contingency planning (53 percent) test the range of alternative values most likely to occur on the variables involved in the sensitivity analysis (Table 10.28). Forty percent test the most likely "optimistic" and "pessimistic" alternative value only, whereas 7 percent test the widest range of likely alternative values. Almost every company (91 percent) develops a possible strategy of response when estimating the cash flow implications of specific events. In most cases (86 percent), however, such a response is outlined in very general terms, only broad financial strategy guidelines being issued (Table 10.29).

The effectiveness of proactive contingency planning in providing for financial mobility at minimum cost, as seen by companies in the study, is presented in Table 10.30. This table shows that 45 percent of the firms regard this form of contingency planning as more than moderately effective, whereas 42 percent view it as only moderately effective. In 13 percent of the firms, the effectiveness of proactive contingency planning is rated as below moderate.

In order to determine whether the effectiveness of proactive contingency planning relates to some of the characteristics of the system, one-sample chi-square tests of independence were performed (Exhibit 10.10 for the decision model, and Table 10.31 for the results). Only one result turned out to be significant (one-tailed probability of 0.045). This result establishes the association between the effectiveness of proactive contingency planning and the number of types of cash flow plan at the level of which proactive

Table 10.28

Range of alternative values tested on the variables involved in the sensitivity analysis

Variable RANGEVAL

	Absolute frequency	Adjusted relative frequency (%)
. The widest range of likely alternative values	4	7.6
. The range of alternative values most likely to occur	28	52.8
. The most likely "optimistic" and "pessimistic" alternative value only	21	39.6
Not determined	5	MISSING
Not applicable	64	MISSING
	-----	-----
Total	122	100.0

N = 53

Table 10.29

Development of a strategy of response on the part of the company

Variable RESPALT

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. No	5	8.9	8.9
. Yes, in general terms	48	85.7	94.6
. Yes, in detailed terms	3	5.4	100.0
Not determined	2	MISSING	100.0
Not applicable	64	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 56



Table 10.30

Effectiveness of proactive contingency planning in providing for financial mobility at minimum cost

Variable WFASDISR

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	0	0.0	0.0
. Moderate	7	12.7	12.7
. High	23	41.8	54.5
. Not determined	18	32.8	87.3
. Not applicable	7	12.7	100.0
	2	MISSING	100.0
	65	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 55

Exhibit 10.10

Decision model for the one-sample chi-square tests of independence between the effectiveness of proactive contingency planning and some of the characteristics of the system

. NULL HYPOTHESES ( $H_0$ ):

The effectiveness of proactive contingency planning (WFASDISR) is independent of

- . the number of types of cash flow plan at the level of which proactive contingency planning is carried out (NCFP)
- . the range of alternative values tested on the variables involved in the sensitivity analysis (RANGEVAL)
- . the development of a strategy of response on the part of the company (RESPALT)

. LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.05$

Table 10.31

Results obtained from the one-sample chi-square tests of independence between the effectiveness of proactive contingency planning and some of the characteristics of the system

Effectiveness of proactive contingency planning WFASDISR	Characteristics of the system		
	NCFP	RANGEVAL	RESPALT
$\chi^2 =$	6.20	1.97	1.84
One-tailed prob. $\alpha' =$	(0.045)*	(0.160)	(0.175)
df =	2	1	1
N =	55	52	55
Cramer's V =	0.336		
Uncertainty coefficient (asymmetric with WFASDISR dependent) =	0.085		

\* One-tailed probability significant at the 0.05 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
df = degrees of freedom  
N = number of valid cases



contingency planning is carried out. A Cramer V coefficient of 0.34 points towards a relatively strong association. It appears, furthermore, that the association is positive. As proactive contingency planning is carried out at the level of more types of cash flow plan, firms tend to regard it as more effective. This statement is based on the information provided by the corresponding contingency table (Appendix F.2 - Table F.2.6). Whereas the majority of the firms which carry out proactive contingency planning at the level of only one or two types of cash flow plan view the effectiveness of that planning as moderate or less than moderate (67 percent and 58 percent respectively), the vast majority (80 percent) of the companies which carry out proactive contingency planning at the level of all three types of cash flow plan regard its effectiveness as above moderate.

As with reactive contingency planning, the association between the implementation of proactive contingency planning and major independent characteristics was also tested, following the hypotheses stated in the study (see Chapter 5). One-sample chi-square tests of independence, and Kendall's rank-order correlation tests were performed. Exhibits 10.11 and 10.12 present the decision models underlying the tests, whereas Tables 10.32 and 10.33 summarize the results obtained.

The implementation of proactive contingency planning is associated with company size (two-tailed probability of 0.024) (Table 10.33). The Kendall correlation coefficient obtained (0.20) suggests a positive association, implying that this form of contingency planning tends to occur in larger companies.

Among the financial features of the firm, three were found to be associated with the implementation of proactive contingency planning, namely the degree of capital turnover (two-tailed probability of 0.012) (Table 10.33), and the degree of predictability of both cash inflows and outflows (one-tailed probability of 0.023 and 0.039 respectively) (Table 10.32). The first relationship appears to be positive ( $\tau=0.22$ ), which implies that companies which carry out this form of contingency planning tend to be the ones with higher rates of activity. The other two relationships appear to be negative (Tables

## Exhibit 10.11

Decision model for the one-sample chi-square tests of independence between the implementation of proactive contingency planning and major independent characteristics.

### . NULL HYPOTHESES (H<sub>0</sub>):

The implementation of proactive contingency planning (WFAS) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the periodicity of cash flow budget revision (CFBUPDT - see Chapter 9)
- . the preparation of cash flow updates or forecasts (UPDT)
- . the industry classification (IC)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

### . LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

### . DECISION CRITERION:

Reject H<sub>0</sub> if  $\alpha' \leq 0.05$

## Exhibit 10.12

Decision model for the Kendall rank-order correlation tests between the implementation of proactive contingency planning and major independent characteristics.

. NULL HYPOTHESES ( $H_0$ ):

The implementation of proactive contingency planning (WFAS) is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 10.32

Results obtained from the one-sample chi-square tests of independence between the implementation of proactive contingency planning and major independent characteristics

Implementation of proactive contingency planning WFAS	Major independent characteristics												
	CFBTIME	CFBCOMM	CFBUPDT	UPDT	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADFDEP	TIMECH
$\chi^2 =$	2.35	1.45	6.19	0.37	7.38	0.00	3.22	0.67	3.19	7.52	6.51	3.46	3.35
One-tailed prob. $\alpha' =$	(0.503)	(0.484)	(0.186)	(0.545)	(0.689)	(0.986)	(0.359)	(0.881)	(0.074)	(0.023) <sup>‡</sup>	(0.039) <sup>‡</sup>	(0.063)	(0.187)
df =	3	2	4	1	10	1	3	3	1	2	2	1	2
N =	82	93	91	93	93	92	86	92	89	92	92	92	91
Cramer's V =										0.286	0.266		
Uncert. coeffic. (asymmetric with WFAS dependent) =										0.061	0.054		

<sup>‡</sup> One-tailed probability significant at the 0.05 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
df = degrees of freedom  
N = number of valid cases

Table 10.33

Results obtained from the Kendall rank-order correlation tests between the implementation of proactive contingency planning and major independent characteristics

Implementation of proactive contingency planning WFAS	Major independent characteristics											
	TURN	FAEMP	ROE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CEXPPB	PEOPLE	TITLE
$\tau =$	0.195	-0.031	0.023	0.217	0.099	0.030	-0.014	0.004	0.073	0.021	0.321	0.276
Two-tailed prob. $\alpha' =$	(0.024) <sup>‡</sup>	(0.722)	(0.793)	(0.012) <sup>‡‡</sup>	(0.254)	(0.730)	(0.870)	(0.967)	(0.398)	(0.812)	(0.001) <sup>‡‡</sup>	(0.037) <sup>‡</sup>
N =	91	90	91	91	91	91	91	91	91	91	86	50

<sup>‡</sup> One-tailed probability significant at the 0.05 level

<sup>‡‡</sup> One-tailed probability significant at the 0.01 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient

$\alpha'$  = level of significance

N = number of valid cases

F.2.7 and F.2.8 in Appendix F.2). Where the degree of predictability of both cash inflows and outflows is very high, the majority of companies (63 percent and 57 percent respectively) do not carry out proactive contingency planning. However, where the degree of predictability of cash flows is lower, most firms produce proactive contingency planning - 64 percent and 76 percent in the former case, 61 percent and 77 percent in the latter.

Significant relationships were also found between two features of the (headquarters) finance department and the implementation of proactive contingency planning (Table 10.33). These features are the size of the (headquarters) finance department (two-tailed probability of 0.001), and the extent of formal institutionalization of the cash function in the (headquarters) finance department (two-tailed probability of 0.037). Both associations appear to be quite strong, and to develop in the same direction ( $\tau=0.32$  and  $\tau=0.28$  respectively). Apparently, companies with larger (headquarters) finance departments and with higher degrees of formal institutionalization of the cash function in company (headquarters), tend to carry out proactive contingency planning.

As a last word in this section, it seems appropriate to emphasize the importance of analysing the kind of general information described in Section 10.2, in terms of the dichotomy of reactive contingency planning versus proactive contingency planning. This would involve analysing how the two forms of contingency planning differ, with respect to such aspects as the advantages generally gained from their implementation, the degree of participation of senior managers outside the (headquarters) finance department in the discussion of their plans, the main reasons motivating companies to carry out each one of them, etc.. Since, for lack of space in the questionnaire, information could not be gathered in the necessary format to allow such a breakdown, the latter could not be conducted in the study. Nevertheless, given the particular interest that surrounds this type of analysis, it may be desirable that it be carried out in future research.



### 10.5 Conclusions

Environmental turbulence is at times an inevitable state of affairs. Therefore, the need to reorientate planning and decision-making processes within the firm, so as to include more formal confrontation with prospective environmental change, is imperative. A contingency approach to planning is a widely represented means of dealing with an uncertain environment, since it enables companies to evaluate the impact of plausible alternative futures on corporate performance and to assess proposed strategies in the light of such alternatives. Donaldson [1969b] observed that in the zone 1 forecast (i.e. up to the one-year horizon) contingency planning was either non-existent, or at most, carried out "underground". Traditional methods of handling uncertainty dominated in the short-term. The results of the study, however, point to a different situation from the one identified by Donaldson [1969b]. In effect, in most sample companies (77 percent) there is some form of contingency planning (at group level), although only 47 percent carry out proactive contingency planning. Furthermore, the majority of companies (53 percent) have considerable experience in planning for contingencies (more than five years prior to the study).

Despite the fact that it is relatively frequent in the short-term, contingency planning appears to be quite elementary. Several results of the study support this conclusion. First, most contingency planning carried out is reactive in nature. Specifically, the study shows that, with the exception of one company for which information is missing, all 93 firms that carry out some form of contingency planning implement contingency planning identified as reactive. Yet, out of these 93 firms, only 61 percent implement proactive contingency planning. According to Fahey et al. [1981], the ex-post form of planning corresponds to the least complex and sophisticated of all environmental scanning and forecasting systems. Second, (and to the extent that the results applicable to proactive contingency planning can be generalized), it appears that most firms conduct sensitivity analysis at the strategic level of response only in very general terms. The fact that only a small number of firms (30 percent) make use of a computer simulation model may justify the

result above, at the same time that it suggests that sensitivity analysis at the level of the cash flow implications of unexpected events must be considerably restricted. Third, the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans, is in most companies (55 percent) moderate or less than moderate. Such a generally low degree of participation does not indicate much awareness on the part of top management of the issue of managing liquidity. Tests of association performed in the study show that such a degree of participation is linked to the size of the firm and to its overall unused borrowing capacity. Apparently, smaller companies, and companies with lower levels of overall unused borrowing capacity, tend to show higher degrees of top management participation in the discussion of contingency plans. As far as the second characteristic is concerned, it appears that only where reserves of external borrowing power are squeezed, does the bargaining power of the (headquarters) finance officer become sufficient to guarantee a more extensive participation of top management in the discussion of contingency plans. Finally, the use of contingency planning is still quite infrequent at individual company level. In effect, most firms which do not use contingency planning at group level do not carry out such planning either at parent or subsidiary company level (100 percent and 84 percent respectively). On the other hand, although most firms which use contingency planning at group level also carry out contingency planning at individual company level, these are only a small majority (53 percent and 59 percent respectively). A substantial number of firms still carry out contingency planning solely at group level.

The belief that traditional early warning systems are adequate to handle the problem of unexpected events, is the main reason it appears for not carrying out reactive contingency planning. Yet, no interchange was found in the study between reactive contingency planning and traditional early warning systems. Another common reason why reactive contingency planning is not carried out is the claim that the problem of unexpected events is not relevant to the company, either because cash can be obtained with very few restrictions or the future is reasonably predictable. These results, together with the conclusions in Chapter 9 concerning the



implementation of traditional early warning systems, permit the conclusion that the non-implementation of reactive contingency planning coincides with conditions of relative stability in the environment or with conditions of relative instability, but where the latter is of no consequence to the company - either because unexpected events mainly have positive cash flow implications or because the firm has no restrictions on cash. Inevitably, the implementation of reactive contingency planning must be dictated by conditions of relative instability in the environment and a low financial capacity on the part of the firm. Other results of the study corroborate this conclusion. Tests of association performed between the implementation of reactive contingency planning and major characteristics of the firm reveal that companies with lower levels of return on investment, higher levels of gearing, smaller relative capacity to generate cash internally and from operations and lower degrees of predictability of cash inflows, appear to implement reactive contingency planning. The conclusion is consistent with Donaldson's [1969b] observation that companies with a good financial profile or with little experience of negative financial surprises paid little attention to liquidity management. It is also consistent with the argument presented by most firms (61 percent) for carrying out reactive contingency planning - the need to check the financial feasibility of certain courses of action in response to major deviations from expected cash flows, and to ensure consistent and effective control of resource allocation.

It is further concluded that only where companies have greater resources or a more complex management, and companies experience greater environmental turbulence, is the more sophisticated form of contingency planning implemented. In effect, tests of association performed in the study reveal that companies carrying out proactive contingency planning appear to be the ones larger in size, with higher rates of activity and lower degrees of predictability of their cash flows. No general agreement appears to exist among companies as to a particular reason for not carrying out proactive contingency planning. The absence of benefit in planning a priori for specific events whose probability is small or uncertain is still the reason most frequently offered.



It is also concluded, as hypothesized, that the implementation of contingency planning is not only associated with characteristics of the firm but also with characteristics of the (headquarters) finance department. In particular, the size of the department, the extent of formal institutionalization of the cash function, and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) were found to be linked to the implementation of reactive contingency planning. Since companies which carry out reactive contingency planning are firms where cash is a problem area, larger (headquarters) finance departments with a more formally institutionalized cash function and more time devoted to the management of cash (at group level) are likely to predominate. Hence the apparently positive association between the characteristics above and the implementation of reactive contingency planning. Furthermore, since companies which carry out proactive contingency planning are also likely to have larger (headquarters) finance departments with a more formally institutionalized cash function, the apparently positive association obtained between these characteristics and the implementation of proactive contingency planning is not surprising.

Finally, the implementation of reactive contingency planning was found to be associated with the degree of commitment attached to cash budgets in general. It appears that companies where the degree of commitment to cash budgets is higher tend to carry out reactive contingency planning. On the other hand, no apparently negative association was found between the degree of commitment attached to cash budgets and the implementation of proactive contingency planning. The commitment to a goal, therefore, does not appear to operate as a deterrent to contingency planning, contrary to what Donaldson [1969b] observed. As far as reactive contingency planning is concerned, it appears to reinforce the need, in the face of unexpected events, for the consideration of alternatives to the expected cash flows of the firm.

An analysis of how effective companies consider reactive contingency planning to be in handling uncertainty indicates that most companies regard it as moderately or more than moderately effective. Companies, nevertheless, tend to consider it more effective in

handling unexpected events which threaten to produce major negative deviations from the expected cash flows of the firm, than in handling unexpected events which are currently producing such deviations. As to the effectiveness of proactive contingency planning in providing for financial mobility at minimum cost, the study shows that only 45 percent of the companies that carry out this form of contingency planning regard it as more than moderately effective. Yet it appears that as proactive contingency planning is carried out at the level of more types of cash flow plan, companies tend to view it as more effective.

With regard to the extent of disclosure of proactive contingency plans within the company, the study reveals that in no case are such plans communicated to the group or company in general. On the other hand, in most cases (90 percent) they are disclosed at directorship level. In the majority of companies (56 percent), proactive contingency plans are also communicated to the (group) senior executives below the (headquarters) finance officer. Generally, proactive contingency plans appear to be less commonly disclosed within the company than the corresponding cash flow plans to which they apply. The implementation of proactive contingency plans appears, therefore, to be an activity whose end product (headquarters) finance officers still keep very much to themselves.

According to the literature (see 4.3.3.2), contingency planning offers significant advantages over traditional early warning systems including minimization of both recognition and response delay. The results of the study, however, appear to demonstrate that most of these advantages are not recognized in practice. In effect, they suggest that the only advantage that companies tend to assign to contingency plans over cash flow updates or forecasts is a better understanding of the potential impact of events upon cash flows. The advantages of an earlier recognition of the emergence of an event, of a faster response to events on the part of the company, and of a lesser need to hold large amounts of instant reserves, appear to be seen as being clearly associated with the preparation of cash flow updates or forecasts, contingency plans bringing no real contribution in this respect. As far as the remaining advantages are concerned, no significant difference is recognized between the two methods of



handling uncertainty. The fact that companies carry out predominantly reactive contingency planning might explain these results, since their experience of early warning systems is basically of ex-post nature. The literature, however, when describing the advantages offered by contingency planning over traditional systems, compares the ex-ante form of contingency planning with the latter.



## Chapter 11 RESULTS AND CONCLUSIONS III

11.1 Introduction

11.2 The Response to Unexpected Financial Needs

11.3 The Inventory of Resources

11.4 The Inventory of Resources as an Indicator of Financial  
Mobility

11.5 Conclusions

### 11.1 Introduction

The results and conclusions of the study on resource planning (at group level) for financial mobility are reported in the present chapter.

Section 11.2 characterizes the response to unexpected financial needs. It starts by identifying the extent to which companies rely on the resources of liquidity to meet unexpected financial needs. Next, a measure of the degree of reliance on the resources of liquidity is derived and the results obtained from tests of association carried out between this variable and major independent characteristics are reported. Finally, it examines the existence of a rationale for the deployment of resources, and the extent to which companies accept certain procedures as a means of responding to unexpected financial needs.

In Section 11.3, the reasons for not preparing an inventory of the resources of liquidity are explored. Next, the major independent characteristics found to be associated with the preparation of such an inventory are identified. The section ends with the provision of general information on the preparation of the inventory of resources, including period of time covered, time of preparation, resources of liquidity included, degree of complexity, information supplied, and extent to which senior managers outside the (headquarters) finance department are called on to discuss it.

Section 11.4 analyses the extent to which the inventory of resources is seen as an indicator of financial mobility. It further analyses the effectiveness of the inventory of resources in providing for financial mobility at minimum cost.

Lastly, Section 11.5 provides the conclusions on the subject.

## 11.2 The Response to Unexpected Financial Needs

Table 11.1 shows the extent to which sample companies rely on the resources of liquidity to meet unexpected financial needs. For each one of the resources listed, information is given on the percentage and on the median of reliance. Both vary over a wide range of values. As far as percentage of reliance is concerned, the overwhelming majority of firms rely on negotiated short-term lines of credit (95 percent) and on the curtailment of planned cash outflows associated with capital expenditures (83 percent). Large majorities also count on the postponement of planned cash outflows (71 percent), on the curtailment of planned cash outflows associated with administrative overheads (69 percent), on unsecured short-term debt financing capacity (67 percent), and on precautionary liquid assets (63 percent). On the other hand, as few as 28 percent, 33 percent and 38 percent respectively rely on secured short-term debt financing capacity, on the curtailment of planned cash outflows associated with the R & D plan, and on medium and long-term debt financing capacity. With respect to median of reliance, the precautionary liquid asset balance is the resource of liquidity most extensively relied on (3.5), immediately followed by negotiated short-term lines of credit (3.4), and the two short-term debt financing capacities (2.4 and 2.0). The resources least extensively relied on are equity financing capacity (1.4) and the curtailment of planned cash outflows associated with the marketing plan (1.4), with the R & D plan (1.3) and with dividends (1.2).

The ranking of the resources of liquidity in descending order of the two criteria above is shown in Table 11.2. The display in this table allows the comparison of the two rankings and, on the basis of the resources of liquidity ordered by median of reliance, the calculation of the variation in rank from one criterion to the other. Table 11.3 presents a summary arrangement of this variation.

In terms of the first criterion, companies generally favour reliance on unconditionally mobile reserves to meet unexpected financial needs. This is indicated by the low rankings obtained by the secured short-term and the medium and long-term debt financing



Table 11.1

Extent to which companies rely on the resources of liquidity to meet unexpected financial needs

Resources of liquidity	Variables	Number of companies which:			N <sup>2</sup>	Percentage of reliance	Median <sup>3</sup> of reliance
		Rely on them	Do not rely on them	Not determined/ Not applicable <sup>1</sup>			
Precautionary liquid asset balance	SCASH	67	39	16	106	63.2	3.515
Negotiated short-term lines of credit	ONCRDT	112	6	4	118	94.9	3.400
Unsecured short-term debt financing capacity	ADUSBL	72	35	15	107	67.3	2.400
Secured short-term debt financing capacity	ADSBL	27	89	26	96	28.1	2.000
Medium and long-term debt financing capacity	LTDEBT	36	58	28	94	38.3	1.700
Equity financing capacity	NWEGTY	42	57	23	99	42.4	1.375
New additions to planned cash inflows	INCPIN	61	40	21	101	60.4	1.522
Anticipation of planned cash inflows	ACCPIN	60	38	24	98	61.2	1.409
Curtailment of planned cash outflows associated with the production plan	CHPROD	43	49	30	92	46.7	1.893
Id. with the marketing plan	RDHARK	46	54	22	100	46.0	1.385
Id. with the R & D plan	RDRDEV	28	57	37	85	32.9	1.278
Id. with administrative overheads	RDADM	74	33	15	107	69.2	1.833
Id. with capital expenditures	RDCEXP	92	19	11	111	82.9	1.947
Id. with dividends	RDDIV	43	57	22	100	43.0	1.217
Postponement of planned cash outflows	DECPOU	75	30	17	105	71.4	1.714
Fixed assets available for sale	LIGFA	62	41	19	103	60.2	1.500
Others: cheque clearing scheme, etc.	OTHERS	5	-	-	5	100.0	3.250

<sup>1</sup> "Not applicable" refers to those companies for which the particular resource is not available

<sup>2</sup> N is the number of valid cases.

<sup>3</sup> The median of reliance was calculated on the basis of the ratings provided by firms on a four-point scale (Very little to Very extensively).

Table 11.2

Ranking of the resources of liquidity in descending order of both percentage and median of reliance.

Ranking of the resources of liquidity in descending order of:			Variation in rank from percentage to median of reliance*
Percentage of reliance		Median of reliance	
UNCRDT	1	SCASH	+ 5
RDCEXP	2	UNCRDT	- 1
DECPOU	3	ADUSBL	+ 2
RDADM	4	ADSBL	+12
ADUSBL	5	RDCEXP	- 3
SCASH	6	CHPROD	+ 4
ACCPIN	7	RDADM	- 3
INCPIN	8	DECPOU	- 5
LIQFA	9	LTDEBT	+ 5
CHPROD	10	INCPIN	- 2
RDMARK	11	LIQFA	- 2
RDDIV	12	ACCPIN	- 5
NWEQTY	13	RDMARK	- 2
LTDEBT	14	NWEQTY	- 1
RDRDEV	15	RDRDEV	0
ADSBL	16	RDDIV	- 4

\* The variation in rank refers to resources of liquidity ranked in descending order of median of reliance.

Table 11.3

Summary arrangement of variation in rank from percentage to median of reliance

	Positive variations in rank		Negative variations in rank	
First eight ranks *	ADSBL	+12	DECPOU	-5
	SCASH	+ 5	RDCEXP	-3
	CHPROD	+ 4	RDADM	-3
	ADUSBL	+ 2	UNCRDT	-1
Last eight ranks *	LTDEBT	+ 5	ACCPIN	-5
			RDDIV	-4
			INCPIN	-2
			LIQFA	-2
			RDMARK	-2
			NWEQTY	-1

\* These ranks refer to resources of liquidity ranked in descending order of median of reliance.



capacities, as well as by the equity financing capacity. Furthermore, they favour reliance on negotiated short-term lines of credit over unsecured short-term debt financing capacity and precautionary liquid assets. Generally, companies also resort to modifications of planned cash flows, yet as far as curtailment of planned cash outflows is concerned, only the curtailment of capital expenditures and the reduction of administrative overheads rank among the eight resources most commonly relied on.

When the criterion is median of reliance, the ranking of the resources of liquidity is different. Instant reserves - i.e. precautionary liquid assets and negotiated short-term lines of credit - are ranked first. Those forms of negotiable reserves which involve the least uncertainty as to timing and magnitude, namely the two short-term debt financing capacities, are ranked next. Other forms of negotiable reserves - medium and long-term debt financing capacity, and equity financing capacity - are placed further down in the ranking. Notwithstanding this fact, the extent of reliance on the former is moderate. It is notable how the increase and the anticipation of planned cash inflows suffer a setback in terms of median of reliance, being ranked among the last eight resources. Except for the curtailment of planned cash outflows associated with the production plan, the curtailment of planned operating cash outflows does not markedly change in rank when median of reliance is the criterion. Companies that resort to the curtailment of production outflows and the reduction of administrative overheads to meet unexpected financial needs, do it moderately. Also moderately relied on are the curtailment of capital expenditures and the postponement of planned cash outflows.

Finally, neither the curtailment of dividends nor the liquidation of fixed assets available for sale occupy any significant rank in terms of both criteria.

Table 11.4 identifies which manager in the company is most frequently in control of each of the resources of liquidity ranked in descending order of median of reliance. It is worth noting that among the first nine ranked resources, six are controlled by the (headquarters) finance officer. The remaining three are controlled

Table 11.4

Manager most frequently in control of the resources of liquidity

Resources of liquidity ranked in descending order of median of reliance		Manager most frequently in control
1	SCASH	. The (HQ) finance officer
2	UNCRDT	. id.
3	ADUSBL	. id.
4	ADSBL	. id.
5	RDCEXP	. A (group) Director above the (HQ) finance officer
6	CHPROD	. id.
7	RDADM	. id.
8	DECPOU	. The (HQ) finance officer
9	LTDEBT	. id.
10	INCPIN	. Subsidiary company Directors
11	LIQFA	. The Group or Board of Directors
12	ACCPIN	. Subsidiary company Directors
13	RDMARK	. A (group) Director above the (HQ) finance officer
14	NWEQTY	. The Group or Board of Directors
15	RDRDEV	. A (group) Director above the (HQ) finance officer
16	RDDIV	. The Group or Board of Directors



by a (group) Director above the (headquarters) finance officer, such as the Managing Director. Among the last seven ranked resources, three are controlled by the Group or Board of Directors, two are controlled by subsidiary company Directors, and only two are controlled by a (group) Director at Managing Director level, their deployment being most likely to require consensus between the manager in control and the operational managers directly involved with them.

In order to obtain a measure of the degree of reliance on the resources of liquidity, a new variable was created. This variable was calculated on the basis of the percentage and the median of reliance and for the purpose of defining it, the case was considered of a hypothetical firm assumed to rely very extensively on every listed resource. Then the case of each individual firm in the sample was compared with this hypothetical firm. In this sense, degree of reliance is a relative measure of the extent to which companies rely on the resources of liquidity to meet unexpected financial needs. In the construction of the measure, weights were assigned to resources, so that the measure could become more sensitive to the type of resource involved. The assignment of weights was based on the ranking of the resources of liquidity in descending order of median of reliance (Table 11.2). A weight of one was ascribed to the first four ranked resources, a weight of two to the next four resources, and finally a weight of three to the last eight resources.

For the purpose of identifying an association between the degree of reliance on the resources of liquidity and major independent characteristics, as hypothesized in the study (see Chapter 5), one-sample chi-square tests of independence, Kendall's and Spearman's rank-order correlation tests were performed. Exhibits 11.1 to 11.3 present the decision models for these tests, and Tables 11.5 and 11.6 show the results obtained.

No association was found between the degree of reliance on the resources of liquidity and any of the characteristics of either the cash flow budgeting system or the cash flow updating or forecasting system. However an association was obtained between the degree of reliance on the resources of liquidity and the implementation of reactive contingency planning (Table 11.5). The relationship



Exhibit 11.1

Decision model for the one-sample chi-square tests of independence between the degree of reliance on the resources of liquidity and major independent characteristics

. NULL HYPOTHESES ( $H_0$ ):

The degree of reliance on the resources of liquidity (RESRELY) is independent of

- . the industry classification (IC)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)

. LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.05$

## Exhibit 11.2

Decision model for the Kendall rank-order correlation tests between the degree of reliance on the resources of liquidity and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The degree of reliance on the resources of liquidity (RESRELY) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the periodicity of cash flow budget revision (CFBUPDT - see Chapter 9)
- . the preparation of cash flow updates or forecasts (UPDT)
- . the number of years for which contingency planning has been carried out (WFTIME)
- . the implementation of reactive contingency planning (WFPD)
- . the implementation of proactive contingency planning (WFAS)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$

### Exhibit 11.3

Decision model for the Spearman rank-order correlation tests between the degree of reliance on the resources of liquidity and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The degree of reliance on the resources of liquidity (RESRELY) is independent of

- . the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART - see Chapter 10)
- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 11.5

Results obtained from the one-sample chi-square tests of independence and the Kendall rank-order correlation tests between the degree of reliance on the resources of liquidity and major independent characteristics

Degree of reliance on the resources of liquidity RESRELY	Major independent characteristics													
	CFBTIME	CFBCOMM	CFBUPDT	UPDT	WFTIME	WFPD	WFAS	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT
One-sample $\chi^2$ tests of independence								10.13 (0.429) 10 116				5.38 (0.020) <sup>‡</sup> 1 110		
One-tailed probability $\alpha'$ =														
df =														
N =														
Kendall rank-order correlation tests														
$\tau$ =	-0.103	0.108	0.076	0.022	-0.092	0.139	-0.029		0.025	0.156	-0.224		-0.153	-0.092
Two-tailed probability $\alpha'$ =	(0.178)	(0.138)	(0.275)	(0.773)	(0.389)	(0.072)	(0.745)		(0.739)	(0.029) <sup>‡</sup>	(0.002) <sup>**</sup>		(0.032) <sup>‡</sup>	(0.202)
N =	100	115	114	116	59	115	88	115	115	107	115		115	115

<sup>‡</sup> One-tailed probability significant at the 0.05 level

<sup>\*\*</sup> One-tailed probability significant at the 0.01 level

Symbols: For the one-sample  $\chi^2$  tests of independence:

$\chi^2$  = chi-square statistic

$\alpha'$  = level of significance

For the Kendall rank-order correlation tests:

$\tau$  = Kendall rank-order correlation coefficient

$\alpha'$  = level of significance

N = number of valid cases

Table 11.6

Results obtained from the Spearman rank-order correlation tests between the degree of reliance on the resources of liquidity and major independent characteristics

Degree of reliance on the resources of liquidity RESRELY	Major independent characteristics										
	WFPART	TURN	FAEMP	ROE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CEXPP8
$r_s = 0.411$	-0.035	-0.103	-0.247	-0.078	0.316	-0.158	-0.368	-0.357	0.037	-0.118	
Two-tailed prob. $\alpha' = (0.004)^{**}$	(0.710)	(0.278)	(0.008) <sup>**</sup>	(0.410)	(0.001) <sup>**</sup>	(0.093) <sup>*</sup>	(0.001) <sup>**</sup>	(0.001) <sup>**</sup>	(0.694)	(0.210)	
N = 48	115	114	115	115	115	115	115	115	115	115	

\* One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $r_s$  = Spearman rank-order correlation coefficient  
 $\alpha'$  = level of significance  
 N = number of valid cases

(significant at the two-tailed probability level of 0.072) appears positive as conveyed by a tau coefficient of 0.14. This implies that companies which carry out reactive contingency planning, tend to show a higher degree of reliance on the resources of liquidity. A thorough analysis of the remaining significant relationships in Tables 11.5 and 11.6 indicates that an identical financial scenario to the one outlined in Chapter 10 for the implementation of reactive contingency planning arises here. Such a scenario provides a partial background against which a company's degree of reliance on the resources of liquidity has to be understood - a background consisting of the amount of financial leverage, the level of return on investment, the proportion of internal and operating cash flow generation, and the degree of predictability of company's cash inflows. The association between the degree of reliance on the resources of liquidity and the amount of financial leverage of the firm (established at the two-tailed probability level of 0.001) appears to be positive ( $\rho=0.32$ ) (Table 11.6). On the other hand, the association between the degree of reliance on the resources of liquidity and the level of return on investment (established at the two-tailed probability level of 0.008) appears to be negative ( $\rho=-0.25$ ) (Table 11.6). Also apparently negative ( $\rho$  coefficients of -0.37 and -0.36 respectively) are the two associations (established at the two-tailed probability level of 0.001) between the degree of reliance on the resources of liquidity and the proportion of cash flow generation, both internal and from operations (Table 11.6). In Table 11.5, the association between the degree of predictability of company's cash inflows and the degree of reliance on the resources of liquidity shows a Kendall correlation coefficient of -0.15, which suggests that this association (established at the two-tailed probability level of 0.032) is also negative. Thus, a higher degree of reliance on the resources of liquidity appears to occur in firms with higher levels of gearing, with lower levels of return on investment, with lower relative capacity to generate cash, and with lower predictability of cash inflows.

Three more financial features of the firm were found to be related to the degree of reliance on the resources of liquidity. They complement the previous background. They are the firm's cash position, the overall unused borrowing capacity of the firm, and the



evolution of this borrowing capacity. As far as the first feature is concerned (Table 11.6), the relationship is significant at the two-tailed probability level of 0.093. The association appears negative with a Spearman correlation coefficient of -0.16. The lower the level of a firm's internal instant reserves (cash plus short-term marketable securities), the higher the degree of reliance placed on the resources of liquidity as a whole. At the same time, a negative association appears to exist between the degree of reliance on the resources of liquidity and the overall unused borrowing capacity of the firm ( $\tau = -0.22$ ) (Table 11.5). This suggests that the lower the availability to a company of overall unused borrowing capacity, the higher its degree of reliance on the resources of liquidity. The relationship is significant at the two-tailed probability level of 0.002. Finally, the association between the degree of reliance on the resources of liquidity and the evolution of the firm's overall unused borrowing capacity was obtained at the one-tailed probability level of 0.020 (Table 11.5). A Phi coefficient of 0.26 suggests that the association is moderately strong. Furthermore, the corresponding contingency table (Appendix F.3 - Table F.3.1) implies that companies whose overall unused borrowing capacity has risen or remained stable, tend to have a lesser degree of reliance on the resources of liquidity than companies whose capacity has decreased or shown high instability. In fact, 87 percent of the firms whose degree of reliance on the resources of liquidity is moderate or less than moderate have seen their overall unused borrowing capacity rising, or at least remaining stable. This figure compares with one of 55 percent for those firms whose degree of reliance on the resources of liquidity is more than moderate.

It is worth emphasizing that no association was found between the degree of reliance on the resources of liquidity and the implementation of proactive contingency planning (Table 11.5). Likewise, no significant relationship was found between the degree of reliance on the resources of liquidity and any of the characteristics referred to in Chapter 10 as being related to the implementation of proactive contingency planning, except for the degree of predictability of company's cash inflows.

Another association was obtained between the degree of reliance on the resources of liquidity and the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (Table 11.6). This relationship is significant at the two-tailed probability level of 0.004, and appears to be very strong and positive ( $\rho=0.41$ ). A higher degree of top management participation in the discussion of contingency plans appears to be linked to a higher degree of reliance on the resources of liquidity. Apparently also, a higher degree of fragmentation in group turnover is associated with a higher degree of reliance on the resources of liquidity (Table 11.5). This association (established at the two-tailed probability level of 0.029) shows a tau coefficient of 0.16 which suggests it to be positive.

The existence of a rationale for the deployment of resources is identified in Table 11.7. Most firms (79 percent) have not established such a rationale. And among those 21 percent which confirm its existence, only 67 percent agree to specify it. The type of rationale, commonly known as "the line of least resistance", is the approach most frequently reported among these companies. In the face of an unexpected financial need, attention is turned first to those resources which have the greatest flexibility, the least inhibiting impact on the company, and the least cost in terms of profit and loss. This implies using cash reserves and borrowing facilities first, then selling trade investments, or selling and leasing back property. Thereafter, cost reduction in overheads or in production is contemplated provided it is fully justified by circumstances, such as if the unexpected financial need is large or persistent. Two other rationales are mentioned, although less often. One of them is generally known as the "key resource" approach, and implies basing the strategy on one principal resource ensured to be adequate for all likely unexpected financial needs. Liquid asset reserves or bank overdrafts usually serve as the key resource. The other rationale might be designated as the "mixed" approach. Recognition is given to the fact that unexpected financial needs show different periods of requirement, though the distinction tends to be roughly set between short-term and long-term needs. Accordingly, a deployment of resources that takes into account the duration (short or long-term) of each particular problem



Table 11.7

Existence of a rationale for the deployment of resources

Variable STRTSEQR

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	24	20.7	20.7
. No	92	79.3	100.0
Not determined	6	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 116



is advocated. However for each of the two major periods of requirement, the approach followed for the deployment of resources tends to be either the approach of "least resistance" or the "key resource" approach.

Tests of association performed between the existence of a rationale for the deployment of resources and three independent characteristics - the implementation of reactive contingency planning, the implementation of proactive contingency planning, and the degree of reliance on the resources of liquidity - produced no significant results.

The extent to which companies accept certain procedures as a means of responding to unexpected financial needs is presented in Table 11.8. The revision or postponement of corporate strategies is not only the procedure most commonly accepted (75 percent of the cases) but also the one most extensively undertaken (Mdn = 2.0). In second place, both in percentage (69 percent) and in median of acceptance (1.8), is the revision or postponement of corporate objectives. On the other hand, the violation of company dividend and debt policies as feasible procedures for meeting unexpected financial needs is accepted by only 45 percent and a narrow majority of 55 percent of the companies respectively. The median of acceptance of these two procedures is also the lowest - 1.2 and 1.4 respectively. A Friedman two-way analysis of variance reveals that, as far as the degree of acceptance is concerned, the difference observed among these four procedures is significant.

According to the hypotheses stated in the study (see Chapter 5), Kendall's rank-order correlation tests were next carried out between the degree of acceptance of each one of the procedures under consideration and major independent characteristics. The latter are listed in Exhibit 11.4 together with the decision model underlying the tests. Table 11.9 presents the results obtained.

An analysis of this table per major independent characteristic, indicates that once again the same financial scenario, made up of the amount of financial leverage, level of return on investment, and proportion of cash flow generation of the firm, stands out as an

Table 11.8

Extent to which companies accept certain procedures as a means of responding to unexpected financial needs

Procedures	Variables	Number of companies which:			N <sup>2</sup>	Percentage of acceptance	Median <sup>3</sup> of acceptance
		Accept them as a means of responding to unexpected financial needs	Do not accept them as a means of responding to unexpected financial needs	Not determined/ Not applicable <sup>1</sup>			
• Revision or postponement of corporate objectives	REVOBJ	70	32	20	102	68.6	1.821
• Revision or postponement of corporate strategies	REVSTRAT	77	26	19	103	74.8	2.047
• Violation of company dividend policy	VDIVPOL	45	55	22	100	45.0	1.162
• Violation of company debt policy	VDEBTPOL	53	43	26	96	55.2	1.355

<sup>1</sup> "Not applicable" refers to those companies where a defined policy of dividends or debt is non-existent.

<sup>2</sup> N is the number of valid cases.

<sup>3</sup> The median was calculated on the basis of the ratings provided by firms on a four-point scale (Very little to Very extensively).

## Exhibit 11.4

Decision model for the Kendall rank-order correlation tests between the degree of acceptance of certain procedures as a means of responding to unexpected financial needs and major independent characteristics

. NULL HYPOTHESES ( $H_0$ ):

The degree of acceptance of the following procedures:

- . revision or postponement of corporate objectives (REVOBJ)
- . revision or postponement of corporate strategies (REVSTRAT)
- . violation of company dividend policy (VDIVPOL)
- . violation of company debt policy (VDEBTPOL)

as a means of responding to unexpected financial needs is independent of

- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the degree of interest coverage (INTCRT)
- . the degree of dividend coverage (DIVCRT)
- . the amount of earnings per share (ERNPSH)

. LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

. DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 11.9

Results obtained from the Kendall rank-order correlation tests between the degree of acceptance of certain procedures as a means of responding to unexpected financial needs and major independent characteristics

Degree of acceptance of the following procedures	Major independent characteristics												
	TURN	FAEMP	ROE	TURPNA	GEARNG	LAPCA	ICFP6R	OCFP6R	WCIP6R	CEXPPB	INTCRT	DIVCRT	ERNPSH
REVOBJ Two-tailed prob. $\alpha'$ N =	-0.054 (0.590) 102	-0.239 (0.016) 101	-0.216 (0.030) 102	0.000 (0.999) 102	0.183 (0.065) 102	-0.139 (0.163) 102	-0.198 (0.046) 102	-0.214 (0.030) 102	0.050 (0.617) 102	-0.207 (0.037) 102	-0.233 (0.034) 83	-0.159 (0.117) 98	-0.282 (0.004) 102
REVSTRAT Two-tailed prob. $\alpha'$ N =	-0.063 (0.525) 103	-0.246 (0.013) 102	-0.205 (0.038) 103	-0.021 (0.831) 103	0.210 (0.033) 103	-0.065 (0.513) 103	-0.162 (0.102) 103	-0.111 (0.263) 103	-0.011 (0.913) 103	-0.177 (0.074) 103	-0.166 (0.133) 83	-0.097 (0.338) 99	-0.247 (0.012) 103
VDIVPOL Two-tailed prob. $\alpha'$ N =	-0.084 (0.406) 100	-0.203 (0.044) 99	-0.176 (0.080) 100	-0.017 (0.864) 100	0.236 (0.018) 100	-0.057 (0.572) 100	-0.222 (0.026) 100	-0.254 (0.011) 100	0.125 (0.217) 100	-0.212 (0.034) 100	-0.312 (0.005) 81	-0.080 (0.439) 96	-0.269 (0.007) 100
VDEBTPOL Two-tailed prob. $\alpha'$ N =	0.068 (0.511) 96	-0.089 (0.389) 95	-0.194 (0.058) 96	-0.019 (0.858) 96	0.373 (0.001) 96	-0.159 (0.121) 96	-0.300 (0.003) 96	-0.274 (0.007) 96	0.041 (0.692) 96	-0.077 (0.457) 96	-0.319 (0.004) 79	-0.181 (0.085) 92	-0.180 (0.079) 96

† One-tailed probability significant at the 0.05 level

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient    N = number of valid cases  
 $\alpha'$  = level of significance

important factor, associated this time with the degree of acceptance of the procedures in question. Furthermore, the direction of the association between this financial scenario and each one of the procedures appears not only to be the same, but also identical to the direction of other significant relationships already referred to between this financial scenario and other dependent variables. It appears that companies with higher levels of gearing, with lower levels of return on investment, and with lower relative capacity to generate cash internally and from operations, tend to be more receptive to the use of each one of the procedures above as a means of responding to unexpected financial needs.

Additionally, a few more financial characteristics of the firm were found to be related to the degree of acceptance of these procedures. Earnings per share, for instance, appear negatively associated with the degree of acceptance of all four procedures. The degree of capital intensiveness of the firm and the proportion of capital investment also appear negatively associated with the degree of acceptance of the first three procedures. In turn, the degree of interest coverage appears negatively associated with all but the degree of acceptance assigned to the revision or postponement of corporate strategies. As to the degree of dividend coverage, its only association is with the degree of acceptance attached to the violation of company debt policy. This also appears to be a negative association.

### 11.3 The Inventory of Resources

The preparation of an inventory of the resources of liquidity appears to be a common practice. In fact, the vast majority of sample firms (76 percent) prepare such an inventory at group level (Table 11.10). Among the 24 percent that do not, the preparation of an inventory of the resources of liquidity is mainly regarded as an unnecessary exercise: either because the company holds substantial resources, including a high borrowing potential, to meet any eventuality (61 percent), or because the firm is involved in a low



risk type of business, seldom exposed to major unexpected financial needs (22 percent) (Table 11.11). A few companies present some additional reasons, namely that: the group structure is very simple, people involved with the cash management of the firm being fully aware of the main resources available to cover unexpected cash shortages - no need, therefore, of a formal inventory; the preparation of an inventory of resources is entirely hypothetical; an inventory would take place only if a need presented itself - otherwise, it is a vehicle to divert managers from achieving budgets; borrowing levels are currently at a maximum - no purpose is seen, therefore, for an inventory of resources.

According to the hypotheses formulated in the study (see Chapter 5), tests of association were carried out between the preparation of an inventory of the resources of liquidity and major independent characteristics. One-sample chi-square tests of independence and Kendall's rank-order correlation tests were performed. The decision models underlying these tests, and the corresponding results, are contained in Exhibits 11.5 and 11.6, and in Tables 11.12 and 11.13 respectively.

An association was found between the preparation of an inventory of the resources of liquidity and the implementation of reactive contingency planning (Table 11.12). The association is established at the one-tailed probability level of 0.046 and appears to be relatively strong (Phi coefficient of 0.21). Furthermore, the corresponding contingency table suggests the presence of a positive association (Appendix F.3 - Table F.3.2). In effect, 61 percent of the companies which do not carry out reactive contingency planning, report the preparation of an inventory of resources. This figure increases to 81 percent for those companies carrying out reactive contingency planning. However, the preparation of an inventory of the resources of liquidity was not found to be related to any of the major independent financial characteristics reported in Chapter 10 as being associated with the implementation of reactive contingency planning - except for the degree of predictability of company's cash inflows (Table 11.12 and Appendix F.3 - Table F.3.3).



Table 11.10

Preparation of an inventory of the resources of liquidity

Variable IV

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	91	75.8	75.8
. No	29	24.2	100.0
Not determined	2	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 120

Table 11.11

Reasons for not preparing an inventory of the resources of liquidity

Variable NIVREAS

	Absolute frequency	Adjusted relative frequency (%)
. Substantial resources to meet any eventuality. High borrowing potential	14	60.9
. Low risk type of business, seldom exposed to major unexpected financial needs	5	21.7
. Other reasons	4	17.4
Not determined	8	MISSING
Not applicable	91	MISSING
	-----	-----
Total	122	100.0

N = 23

## Exhibit 11.5

Decision model for the one-sample chi-square tests of independence between the preparation of an inventory of the resources of liquidity and major independent characteristics

### . NULL HYPOTHESES (H<sub>0</sub>):

The preparation of an inventory of the resources of liquidity (IV) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the periodicity of cash flow budget revision (CFBUPDT - see Chapter 9)
- . the preparation of cash flow updates or forecasts (UPDT)
- . the number of years for which contingency planning has been carried out (WFTIME)
- . the implementation of reactive contingency planning (WFPD)
- . the implementation of proactive contingency planning (WFAS)
- . the existence of a rationale for the deployment of resources (STRTSEQR)
- . the industry classification (IC)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

### . LEVEL OF SIGNIFICANCE:

One-tailed probability  $\alpha = 0.05$

### . DECISION CRITERION:

Reject H<sub>0</sub> if  $\alpha' \leq 0.05$

## Exhibit 11.6

Decision model for the Kendall rank-order correlation tests between the preparation of an inventory of the resources of liquidity and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The preparation of an inventory of the resources of liquidity (IV) is independent of

- . the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART - see Chapter 10)
- . the degree of reliance on the resources of liquidity (RESRELY - see previous section)
- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

. **LEVEL OF SIGNIFICANCE:**

Two-tailed probability  $\alpha = 0.10$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.10$



Table 11.12

Results obtained from the one-sample chi-square tests of independence between the preparation of an inventory of the resources of liquidity and major independent characteristics

Preparation of an inventory of the resources of liquidity IV	Major independent characteristics																
	CFBTIME	CFBCOMM	CFBUPDT	UPDT	WFTIME	WFPD	WFAS	STRTSEQR	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADFDEP	TIMECH
$\chi^2 =$ One-tailed prob. $\alpha' =$ $df =$ $N =$	1.22 (0.543) 2 103	1.31 (0.520) 2 118	0.39 (0.532) 1 117	0.85 (0.356) 1 120	0.21 (0.648) 1 61	3.97 (0.046) <sup>‡</sup> 1 119	0.28 (0.595) 1 91	1.30 (0.254) 1 115	12.89 (0.230) 10 120	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADFDEP	TIMECH
$\chi^2 =$ One-tailed prob. $\alpha' =$ $df =$ $N =$	0.00 (1.000) 1 118	2.83 (0.418) 3 111	4.00 (0.261) 3 118	0.00 (0.944) 1 113	4.11 (0.043) <sup>‡</sup> 1 119	1.76 (0.414) 2 119	1.53 (0.216) 1 117	3.95 (0.047) <sup>‡</sup> 1 118									

‡ One-tailed probability significant at the 0.05 level

Symbols:  $\chi^2$  = chi-square statistic  
 $\alpha'$  = level of significance  
 $df$  = degrees of freedom  
 $N$  = number of valid cases

Table 11.13

Results obtained from the Kendall rank-order correlation tests between the preparation of an inventory of the resources of liquidity and major independent characteristics

Preparation of an inventory of the resources of liquidity IV	Major independent characteristics												
	WFPART	RESRELY	TURN	FAPEMP	ROE	TURPNA	GEARNG	LAPCA	ICFPGR	OCFPGR	WCIPGR	CEXPPB	PEOPLE
$\tau = 0.118$	-0.053	-0.031	-0.022	-0.121	-0.093	-0.023	0.130	-0.082	-0.088	0.017	0.009	0.071	-0.006
Two-tailed prob. $\alpha' =$	(0.493)	(0.687)	(0.770)	(0.112)	(0.226)	(0.767)	(0.087) <sup>†</sup>	(0.281)	(0.246)	(0.824)	(0.908)	(0.388)	(0.959)
N = 49	116	118	117	118	118	118	118	118	118	118	118	110	63

<sup>†</sup> One-tailed probability significant at the 0.05 level

Symbols:  $\tau$  = Kendall rank-order correlation coefficient  
 $\alpha'$  = level of significance  
 N = number of valid cases

Besides these associations, two more significant relationships were obtained. The first establishes the association between the preparation of an inventory of the resources of liquidity and the firm's cash position (two-tailed probability of 0.087) (Table 11.13). A Kendall correlation coefficient of 0.13 suggests that the association is positive, which implies that companies where an inventory of resources is prepared, tend to be those with higher reserves of cash and short-term marketable securities. The second establishes the association between the preparation of an inventory of the resources of liquidity and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (Table 11.12). The relationship is significant at the one-tailed probability level of 0.047, its strength and direction being conveyed respectively by a Phi coefficient of 0.21 and a contingency table as displayed in Appendix F.3 - Table F.3.4. This table shows that among companies where an inventory of resources is not prepared, the percentage of cases devoting less than 10 percent, and 10 percent or more of their (headquarters) finance department's time to the management of cash is quite similar - 46 percent v. 54 percent. Yet among companies where such an inventory is prepared, the vast majority of cases now (76 percent) tend to devote 10 percent or more of its (headquarters) finance department's time to the management of cash.

A descriptive analysis of the major features of the inventory of resources is provided next. The period of time covered by the inventory of resources is shown in Table 11.14. For the majority of firms (55 percent), the inventory of resources is prepared for a maximum period of three to 12 months. For almost one third (28 percent); this period exceeds one year, whereas for 12 percent, it only covers up to three months ahead. Table 11.15 reveals that in most cases (70 percent), the inventory of resources and the cash flow budget are simultaneous. In a much smaller number of cases (39 percent and 36 percent respectively), the inventory of resources is prepared at the date of preparation of cash flow budget revisions, or of cash flow updates or forecasts. Only in 34 percent, is the inventory of resources prepared at regular intervals.



Table 11.14

Period of time covered by the inventory of resources

Variable IVHRZ

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. One day ahead	0	0.0	0.0
. Between 1 day and 1 week ahead	3	3.5	3.5
. Between 1 week and 1 month ahead	3	3.5	7.0
. Between 1 and 3 months ahead	4	4.7	11.7
. Between 3 and 6 months ahead	9	10.6	22.3
. Between 6 and 12 months ahead	38	44.8	67.1
. More than 12 months ahead	24	28.2	95.3
. Other periods: to end of financial year/variable	4	4.7	100.0
Not determined	8	MISSING	100.0
Not applicable	29	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 85

Table 11.15

Time of preparation of the inventory of resources

Time of preparation	Variables	Number of companies where:			N <sup>2</sup>	Percentage of preparation
		The inventory of resources is prepared:	The inventory of resources is not prepared:	Not determined/ Not applicable <sup>1</sup>		
• When preparing the cash flow budget	IVCFB	63	27	1	90	70.0
• When preparing the cash flow budget revisions	IVRCFB	31	49	11	80	38.7
• When preparing the cash flow updates or forecasts	IVUPDT	25	44	22	69	36.2
• At regular intervals	IVTIME	31	60	0	91	34.1
• On other occasions: on occurrence of major unexpected events/ad hoc reviews, etc.	IVOTH	6	-	-	6	100.0

<sup>1</sup> "Not applicable" refers to those companies where the particular cash flow plan (budget, budget revision or update) is not prepared.

<sup>2</sup> N is the number of valid cases.

The resources of liquidity included in the inventory are identified in Table 11.16. This table reveals that the resources of liquidity which companies tend most extensively to rely on to meet unexpected financial needs - i.e. precautionary liquid assets, negotiated short-term lines of credit, and unsecured short-term debt financing capacity - are also those most commonly included in the inventory of resources (by more than 70 percent of the cases). Medium and long-term debt financing capacity, and secured short-term debt financing capacity are included in the inventory of resources by a smaller majority of firms (around 50 percent). Less commonly included (in 20 to 35 percent of the cases) are equity financing capacity, fixed assets available for sale, and the curtailment of planned cash outflows associated with capital expenditures, the production plan and administrative overheads. All the remaining resources are included in the inventory by less than 20 percent of the cases. For the purpose of measuring the degree of complexity of the inventory of resources, a new variable was created based on the number and type of resources of liquidity included in the inventory. This variable made use of a weighing system identical to the one applied in the construction of the degree of reliance on the resources of liquidity. Tests of association carried out between the degree of complexity of the inventory of resources and major independent characteristics, did not prove to be significant (see hypotheses in Chapter 5).

The identification of the resources of liquidity which are available to meet unexpected financial needs, is accompanied in 91 percent of the cases by information concerning their magnitude. Additional information on the certainty and on the conditions of availability of the resources is provided in 68 percent and 65 percent respectively. Less commonly provided (in only 56 percent of the cases) is information concerning the lead time required to deploy the resources (Table 11.17). The large majority of firms (75 percent) do not have an established criterion for evaluating the adequacy of the resources in the inventory, both in total amount and in distribution among specific resources (Table 11.18). On the other hand, only two firms out of the 25 percent that have such a criterion, relate the adequacy of the resources in the inventory to pre-defined contingency scenarios. In two companies, the adequacy



Table 11.16

## Resources of liquidity included in the inventory

Resources of liquidity	Variables	Number of companies where:			N <sup>2</sup>	Percentage of inclusion
		They are included	They are not included	Not determined/ Not applicable <sup>1</sup>		
Precautionary liquid asset balance	IVSCASH	42	6	43	48	87.5
Negotiated short-term lines of credit	IVUNCRDT	73	4	14	77	94.8
Unsecured short-term debt financing capacity	IVADUSBL	39	15	37	54	72.2
Secured short-term debt financing capacity	IVADSBL	10	10	71	20	50.0
Medium and long-term debt financing capacity	IVLTDEBT	15	11	65	26	57.7
Equity financing capacity	IVNWEQTY	9	18	64	27	33.3
New additions to planned cash inflows	IVINCPIN	4	36	51	40	10.0
Anticipation of planned cash inflows	IVACCPIN	7	35	49	42	16.7
Curtailment of planned cash outflows associated with the production plan	IVCHPROD	7	24	60	31	22.6
Id. with the marketing plan	IVRDMARK	6	29	56	35	17.1
Id. with the R & D plan	IVRDRDEV	2	17	72	19	10.5
Id. with administrative overheads	IVRDADM	12	43	36	55	21.8
Id. with capital expenditures	IVRDCEXP	21	45	25	66	31.8
Id. with dividends	IVRDDIV	6	28	57	34	17.6
Postponement of planned cash outflows	IVDECPOU	8	44	39	52	15.4
Fixed assets available for sale	IVLIQFA	9	35	47	44	20.5
Others: cheque clearing scheme, etc.	IVOTHERS	-	2	-	2	

<sup>1</sup> "Not applicable" refers to those companies for which the particular resource is not available, or which do not rely upon that resource to meet unexpected financial needs.

<sup>2</sup> N is the number of valid cases.

Table 11.17

Information provided by the inventory of resources

	Number of responses	Percentage of responses	Percentage of cases
. Magnitude of the resources	83	32.6	91.2
. Lead time required to deploy the resources	51	20.0	56.0
. Certainty of availability	62	24.3	68.1
. Conditions of availability	59	23.1	64.8
	-----	-----	-----
Total responses	255	100.0	280.2

N = 91

Table 11.18

Existence of an established criterion for evaluating the adequacy of the resources in the inventory

Variable CRITADQY

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	22	25.0	25.0
. No	66	75.0	100.0
Not determined	5	MISSING	100.0
Not applicable	29	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 88

of the resources is subject to an independent valuation on the part of the finance officer, whereas in most cases it is a rule of thumb that dictates the adequacy of the resources. The most common procedure appears to be to relate the measurement of the resources as a whole, to overall expected (budgeted) requirements plus an adequate margin of safety for contingencies, the latter being arbitrarily fixed. Furthermore, the range of resources included in the inventory is related to the particular type of budgeted requirement and its time span. A similar procedure is the one where the adequacy of the resources is judged against a possible maximum-sized unexpected financial need. Yet another approach consists in setting the appropriate amount of resources as a percentage of total gross capital employed, or as a function of the size of several ratios, such as total debt v. equity, short-term debt v. total debt, unused borrowing facilities v. cash, interest coverage, etc..

The extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of the inventory of resources is presented in Table 11.19. This table is similar to Table 10.7 which deals with the extent of their participation in the discussion of contingency plans. A comparison of the two tables reveals that both the percentage and the median of participation of each senior manager are generally lower in the case of the inventory of resources than in the case of contingency plans. Even so, the (Group) Managing Director stands out again, not only as the senior manager most commonly called on to participate (93 percent), but also as the one whose participation is the most extensive (Mdn=3.0). As to percentage of participation, the (Group) Divisional Directors and the subsidiary company finance officer are next, as in Table 10.7. The subsidiary company Directors, however, change in rank with both the (Group) Marketing Director and the (Group) Production Director. As a whole, operational executives have the lowest levels of participation in the discussion of the inventory of resources. It is also worth noting how far these levels of participation fall short of the corresponding ones in the discussion of contingency plans. Finally, there is an apparent correspondence between the percentage and the median of participation in the discussion of the inventory of resources. The exception to this is the (Group) Production Director. Although called on to



Table 11.19

Extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of the inventory of resources

Senior managers outside the (headquarters) finance department	Variables	Number of companies where:			N <sup>2</sup>	Percentage of participation	Median <sup>3</sup> of participation
		They are called on to participate in the discussion of the inventory of resources	They are not called on to participate in the discussion of the inventory of resources	Not determined/Not applicable			
• (Group) Marketing Director	IVDSCMD	20	24	47	44	45.5	1.750
• (Group) Production Director	IVDSCPD	10	18	63	28	35.7	2.250
• (Group) R & D Director	IVDSCRD	6	17	68	23	8.8	1.500
• (Group) Managing Director	IVDSCMD	78	6	7	84	92.9	3.000
• (Group) Divisional Directors	IVDSCDVD	39	19	33	58	67.2	2.115
• Subsidiary company Directors	IVDSCSD	32	32	27	64	50.0	1.750
• Subsidiary company finance officer	IVDSCSFD	41	23	27	64	64.1	1.885
• Others: Chairman/Group Board/Other Directors	IVDSCOTH	8	-	-	8	100.0	3.250

<sup>1</sup> "Not applicable" refers to those companies where the manager in question is non-existent.

<sup>2</sup> N is the number of valid cases.

<sup>3</sup> The median of participation was calculated on the basis of the ratings provided by firms on a four-point scale (Very little to Very extensively).

participate by only approximately one third of the cases, the extent of his participation in the discussion of the inventory of resources is one of the highest.

A measure of the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources was then developed. The new variable was defined in the same way as its counterpart in the previous chapter and its calculation followed the same path. According to the hypotheses stated in the study (see Chapter 5), tests of association were performed between this variable and major independent characteristics. The tests carried out comprised one-sample chi-square tests of independence, Kendall's and Spearman's rank-order correlation tests. The decision models underlying the tests are described in Exhibits 11.7 through 11.9. The results obtained are summarized in Tables 11.20 and 11.21.

These tables reveal an association between the degree of top management participation in the discussion of the inventory of resources and two independent characteristics - the degree of top management participation in the discussion of contingency plans, and the degree of reliance on the resources of liquidity (Table 11.21). Both associations are established at the two-tailed probability level of 0.001, and both appear to be positive (rho coefficients of 0.64 and 0.42 respectively). This implies that companies with higher degrees of top management participation in the discussion of contingency plans, and companies with greater overall reliance on the resources of liquidity to meet unexpected financial needs, tend to show higher degrees of top management participation in the discussion of the inventory of resources.

In the same way as the former, the degree of top management participation in the discussion of the inventory of resources was also found to be related to the overall unused borrowing capacity of the firm (Table 11.20). The association is established at the two-tailed probability level of 0.014 and appears to be negative (tau=-0.25).

## Exhibit 11.7

Decision model for the one-sample chi-square tests of independence between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources and major independent characteristics

. **NULL HYPOTHESES ( $H_0$ ):**

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources (IVPART) is independent of

- . the industry classification (IC)
- . the evolution of the firm's overall unused borrowing capacity (BORCAPEV)
- . the (group) senior executive in charge of the (headquarters) finance department (HEADFDEP)

. **LEVEL OF SIGNIFICANCE:**

One-tailed probability  $\alpha = 0.05$

. **DECISION CRITERION:**

Reject  $H_0$  if  $\alpha' \leq 0.05$



## Exhibit 11.8

Decision model for the Kendall rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources and major independent characteristics

### . NULL HYPOTHESES ( $H_0$ ):

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources (IVPART) is independent of

- . the number of years for which the cash flow budgeting system has been in operation (CFBTIME)
- . the degree of commitment attached to cash budgets in general (CFBCOMM)
- . the number of years for which contingency planning has been carried out (WFTIME)
- . the age of the firm (COEXIST)
- . the degree of fragmentation in group turnover (PERCSAL)
- . the overall unused borrowing capacity of the firm (BORCAPR)
- . the degree of predictability of company's cash inflows (CIPREDCT)
- . the degree of predictability of company's cash outflows (COPREDCT)
- . the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (TIMECM)

### . LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

### . DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$

## Exhibit 11.9

Decision model for the Spearman rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources and major independent characteristics

### . NULL HYPOTHESES ( $H_0$ ):

The degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources (IVPART) is independent of

- . the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans (WFPART - see Chapter 10)
- . the degree of reliance on the resources of liquidity (RESRELY - see previous section)
- . the degree of complexity of the inventory of resources (IVCOMP)
- . the size of the firm (TURN)
- . the degree of capital intensiveness (FAPEMP)
- . the level of return on investment (ROE)
- . the degree of capital turnover (TURPNA)
- . the amount of financial leverage (GEARNG)
- . the firm's cash position (LAPCA)
- . the proportion of internal cash flow generation (ICFPGR)
- . the proportion of operating cash flow generation (OCFPGR)
- . the proportion of investment in working capital (WCIPGR)
- . the proportion of capital investment (CEXPPB)
- . the size of the (headquarters) finance department (PEOPLE)
- . the extent of formal institutionalization of the cash function in the (headquarters) finance department (TITLE - see Chapter 8)

### . LEVEL OF SIGNIFICANCE:

Two-tailed probability  $\alpha = 0.10$

### . DECISION CRITERION:

Reject  $H_0$  if  $\alpha' \leq 0.10$

Table 11.20

Results obtained from the one-sample chi-square tests of independence and the Kendall rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources and major independent characteristics

Degree of participation of senior managers outside the (HQ) finance department in the discussion of the inventory of resources IVPART	Major independent characteristics											
	CFBTIME	CFBCOMM	WFTIME	IC	COEXIST	PERCSAL	BORCAPR	BORCAPEV	CIPREDCT	COPREDCT	HEADDEP	TIMECH
One-sample $\chi^2$ tests of independence One-tailed probability $\chi^2 =$ $\alpha' =$ $df =$ $N =$				12.47 (0.255) 10 57				0.00 (1.000) 1 53			0.00 (1.000) 1 56	
Kendall rank-order correlation tests Two-tailed probability $\tau =$ $\alpha' =$ $N =$	0.023 (0.838) 48	0.061 (0.573) 57	0.172 (0.228) 34		-0.007 (0.950) 57	0.094 (0.360) 55	-0.254 (0.014) 57		0.048 (0.646) 56	-0.034 (0.751) 56		0.283 (0.009) 56

\*\* One-tailed probability significant at the 0.01 level

Symbols: For the one-sample  $\chi^2$  tests of independence:

$\chi^2$  = chi-square statistic     $df$  = degrees of freedom

$\alpha'$  = level of significance     $N$  = number of valid cases

For the Kendall rank-order correlation tests:

$\tau$  = Kendall rank-order correlation coefficient

$\alpha'$  = level of significance

$N$  = number of valid cases



Table 11.21

Results obtained from the Spearman rank-order correlation tests between the degree of participation of senior managers outside the (headquarters) finance department in the discussion of resources and major independent characteristics

Degree of participation of senior managers outside the (HQ) finance department in the discussion of the inventory of resources IVPART	Major independent characteristics														TITLE
	WFPART	RESRELY	IVCOMP	TURN	FAPEMP	ROE	TURPNA	GEARNG	LAPCA	ICFP6R	OCFP6R	WCIP6R	CEXPP8	PEOPLE	
$r_s = 0.638$	0.416	-0.093	-0.069	-0.044	-0.020	0.082	-0.001	-0.099	-0.102	-0.160	0.078	-0.026	0.006	0.107	
Two-tailed probability $\alpha' = (0.001)^{**}$	$(0.001)^{**}$	$(0.512)$	$(0.613)$	$(0.747)$	$(0.886)$	$(0.549)$	$(0.997)$	$(0.466)$	$(0.453)$	$(0.240)$	$(0.569)$	$(0.850)$	$(0.965)$	$(0.594)$	
N = 40	56	52	56	56	56	56	56	56	56	56	56	56	52	27	

\*\* One-tailed probability significant at the 0.01 level

Symbols:  $r_s$  = Spearman rank-order correlation coefficient

$\alpha'$  = level of significance

N = number of valid cases

A significant relationship was further found between the degree of top management participation in the discussion of the inventory of resources, and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level) (Table 11.20). The association is established at the two-tailed probability level of 0.009, and appears to be positive ( $\tau=0.28$ ).

Finally, the preparation of an inventory of the resources of liquidity at individual company level was analysed. Whereas at parent company level (Table 11.22), the number of firms preparing and not preparing such an inventory is basically the same (50 percent), at subsidiary company level (Table 11.23), the tendency is clearly towards the non-preparation of such an inventory (70 v. 30 percent). Two one-sample chi-square tests of independence carried out between the preparation of an inventory of the resources of liquidity at group level and the preparation of an inventory of the resources of liquidity at individual company level - parent and subsidiary - revealed to be significant (Exhibit 11.10 and Table 11.24). Phi coefficients of 0.47 and 0.25 respectively, imply that the association is much stronger with the parent company than with the subsidiary company. The corresponding contingency tables (Appendix F.3 - Tables F.3.5 and F.3.6) reveal furthermore that the apparently positive direction of the association is also much more clearly established with the former than with the latter.

#### 11.4 The Inventory of Resources as an Indicator of Financial Mobility

Financial mobility is defined as the capacity to redirect the necessary resources to restore funds flow equilibrium. Table 11.25 shows the extent to which the inventory of resources is viewed as an indicator of such a capacity. In 56 percent of the cases, the inventory of resources is more than moderately regarded as an indicator of financial mobility, whereas in almost one third of the companies (29 percent), it is only moderately regarded as such.

Table 11.22

Preparation of an inventory of the resources of liquidity at parent company level

Variable IVPC

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	51	50.5	50.5
. No	50	49.5	100.0
Not determined	14	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 101

Table 11.23

Preparation of an inventory of the resources of liquidity at subsidiary company level

Variable IVSC

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Yes	30	29.7	29.7
. No	71	70.3	100.0
Not determined	14	MISSING	100.0
Not applicable	7	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 101



Exhibit 11.10

Decision model for the one-sample chi-square tests of independence between the preparation of an inventory of the resources of liquidity at group level and the preparation of an inventory of the resources of liquidity at individual company level

<p><b>. NULL HYPOTHESES (<math>H_0</math>):</b>          The preparation of an inventory of the resources of liquidity at group level (IV) is independent of the preparation of an inventory of the resources of liquidity</p> <p>. at parent company level (IVPC)          . at subsidiary company level (IVSC)</p> <p><b>. LEVEL OF SIGNIFICANCE:</b>          One-tailed probability <math>\alpha = 0.05</math></p> <p><b>. DECISION CRITERION:</b>          Reject <math>H_0</math> if <math>\alpha' \leq 0.05</math></p>
---

Table 11.24

Results obtained from the one-sample chi-square tests of independence between the preparation of an inventory of the resources of liquidity at group level and the preparation of an inventory of the resources of liquidity at individual company level

Preparation of an inventory of the resources of liquidity at group level IV	Preparation of an inventory of the resources of liquidity at individual company level	
	IVPC	IVSC
One-tailed prob. $\chi^2 =$	19.53 **	4.77 *
$\alpha' =$	(0.000)	(0.029)
df =	1	1
N =	100	100
Phi =	0.466	0.245

\* One-tailed probability significant at the 0.05 level  
 \*\* One-tailed probability significant at the 0.01 level

Symbols:  $\chi^2$  = chi-square statistic      df = degrees of freedom  
 $\alpha'$  = level of significance      N = number of valid cases

Table 11.25

Extent to which the inventory of resources is viewed as an indicator of financial mobility

Variable IVREAL

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Not at all	4	4.5	4.5
.	10	11.1	15.6
. Moderately	26	28.9	44.5
.	19	21.1	65.6
. Very extensively	31	34.4	100.0
Not determined	3	MISSING	100.0
Not applicable	29	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 90

A comparison on the basis of the median, between the extent to which the inventory of resources and seven other items are viewed as indicators of financial mobility, is presented in Table 11.26. The inventory of resources, together with liquid assets, are viewed as being the most representative of such a capacity. A series of Wilcoxon's matched-pairs signed-ranks tests were performed to determine whether significant differences exist between the inventory of resources and each one of the other items, with regard to the extent to which they are viewed as indicators of financial mobility. The results obtained are significant at the two-tailed probability level of 0.000 in all the seven tests carried out (Table 11.26).

The effectiveness of the inventory of resources in providing for financial mobility at minimum cost is shown in Table 11.27. A small majority of 51 percent regard the inventory of resources as being more than moderately effective, whereas 35 percent regard it as only moderately effective.

Kendall's rank-order correlation tests performed between the effectiveness of the inventory of resources and two major independent characteristics - the degree of complexity of the inventory, and the degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources - did not produce any significant results. Neither did the Kendall rank-order correlation tests performed between the extent to which the inventory of resources is viewed as an indicator of financial mobility and the same independent characteristics. However, an association was found between the effectiveness of the inventory of resources and the extent to which the inventory is viewed as an indicator of financial mobility. The one-sample chi-square test of independence carried out for this purpose is significant at the one-tailed probability level of 0.000. A Cramer V of 0.50 and an uncertainty coefficient of 0.2 suggest that the association is quite strong. The corresponding contingency table (Appendix F.3 - Table F.3.7) suggests, furthermore, that the association is positive. In fact, the majority of firms for which the inventory of resources is moderately or less than moderately viewed as an indicator of financial mobility, regard it as being only moderately or less than moderately effective (93 percent and 65 percent respectively). However, firms



Table 11.26

A comparison between the extent to which the inventory of resources and certain items are viewed as indicators of financial mobility

Items*1	Extent to which they are viewed as indicators of financial mobility (Median)	Two-tailed prob. $\alpha'$ obtained from the Wilcoxon matched-pairs signed-ranks test between the extent to which the inventory of resources and each one of the following items are viewed as indicators of financial mobility
. Inventory of resources	3.763	
. Liquid assets	3.167	(0.000)**
. Liquid assets/Current assets	2.179	(0.000)**
. Quick ratio	1.909	(0.000)**
. Current ratio	1.500	(0.000)**
. Working capital	1.969	(0.000)**
. Working capital/Net assets	1.406	(0.000)**
. Cash flow/Total debt	2.233	(0.000)**

\*\* One-tailed probability significant at the 0.01 level

\* For a definition of these items, see questionnaire - SECTION 3 - Q.12/Q.11.

Table 11.27

Effectiveness of the inventory of resources in providing for financial mobility at minimum cost

Variable IVDISR

	Absolute frequency	Adjusted relative frequency (%)	Cumulative adj. relat. frequency (%)
. Null	4	4.4	4.4
.	9	9.9	14.3
. Moderate	32	35.1	49.4
.	23	25.3	74.7
. High	23	25.3	100.0
Not determined	2	MISSING	100.0
Not applicable	29	MISSING	100.0
	-----	-----	
Total	122	100.0	

N = 91

for which the inventory of resources is more than moderately viewed as an indicator of financial mobility, regard it as being more than moderately effective (72 percent).

### 11.5 Conclusions

Understanding corporate attitudes towards the resources of liquidity is an integral part of the process of understanding the handling of unexpected events. The results of the study allow a characterization of these attitudes. They reveal that the resources of liquidity most extensively relied on to meet unexpected financial needs are those most commonly under the control of the top finance officer, and those under the control of a top executive to whom the (headquarters) finance officer reports directly. The former are mostly uncommitted resources. The latter are modifications of planned cash flows whose deployment appears less likely to require the consensus of operational managers. They also reveal that among the resources of liquidity most extensively relied on to meet unexpected financial needs, preference is given to uncommitted resources over modifications of planned cash flows, except for medium and long-term debt financing capacity. Furthermore, among uncommitted resources, preference is given to instant reserves (precautionary liquid assets and negotiated short-term lines of credit) over those forms of negotiable reserves which involve the least uncertainty as to the timing of their availability and their magnitude (namely, the two short-term debt financing capacities). Overall, these results suggest that two main lines of concern determine corporate reliance on the resources of liquidity: ease of negotiation, and considerations of certainty and predictability of the source of funds. They also lead to the conclusion that the general attitude of companies in response to unexpected financial needs is in line with the type of response which Donaldson [1969b] identified for the typical company as "the strategy of least resistance". This is not surprising, given the fact that most companies appear not to have a formally established rationale for the deployment of resources. Among those companies that have such a rationale, "the strategy of least resistance" appears



to be the approach most frequently adopted.

The results of the study of the role of individual resources in the response to unexpected financial needs are consistent in many instances with Donaldson's [1969b] observations. Precautionary liquid assets and short-term debt financing capacity are the primary defence against the unexpected - a fact to which Donaldson [1969b] also called attention. However, negotiated short-term lines of credit are more commonly relied on to meet unexpected financial needs than are unsecured short-term debt financing capacity and precautionary liquid assets. Secured short-term debt financing capacity is not commonly relied on at all. This is in accordance with what Donaldson [1969b] observed, namely that finance officers were more disposed to rely on the off-the-balance-sheet resource than on the firm's free cash balance, and that borrowing short-term on a specific pledge of assets was viewed as a potential emergency source, but sufficiently distasteful as to be usually eliminated from a defined strategic role. Likewise, Donaldson [1969b] observed that the medium and long-term capital contract did not play an important role in a strategy of mobility, although he noted that the medium and long-term debt contract was looked on with more favour than equity for the purpose of dealing with uncertainty. The use of equity was very uncommon, and companies that used common stock were really forced into it. Equally, the reserve of medium and long-term borrowing power was not commonly relied on, but companies that did, used it moderately, mainly as a means of restoring or increasing other resources of liquidity. Similar results were obtained in the study.

The increase and anticipation of planned cash inflows are common liquidity resources, although they are not extensively relied on to meet unexpected financial needs. This is somewhat inconsistent with Donaldson's [1969b] observation that the option of modifying the inflow stream appeared relatively rare and inconsequential.

The release of committed resources through postponement of planned cash outflows is moderately relied on by firms in general. On the other hand, as far as curtailment of planned operating cash outflows is concerned, only the reduction of administrative overheads is commonly resorted to. This is in accord with what the literature



(see 3.3.3.2) suggests - that volume-related and strategic-related outflows afford little or no room for discretionary modification, while scale-related outflows can play a significant role as a source of liquidity. The fact that outflows associated with the marketing plan were not found to be an important source of liquidity among companies, raises several arguable explanations: either these outflows are more strategic-related than theory considers them to be; or, being scale-related, their relationship with prospective sales and earnings is so vague that management refuses to curtail them because of the consequences this may have on the firm's returns; or, possibly (and this also applies to outflows associated with the production plan and the R & D plan), their curtailment faces considerable resistance from the corresponding management who sees its plan under scrutiny. Similar reasons may explain the fact that the release of committed resources through curtailment of planned operating cash outflows does not markedly change in rank when median of reliance is the criterion. An exception arises here in terms of the outflows associated with the production plan. Companies that resort to curtailment of these outflows to meet unexpected financial needs, do it moderately. This may be due to the fact that these companies are firms with sizeable scale-related outflows in the production area, or firms experiencing a steady decline in sales volume and, therefore, resorting to curtailment of volume-related outflows. Or again, it may be due to the fact that these companies are simply firms where buffer stocks of inventories have been accumulated. In the face of cash flow deficits, the bargaining power of the finance officer may be strong enough to demand a slow down of production. By virtue of the number of companies participating in the study that specify the sale of inventory stocks, the latter appears to be a plausible explanation.

To the extent that capital expenditures are strategic-related, the curtailment of outflows associated with them should not be a primary resource of liquidity, since on most occasions it would imply technical insolvency. The study shows no support for such an argument. It could therefore be that either capital expenditures do not correspond closely to the implementation of strategic decisions (as Donaldson [1969b] implies) or that the corporate objectives and strategies served by these expenditures are quickly subject to revision or postponement in the face of unexpected financial needs.



The latter would be consistent with the finding of the study that the revision or postponement of corporate strategies and objectives appears to be a commonly and extensively accepted procedure for meeting unexpected financial needs. The study further shows that the curtailment of dividends is seldom used as a resource of liquidity. This is consistent with another finding, namely that the violation of company dividend policy appears to be poorly accepted as a means of responding to unexpected financial needs. Compared to this, a larger number of firms appear to be more willing to accept the violation of company debt policy. Overall, these results contradict the evidence presented by Donaldson [1969b]. He observed that financial policy on such issues as debt and dividend was constantly interacting with the company's strategy of mobility. In particular, he found a surprising degree of willingness among companies to cut back the dividend when the cash flow situation deteriorated.

Finally, the liquidation of fixed assets available for sale does not play any significant role in the response to unexpected financial needs. Reference to Donaldson's [1969b] study indicates that the result above is in accordance with the view of the majority of managers about the sale of assets - namely, that it could not and should not be a significant part of a strategy of financial mobility.

In global terms, the degree of reliance on the resources of liquidity is associated, as hypothesized, with the degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans, and with a particular financial profile of the company. Tests of association conducted in the study reveal that firms with greater top management participation in the discussion of contingency plans appear to exhibit a greater overall reliance on liquidity resources. This result accords with what the literature (see 4.3.4.1 - last comments) suggests - that the greater the participation, the greater the general awareness on the part of top management of the issue of managing liquidity, and therefore, the greater the likelihood of a corporate approach to the problem of unexpected events and to liquidity resources. Since the participation appears to be higher in companies with lower levels of overall unused borrowing capacity (see Chapter 10), it is not surprising that where reserves of external



borrowing power are squeezed, the degree of reliance on the resources of liquidity appears higher as well. Meanwhile, the same tests of association reveal that a greater overall reliance on the resources of liquidity appears to exist in firms with lower levels of return on investment, higher levels of gearing, smaller relative capacity to generate cash internally and from operations, lower levels of internal instant reserves, and a lower degree of predictability of cash inflows. Also, firms whose overall unused borrowing capacity has decreased or shown high instability, appear to have a higher degree of reliance on the resources of liquidity. In short, except for the firm's cash position and the evolution of the firm's overall unused borrowing capacity, the same financial scenario that appears to dictate the implementation of reactive contingency planning (see Chapter 10), also appears to affect the degree of reliance on the resources of liquidity. The apparently positive association found in the study between the latter and the former is therefore not surprising. By suggesting the link between the degree of reliance on the resources of liquidity and a bad financial profile on the part of the company, the study adds further support to Donaldson's [1969b] argument.

Furthermore, it is concluded that the extent to which firms are willing to accept technical insolvency by undertaking certain procedures as a means of responding to unexpected financial needs, is associated as hypothesized with certain financial characteristics of the firm. Again the study strengthens Donaldson's [1969b] argument. In effect, the results of tests of association performed in the study show that companies with lower levels of return on investment, higher levels of gearing and a smaller relative capacity to generate cash internally and from operations, appear to be more receptive to the use of each one of the procedures in question. Such characteristics make up the same financial scenario that appears to be behind the implementation of reactive contingency planning and the degree of reliance on the resources of liquidity. Other financial characteristics of the firm were also found to be associated with the degree of acceptance of such procedures. Among these characteristics, the amount of earnings per share is particularly relevant. Companies, where earnings per share are smaller, appear generally prone to accepting every procedure, although they show a

certain preference for the revision or postponement of corporate objectives and strategies, and for the violation of company dividend policy. As for the latter, the results of the study corroborate Donaldson's [1969b] observation that in most cases, a deterioration of earnings needs to precede the reduction in dividend payments in order to justify the action.

The preparation of an inventory of the resources of liquidity appears to be a common practice, given the vast majority of sample firms (76 percent) that carry out such an inventory at group level. Among the 24 percent that do not, the preparation of an inventory of the resources of liquidity is mainly regarded as an unnecessary exercise: either because the company is involved in a low risk type of business, seldom exposed to major unexpected financial needs or because the company holds substantial resources to meet any eventuality. In these circumstances, it would not be surprising if the preparation of an inventory of resources was found to be apparently associated with environmental instability, and a low financial capacity on the part of the company. However, except for the association with a certain relative instability in the environment reflected by the degree of predictability of company's cash inflows, no association with a particular financial profile of the company was obtained. On the other hand, the preparation of an inventory of the resources of liquidity was found to be positively associated with the implementation of reactive contingency planning. It is concluded, therefore, that the implementation of such a technique as the preparation of an inventory of resources appears to be dictated by the development of a certain expertise in planning for unexpected events and by a certain relative instability in the environment, rather than by the occurrence of a set of financial conditions in the firm. The preparation of an inventory of resources was still found to be related to the percentage of (headquarters) finance department's time devoted to the management of cash (at group level). The relationship appears to be positive.

For the typical company in the sample, the inventory of resources and the cash flow budget are simultaneous. Furthermore, the inventory of resources is prepared for a maximum period of six to 12 months.



The resources of liquidity which companies tend most extensively to rely on to meet unexpected financial needs - i.e. precautionary liquid assets, negotiated short-term lines of credit, and unsecured short-term debt financing capacity - are also those most commonly included in the inventory of resources. This result is consistent with the generally low degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources. Tests of association carried out in the study, reveal that the degree of top management participation in the discussion of the inventory of resources is associated with both their degree of participation in the discussion of contingency plans and the degree of reliance on the resources of liquidity. An association was also found with the overall unused borrowing capacity of the firm. Top management participation in the discussion of contingency plans and the inventory of resources is apparently higher in companies where the availability of external funds is smaller. Hence the apparently positive association between the two degrees of participation. Furthermore, companies with greater top management participation in the discussion of the inventory of resources, appear to show a greater overall reliance on liquidity resources. Yet no association was found in the study between the degree of top management participation in the discussion of the inventory of resources and the degree of complexity of the inventory.

The identification of the resources of liquidity in the inventory is accompanied in most cases by information concerning their magnitude, certainty and conditions of availability. It is accompanied less commonly by information concerning the lead time required to deploy those resources. Finally, most firms (75 percent) were found to have no established criterion for evaluating the adequacy of the resources in the inventory (both in total amount and in distribution among specific resources). Of the remaining 25 percent, only two relate the adequacy of the resources in the inventory to pre-defined contingency scenarios. In all the rest, it is a rule of thumb that dictates the adequacy of the resources.

Overall, the results above lead to the conclusion that in practice, the inventory of resources fails most of the time to perform the function that theory attributes to it, namely to reveal situations



of possible excess or deficiency in the overall resource position, and to identify gaps in the range of alternatives open to management (see 4.3.4.1). Such results also lead to the conclusion that the evaluation of the adequacy of the resources in the inventory, both in total amount and in distribution among resources, is wholly independent of the preparation of specific proactive contingency plans. Generally, no established criterion for evaluating the adequacy of the resources exists; alternatively, such a criterion is established on an arbitrary basis. In this case, no mention tends to be made that the inventory provides a wide range of resources in terms of speed and certainty of reallocation, as theory suggests (see 4.3.4.1).

Despite these findings, a clear majority of 56 percent view the inventory of resources as more than a moderate indicator of financial mobility. Moreover, the inventory appears to be viewed as more representative of such a capacity than any other item. Interestingly, no association was found between the degree of complexity of the inventory and the extent to which it is viewed as an indicator of financial mobility. It appears, therefore, that many financial managers are adapted to a situation in which the corporate approach to the provision of financial mobility is mostly restricted to passive resources.

As to the effectiveness of the inventory of resources in providing for financial mobility at minimum cost, most cases (51 percent) perceive it as being more than moderately effective. An apparently positive association was found between the extent to which the inventory of resources is viewed as an indicator of financial mobility and its effectiveness. This leads to the further conclusion that many financial managers appear to have little awareness of the opportunity cost of holding reserves of unused capital, both internal and external. In this respect, the study tends to agree with Donaldson's [1969b].

## Chapter 12 FINAL CONCLUSIONS AND MAJOR IMPLICATIONS OF THE STUDY

12.1 Introduction

12.2 The Evidence from the Study

12.3 Limitations of the Study

12.4 Expected Contributions and Suggestions for Further Research

### 12.1 Introduction

The main purpose of this chapter is to report the final conclusions and major implications of the study. The evidence presented in Section 12.2 is the result of bringing together the several conclusions contained in the last three chapters, and organizing them into a coherent and rational structure. In Section 12.3, the limitations of the study are outlined. The expected contributions of the study, both theoretical and practical, are contained in Section 12.4 which also presents some suggestions for further research on the subject.

### 12.2 The Evidence from the Study

Unexpected events which have major negative implications for the expected funds flow equilibrium of the firm require financial mobility on the part of the company - i.e. the capacity to redirect the necessary resources to restore balance in funds flow within the limits of technical solvency and with an acceptable risk exposure. Providing for financial mobility at minimum cost should be the objective of liquidity management. If this is to fulfil its objective, it should include two other basic activities besides cash flow planning: implementation of early warning systems and resource planning for financial mobility. In this context, the objective of the study was to discover the kind of liquidity management being implemented in practice, and the relationship between specific liquidity management practices and particular characteristics of the firm, and of its (headquarters) finance department.



The results of the study and the intermediate conclusions drawn from them, elicit six final conclusions on the subject.

The first is that companies which lack experience of negative financial surprises pay little attention to liquidity management. In effect, environmental turbulence appears to be decisive for the implementation of some liquidity management practices (e.g. cash flow budget revisions, cash flow updates or forecasts, preparation of an inventory of the resources of liquidity, etc.). Yet it is only when conditions of relative instability in the environment coincide with a significantly bad financial profile on the part of the company, that more attention is apparently paid to liquidity management. This translates itself in terms of the implementation of more sophisticated liquidity management practices (e.g. contingency planning) as well as in terms of a more complex type of response to unexpected financial needs (e.g. a greater overall reliance on the resources of liquidity, and a greater willingness to accept technical insolvency by undertaking certain procedures as a means of responding to such needs). Lower levels of return on investment, higher levels of gearing, a smaller relative capacity to generate cash internally and from operations make up the financial scenario in question. In this respect, the study provides a more thorough conclusion than Donaldson's [1969b]. It goes further still by showing that the preparation of cash flow updates or forecasts also appears to be a common practice in companies prone to systematic positive deviations from expected cash flows. However, while in companies such as these, cash flow updates or forecasts are geared to the investment of surplus funds on the money market, in companies prone to negative deviations from expected cash flows, updates or forecasts are geared to the control of such deviations.

The second final conclusion is that certain characteristics of the (headquarters) finance department are associated with the implementation of liquidity management practices, namely the size of the department, the extent of formal institutionalization of the cash function, and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level). This is a byproduct of the former conclusion. Since companies where liquidity management practices are implemented tend to be in risky environments,



(headquarters) finance departments devoting more time to the management of cash (at group level) are likely to predominate. Furthermore, since companies which employ more sophisticated liquidity management practices (e.g. contingency planning) are also the firms for which cash is apparently a problem area, it is not surprising to find they tend to have larger (headquarters) finance departments with a more formally institutionalized cash function. In this regard, the study corroborates and goes further than other studies [Donaldson, 1969b; Linneman and Klein, 1979].

The third final conclusion is that the kind of liquidity management being practised is mostly ex-post in nature, i.e. crisis-initiated. As far as the implementation of early warning systems is concerned, companies frequently appear to resort to traditional methods in the short-term. A similar observation is reported by Donaldson [1969b]. Interestingly, it appears that traditional early warning systems, contrary to what the literature seems to imply, are not used interchangeably since they serve different purposes while handling the uncertainty underlying the short-term cash flow planning process. Companies also frequently appear to resort in the short-term to contingency planning. This conflicts with Donaldson's [1969b] findings. The existence of a budgetary system, and therefore the commitment to a goal, does not appear to operate as a deterrent to contingency planning, contrary to what Donaldson [1969b] found. Most of this planning, however, is reactive in nature. In effect, the study shows that all firms that carry out some form of contingency planning implement contingency planning identified as reactive. Out of these, only some implement proactive contingency planning. Firms that carry out this more sophisticated form of contingency planning appear to be larger and to experience greater environmental uncertainty. Similar conclusions are found in Jones [1986]. As far as resource planning for financial mobility is concerned, the preparation of an inventory of the resources of liquidity appears to be a common practice. However, the low degree of complexity (defined in terms both of the number and type of resources included) which apparently characterizes most inventories, as well as the virtual absence of a formally established rationale for the deployment of resources, suggests that the response to unexpected financial needs is mostly formulated only in the face of such needs.



The fourth final conclusion is that quite an elementary kind of liquidity management is being practised, despite the fact that companies appear to have considerable experience in planning for the unexpected. This proceeds from the essentially ex-post character of liquidity management and also, from the characteristics of the liquidity management practices being implemented. For instance, with respect to contingency planning in general, sensitivity analysis both at the level of the cash flow implications of unexpected events and at the strategic level of response appears to be considerably restricted, and to be conducted only in very broad terms. The fact that few firms make use of a computer simulation model for the purpose may contribute to this. With respect to the inventory of resources, its composition is generally basic, commonly being limited to the inclusion of those resources whose availability (in terms of timing and magnitude) is certain or most readily estimated. Information on the magnitude, certainty and conditions of availability of these resources is commonly provided, but not so commonly on the lead time required to deploy them. In these circumstances, the inventory of resources must inevitably fail in practice to perform the function that theory attributes to it, namely to reveal situations of possible excess or deficiency in the overall resource position, and to identify gaps in the range of alternatives open to management. The evaluation of the adequacy of the resources in the inventory, both in total amount and in distribution among resources, is furthermore wholly independent of the preparation of specific proactive contingency plans. Generally, no established criterion for evaluating the adequacy of the resources exists. Alternatively, such a criterion is established on an arbitrary basis. Overall, the study accords with Jones' [1986] conclusion that company financial planning practices in the U.K. are largely unsophisticated, basic and simple.

The fifth final conclusion is that liquidity management is formally carried out in the company but it is not a corporate affair. The generally low degree of top management participation in the discussion of both contingency plans and the inventory of resources supports this conclusion. Thus, the isolation of liquidity management in the organizational structure of the firm occurs at a different level from that identified by Donaldson [1969b]. The



latter observed that, with the exception of traditional early warning systems, all other liquidity management practices when carried out were at best undertaken "underground" by the finance officer. In contrast, the study suggests that liquidity management is formally accepted in the firm but remains very much an affair of the (headquarters) finance department so as to cause the least disturbance to other sections of the firm. This is reflected in the type of response to unexpected financial needs. In effect, the study shows that this response is mostly based upon those resources of liquidity most commonly under the control of the top finance officer, and those under the control of a top executive to whom the (headquarters) finance officer reports directly. The former are mostly uncommitted resources. The latter are modifications of planned cash flows whose deployment appears less likely to require the consensus of operational managers. The study further suggests that the general attitude of companies in response to unexpected financial needs is in line with the type of response which Donaldson [1969b] identified for the typical company as "the strategy of least resistance". Ease of negotiation, and considerations of certainty and predictability of the source of funds appear to dictate the essence of the response to the unexpected. The restriction of liquidity management to the capacity of the (headquarters) finance department is also reflected in the simplicity of the liquidity management practices implemented, for which it is certainly responsible to a large extent.

Interestingly, top management participation in the discussion of contingency plans and the inventory of resources is apparently higher in companies where the availability of external funds is smaller. It appears, therefore, that only where reserves of external borrowing power are squeezed, and the ability of the (headquarters) finance department to meet unexpected financial needs is substantially reduced, does the bargaining power of the finance officer become sufficient to guarantee a more extensive participation of top management in the discussion of liquidity matters. It is not surprising that these companies appear to exhibit a greater overall reliance on liquidity resources, since as the literature suggests, the latter is apparently associated with a higher degree of top management participation. However this does not appear to influence the degree of complexity of the inventory of resources. It can therefore be



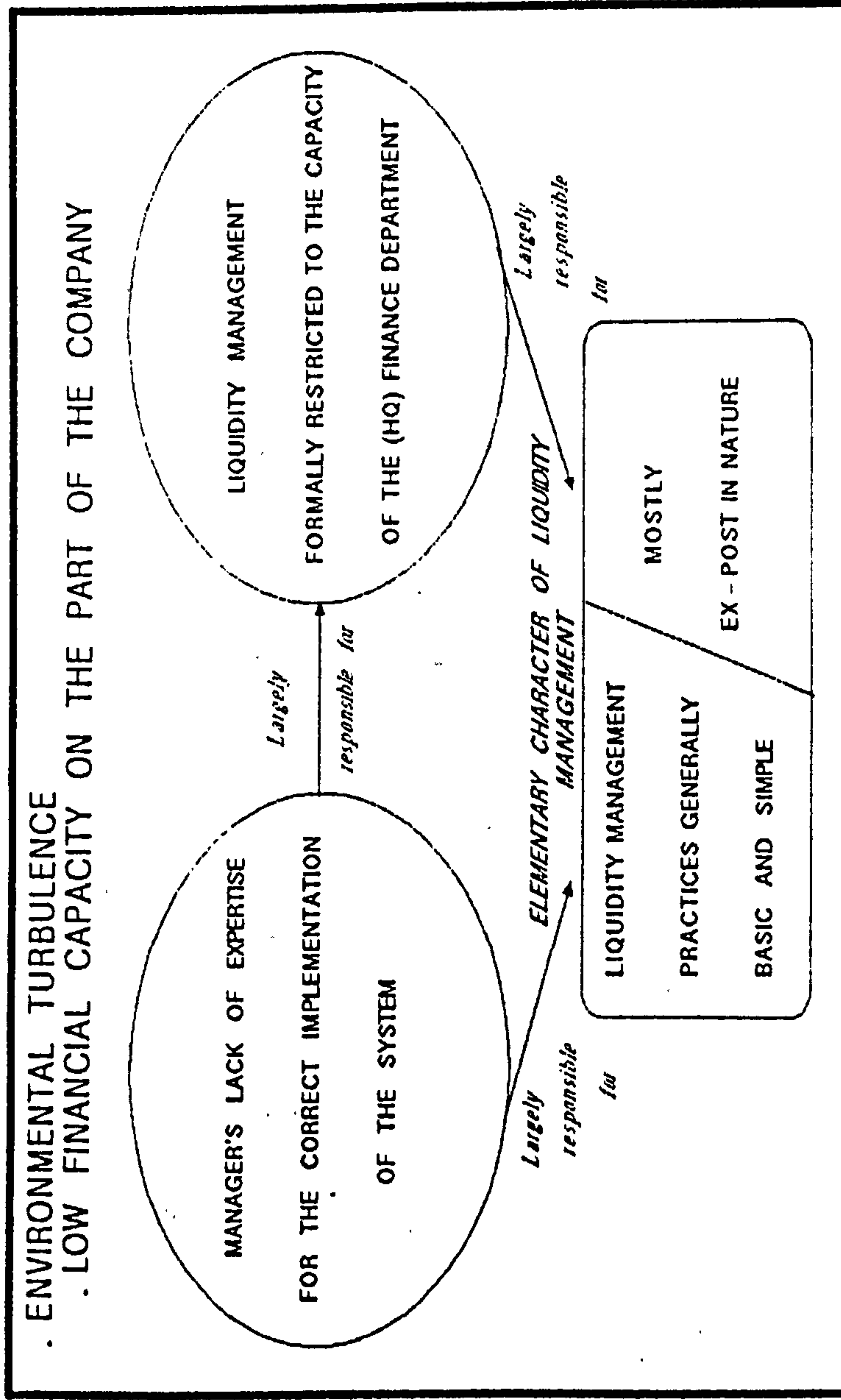
inferred that if senior managers are involved at all in liquidity management, it tends to be only when confronted with the unexpected. A priori liquidity management practices (proactive contingency planning and resource planning for financial mobility) appear to be left exclusively to the responsibility of the (headquarters) finance officer.

The sixth final conclusion is that financial managers not only appear to be content with the kind of liquidity management being practised, but also to lack the expertise for the correct implementation of the system. The results of the study show that many financial managers view the inventory of resources as more than a moderate indicator of financial mobility, despite its limitations. This suggests their adaptation to a situation in which the approach to the provision of financial mobility is mostly restricted to passive resources. The results also show that many financial managers regard ex-post early warning systems as being more than moderately effective in handling uncertainty, and as clearly providing earlier recognition and faster response to events. This suggests their adaptation to a situation in which the approach to the provision of financial mobility is mostly based upon elementary liquidity management practices. On the other hand, the results of the study reveal that many financial managers view a priori liquidity management practices as more than moderately effective in providing for financial mobility at minimum cost, despite their very basic characteristics. This suggests that managers may have little understanding of these methods and their purpose. This lack of background preparation may be largely responsible also for the simplicity which generally characterizes liquidity management practices, as well as for the low acceptance of liquidity management as a top executive group responsibility.

Exhibit 12.1 presents the suggested links between the final conclusions of the study. Overall, this is indicative of liquidity management as a generally "irregular" system in the context of the conceptual typology of environmental scanning and forecasting systems developed by Fahey et al. [1981]. In a few cases only does liquidity management appear at best to approach what these authors identify as a "periodic" system. The generalized movement in this

Exhibit 12.1

Suggested links between the final conclusions of the study





direction, and subsequently towards a "continuous" model, is predicted in Fahey et al. [1981]. At the level of the individual firm, this evolution is likely to occur but not without interruptions. In fact, as Kudla [1978] suggests, the planning process appears to be constantly evolving and cyclical. Strategic planning activity expands during adversity and contracts when economic conditions are favourable.

In the meantime, the major implications of the study can be drawn from Exhibit 12.1. The first is that liquidity management, as it is currently most commonly practised, cannot achieve its objective of providing for financial mobility at minimum cost. The second is that in order to reach a higher level of liquidity management, management education is in urgent need of improvement. Finance officers will have to learn liquidity management practices and objectives, to gain experience with the techniques, and to develop skill and confidence in their bargaining ability. In addition, other managers will need to gain awareness of the importance of liquidity management, and to recognize its principles and function.

### 12.3 Limitations of the Study

Most of the study limitations proceed from the research methodology adopted. Firstly, the manner in which research questions were posed, meant that the study had to be restricted to the analysis of observed relationships at a particular moment in time. Therefore, inferences regarding the sequential response of companies to unexpected events could not be drawn. Secondly, the use of survey analysis as the research strategy of the study, meant that the latter could never go beyond the reporting of distributions and relationships, to their interpretation. Therefore, the possibility of making causal inferences was denied to the study. Thirdly, the use of a questionnaire as the main data collection method, meant that the content of the research would have to be kept at a general level. In-depth analysis could never be undertaken. Finally, the use of averages rather than tendencies to describe the financial and non-

financial profile of the companies participating in the study gave the latter an essentially static character. Therefore, a complete view of the picture associated with the implementation of particular liquidity management practices could not be achieved by the study.

A limitation which does not proceed from the research methodology adopted is one which concerns the lack of representativeness of the sample with regard to some of the selected characteristics of the firm and of the (headquarters) finance department - such as the age of the firm, the degree of capital intensiveness, and the (group) senior executive in charge of the (headquarters) finance department. The small dispersion of the sample with respect to these characteristics may explain their poor contribution to the results of the study.

#### 12.4 Expected Contributions and Suggestions for Further Research

The expected contributions of the study are of both a theoretical and a practical nature.

On the one hand, it is hoped that the study may contribute to normative theory in the field of liquidity management. The search for a research subject was the decisive factor in the identification of the business problem which is at the core of the investigation. The attempt to devise a rational solution to this problem and a related, robust implementation methodology, in every respect consistent with the principles of normative finance theory, led to the development of a new piece of integrated theory in the area. Such a conceptual construction was the result of an effort by the author to consolidate and integrate a few scattered pieces of theoretical research already available in the field. By so doing, the author hopes that a contribution may also be made towards a better understanding of the several meanings of liquidity.



On the other hand, it is expected that the study will contribute to a greater awareness on the part of professionals and management educators, of the state of the art in the practice of liquidity management in the U.K.. It is further expected that recognition of the significant differences between theory and practice suggested by the study, will not only challenge the level at which companies practice liquidity management but also lead to a more extensive inclusion of the subject in the programmes of corporate finance courses, both at undergraduate and postgraduate level. Companies need to make urgent changes in their approach to liquidity management. Similarly, there is an urgent need to promote the teaching of the ideas upon which liquidity management theory is based. In effect, the correct and successful implementation of liquidity management depends on its acceptance and understanding by the entire top management team, from the Board of Directors to the Chief Executive and the whole senior management line. For this to be possible, managers will need to be educated to think more broadly and to develop the sort of mental flexibility that uncertainty, and especially the unexpected, require. The trend has to be towards a more conscious approach to the problem of unexpected change, a greater willingness to treat it in a systematic and co-ordinated fashion, and a more participative style of management.

Finally, given the study's attempt to generalize observed relationships in practice, it is hoped that it will make some contribution to the development of positive theory. Yet, if further theoretical progress is to be made, more empirical research is needed on the subject. In particular, advances need to be made in the direction of a deeper and more thorough understanding of the matter. This can only be achieved through in-depth analysis of the liquidity management process in practice. At this level, there is considerable scope for further research. The process of scenario development and analysis, the process of sequential response to the unexpected, given different company circumstances or financial needs of different visibility, and the behavioural aspects surrounding the implementation of liquidity management practices are a few of the topics which await serious investigation. Such research is likely to produce a significant and relevant contribution to knowledge.



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## APPENDICES

- Appendix A List of Characteristics Selected in the Study
- Appendix B Questionnaire and Covering Letters
- Appendix C Elements of the Archival Analysis
- Appendix D Preparation of the Data Matrix
- Appendix E Statistical Techniques
- Appendix F Contingency Tables

**Appendix A List of Characteristics Selected in the Study**

**A.1 Characteristics of liquidity management**

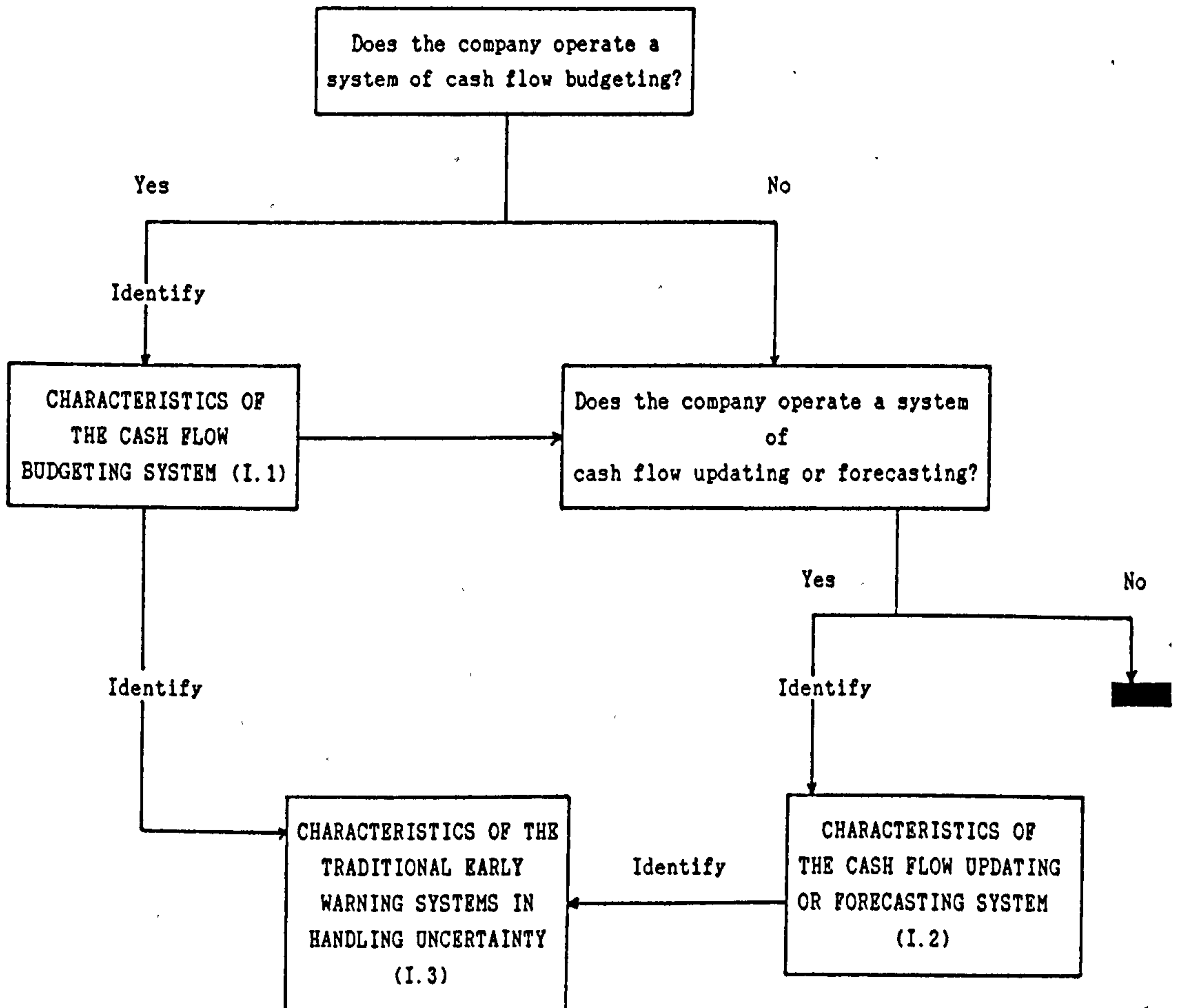
**A.2 Characteristics of the firm**

**A.3 Characteristics of the (headquarters) finance department**



## A.1 Characteristics of liquidity management

I. Short-Term Cash Flow Planning Systems



## I.1 Characteristics of the cash flow budgeting system

- (1) \* Number of years for which the cash flow budgeting system has been in operation
- \* Objectives set for the cash flow budgeting system
  - \* Degree of commitment attached to cash budgets in general
  - \* Period of time covered by the cash flow budget
  - \* Interval of division used in each of the stages over the period of time covered by the cash flow budget:
    - \* up to first month
    - \* between first and third month, or up to third month
    - \* between third and sixth month, or up to sixth month
    - \* between sixth and twelfth month, or up to first year
    - \* after first year
  - \* Character of the cash flow budget revisions
  - \* Frequency of the cash flow budget revisions
  - \* Nature of the cash flow budget revisions
  - \* Timing of roll-over preparation
- (2) \*\* Periodicity of cash flow budget revision

## I.2 Characteristics of the cash flow updating or forecasting system

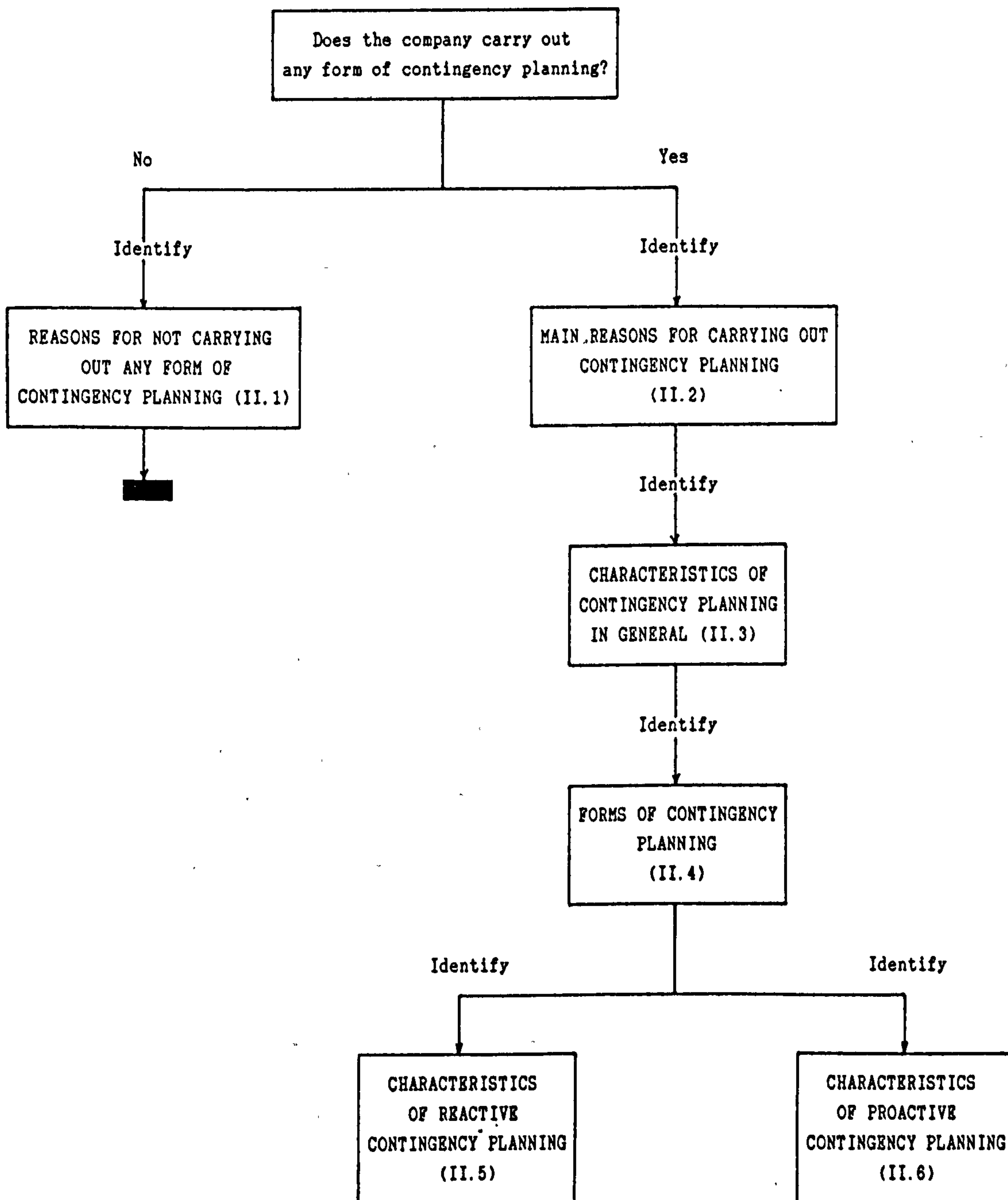
- \* Number of years for which the cash flow updating or forecasting system has been in operation
- \* Objectives set for the cash flow updating or forecasting system
- \* Degree of commitment attached to cash flow updates or forecasts
- \* Character of the cash flow updates or forecasts
- \* Frequency of the cash flow updates or forecasts
- \* Nature of the period of time covered by the cash flow updates or forecasts
- \* Period of time covered by the cash flow updates or forecasts
- \* Number of planning processes operated over the period of time covered by the cash flow updates or forecasts
- \* Main reasons for the preparation of cash flow updates or forecasts



I.3 Characteristics of the traditional early warning systems in handling uncertainty

- \* Effectiveness of the traditional early warning systems:
  - \* cash flow budget revisions, and
  - \* cash flow updates or forecastsin handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm
- \* Effectiveness of the traditional early warning systems:
  - \* cash flow budget revisions, and
  - \* cash flow updates or forecastsin handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm
- \* Advantages generally gained from the preparation of cash flow updates or forecasts

II. Contingency Planning



- II.1 Reasons for not carrying out any form of contingency planning
- II.2 Main reasons for carrying out contingency planning
- II.3 Characteristics of contingency planning in general
- \* Who in the company took the initiative to carry out contingency planning
  - \* Number of years for which contingency planning has been carried out
  - \* Use of a computer simulation model in carrying out contingency planning
  - \* Extent to which senior managers outside the (headquarters) finance department:
    - \* (Group) Marketing Director
    - \* (Group) Production Director
    - \* (Group) R & D Director
    - \* (Group) Managing Director
    - \* (Group) Divisional Directors
    - \* Subsidiary company Directors
    - \* Subsidiary company finance officer
    - \* Others
 are called on to participate in the discussion of contingency plans
  - \*\* Degree of participation of senior managers outside the (headquarters) finance department in the discussion of contingency plans
  - \* Advantages generally gained from the preparation of contingency plans
  - \* Implementation of contingency planning at individual company level:
    - \* at parent company level
    - \* at subsidiary company level
- II.4 Forms of contingency planning



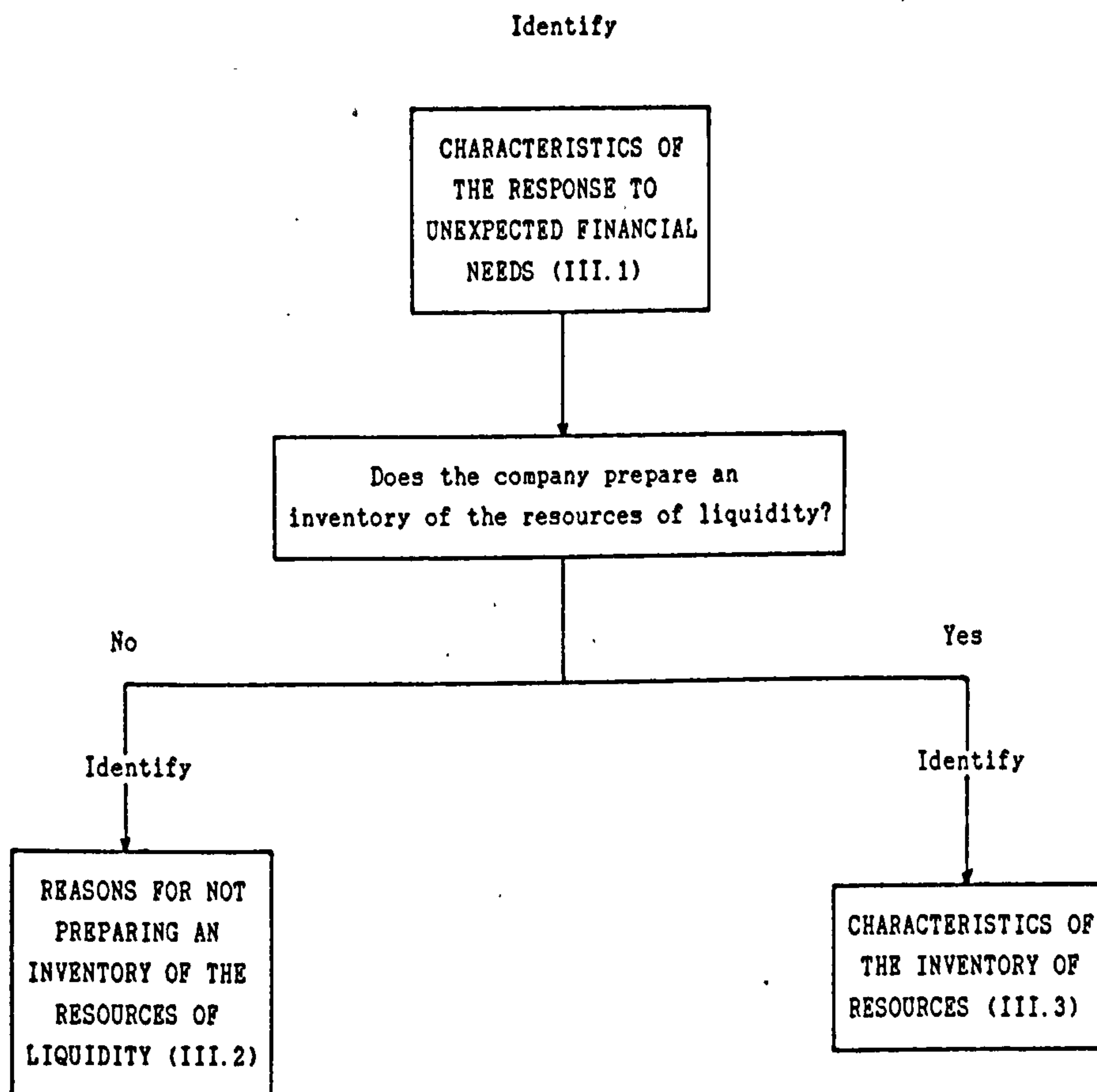
## II.5 Characteristics of reactive contingency planning

- \* Types of unexpected event leading to reactive contingency planning
- \* Effectiveness of reactive contingency planning in handling:
  - \* unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm, and
  - \* unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm
- \* When the case, reasons for not carrying out proactive contingency planning

## II.6 Characteristics of proactive contingency planning

- \* Cash flow plans at the level of which proactive contingency planning is carried out
- \*\* Number of types of cash flow plan at the level of which proactive contingency planning is carried out
- \* People in the company to whom:
  - \* proactive contingency plans, and
  - \* the cash flow plans to which they apply are communicated
- \* Range of alternative values tested on the variables involved in the sensitivity analysis
- \* Development of a strategy of response on the part of the company
- \* Effectiveness of proactive contingency planning in providing for financial mobility at minimum cost
- \* When the case, main reasons for not carrying out reactive contingency planning

## III. Resource Planning for Financial Mobility



## III.1 Characteristics of the response to unexpected financial needs

- \* Extent to which companies rely on the resources of liquidity:
  - \* precautionary liquid asset balance
  - \* negotiated short-term lines of credit
  - \* unsecured short-term debt financing capacity
  - \* secured short-term debt financing capacity
  - \* medium and long-term debt financing capacity
  - \* equity financing capacity
  - \* curtailment of planned cash outflows associated with the production plan
  - \* curtailment of planned cash outflows associated with the marketing plan
  - \* curtailment of planned cash outflows associated with the R & D plan
  - \* curtailment of planned cash outflows associated with administrative overheads
  - \* curtailment of planned cash outflows associated with capital expenditures
  - \* curtailment of planned cash outflows associated with dividends
  - \* postponement of planned cash outflows
  - \* new additions to planned cash inflows
  - \* anticipation of planned cash inflows
  - \* fixed assets available for sale
  - \* others
- to meet unexpected financial needs
- \* Manager in control of the resources of liquidity:
  - \* Idem as above
- \*\* Degree of reliance on the resources of liquidity
  - \* Existence of a rationale for the deployment of resources
  - \* Extent to which companies accept certain procedures:
    - \* revision or postponement of corporate objectives
    - \* revision or postponement of corporate strategies
    - \* violation of company dividend policy
    - \* violation of company debt policy
- as a means of responding to unexpected financial needs

## III.2 Reasons for not preparing an inventory of the resources of liquidity



## III.3 Characteristics of the inventory of resources

- \* Period of time covered by the inventory of resources
- \* Time of preparation of the inventory of resources
- \* Resources of liquidity included in the inventory
- \*\* Degree of complexity of the inventory of resources
- \* Information provided by the inventory of resources
- \* Existence of an established criterion for evaluating the adequacy of the resources in the inventory
- \* Extent to which senior managers outside the (headquarters) finance department:
  - \* (Group) Marketing Director
  - \* (Group) Production Director
  - \* (Group) R & D Director
  - \* (Group) Managing Director
  - \* (Group) Divisional Directors
  - \* Subsidiary company Directors
  - \* Subsidiary company finance officer
  - \* Others
 are called on to participate in the discussion of the inventory of resources
- \*\* Degree of participation of senior managers outside the (headquarters) finance department in the discussion of the inventory of resources
- \* Preparation of an inventory of the resources of liquidity at individual company level:
  - \* at parent company level
  - \* at subsidiary company level
- \* Extent to which
  - \* the inventory of resources, and
  - \* certain items:
    - \* liquid assets
    - \* liquid assets/current assets
    - \* quick ratio
    - \* current ratio
    - \* working capital
    - \* working capital/net assets
    - \* cash flow/total debt
    - \* others
 are viewed as indicators of financial mobility
- \* Effectiveness of the inventory of resources in providing for financial mobility at minimum cost

Footnotes

- (1) Information on one-star characteristics was collected in the study through the questionnaire.
- (2) Information on two-star characteristics was obtained in the study working from the information collected on the one-star characteristics.

## A.2 Characteristics of the firm



Non-financial characteristics

- (1) Industry classification
- (2) \*\*\* Size of the firm
- \*\*\* Degree of capital intensiveness
  - \* Age of the firm
  - Organization into group structure
  - \* Role of company headquarters
  - \* Degree of fragmentation in group turnover

Financial characteristics

- \*\*\* Level of return on investment
- \*\*\* Degree of capital turnover
- \*\*\* Amount of financial leverage
- \*\*\* Firm's cash position
- \*\*\* Proportion of internal cash flow generation
- \*\*\* Proportion of operating cash flow generation
- \*\*\* Proportion of investment in working capital
- \*\*\* Proportion of capital investment
- \*\*\* Degree of interest coverage
- \*\*\* Degree of dividend coverage
- \*\*\* Amount of earnings per share
  - \* Overall unused borrowing capacity of the firm
  - \* Evolution of the firm's overall unused borrowing capacity
  - \* Degree of predictability of company's cash inflows
  - \* Degree of predictability of company's cash outflows

Footnotes

- (1) Information on no-star characteristics was already available in the study.
- (2) Information on three-star characteristics was collected in the study from sample companies' financial reports.

### A.3 Characteristics of the (headquarters) finance department



- \* Size of the (headquarters) finance department
- \* (Group) senior executive in charge of the (headquarters) finance department
- \* Title categories associated or potentially associated with cash management in the (headquarters) finance department
- \*\* Extent of formal institutionalization of the cash function in the (headquarters) finance department
- \* Character of cash management carried out in the group
- \* Percentage of (headquarters) finance department's time devoted to the management of cash (at group level)

## Appendix B Questionnaire and Covering Letters

- B.1 Questionnaire final version - group form
- B.2 Questionnaire final version - non-group form
- B.3 First request letters
- B.4 Second request letter
- B.5 Acknowledgement letter

B.1 Questionnaire final version - group form



CONFIDENTIALQUESTIONNAIRE ON SHORT-TERM CASH FLOW PLANNINGGENERAL INSTRUCTIONS FOR COMPLETION

- \* The survey is addressed to major U.K.-based companies. This questionnaire, in particular, is being forwarded to companies that are groups. Therefore, throughout the questionnaire, COMPANY should be understood as GROUP, unless stated otherwise.
- \* The questionnaire should be answered by the group senior executive who is responsible for corporate cash flow management in the company.
- \* The questionnaire will take only a little time to complete. Alternative answers are already provided for most questions and the respondent is asked simply to tick the box(es) which best describe(s) his/her opinion or the company's practice. Space for comments is generally provided.
- \* If you wish to inform us about any specific aspect of your company's practice relating to the subject of this research project which you think is not covered or only partially covered in this questionnaire, we should be pleased if you would do so. Please return such information with the completed questionnaire.
- \* All of the information provided here will be held in strict confidence, and will be presented in aggregate form only. In all circumstances, the anonymity of individual respondents and company names will be carefully protected.
- \* Thank you very much for your assistance and cooperation. Should you have any questions concerning this study, please contact:

Mrs. Maria M. Marques  
University of Glasgow  
Department of Accountancy  
67 Southpark Avenue  
Glasgow G12 8LE

Phone: (041) 339 8855 Extension 501

**SECTION 1 - SHORT-TERM CASH FLOW PLANNING**

This section aims at a characterization of the short-term cash flow planning process as it is operated in practice. In this sense, it is concerned with the characteristics of the **CASH FLOW BUDGET** and other short-term cash flow forecasts. The **CASH FLOW BUDGET** is understood as that "one-off" estimate of the company's cash flows into the future, produced at least once a year as the final result of the overall budget procedure. Other short-term cash flow forecasts comprise those regular **CASH FLOW UPDATES OR FORECASTS** prepared during the year, usually in pure cash terms, i.e. with no links to Profit & Loss account figures.

1. What period of time is covered by the GROUP's CASH FLOW BUDGET?
2. How is the CASH FLOW BUDGET divided? (Please tick (✓) as appropriate).

Period covered:

- (a) Up to the 1st month.
- (b) Between the 1st and 3rd month.
- (c) Between the 3rd and 6th month.
- (d) After the 6th month.
- (e) Others (please specify):

The CASH FLOW BUDGET is divided by:					
Days	Weeks	Months	Quarters	Years	Others (please specify)

3. Is the CASH FLOW BUDGET prepared on a continuous roll-over basis?

Yes  No

If Yes, please describe briefly how the system works (e.g. every 3 months, the company drops 1 quarter and adds another in order to maintain a 12 month forecast):

4. When are major revisions (i.e. linked to modifications at the level of the assumptions and objectives stated in the overall budget) made to the CASH FLOW BUDGET? (Please tick (✓) one box).

- (a) Never.
- (b) Occasionally.
- (c) Regularly:
- (c.1) Six monthly.  (c.4) Weekly.
- (c.2) Quarterly.  (c.5) Others (please specify):
- (c.3) Monthly.

- 5.1. Does the company prepare, in addition to the GROUP's CASH FLOW BUDGET, any SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL?

(a) Yes (go to question 5.2)  (b) No (go to question 6)

- 5.2. When are these CASH FLOW UPDATES OR FORECASTS prepared? (Please tick (✓) one box).

- (a) Daily.  (c) Monthly.
- (b) Weekly.  (d) Others (please specify):

5.3. Please indicate the period of time ahead for which the company prepares these CASH FLOW UPDATES OR FORECASTS.

5.4. What major reason(s) led the company to prepare these CASH FLOW UPDATES OR FORECASTS?

6. For how long has the company been preparing the following? (For each column, if applicable, please tick (✓) the appropriate box).

GROUP CASH FLOW BUDGETS

SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL



(a) For 5 years or less.



(b) For more than 5 years up to 10 years.



(c) For more than 10 years up to 20 years.



(d) For more than 20 years.



(e) Do not know or cannot remember.

7. What objectives does the company usually set for the following? (For each column, if applicable, please tick (✓) as appropriate).

The GROUP's CASH FLOW BUDGET

The SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL



(a) To plan for business growth, investment in projects, introduction of new products, etc..



(b) To express in cash terms the objectives, strategies and plans of the business.



(c) To plan the need for financing.



(d) To manage and control the cash position.



(e) Others (please specify):

8. Using the scale below, please indicate the degree of commitment the company generally has with respect to each of the following: (For each alternative, if applicable, please tick (✓) one cell).

	1 Very low	2	3 Moderate	4	5 Very high
(a) The GROUP's CASH FLOW BUDGET.					
(b) The SHORT-TERM CASH FLOW UPDATES OR FORECATS AT GROUP LEVEL.					



## SECTION 2 - PLANNING FOR UNCERTAINTY

Because the budget is based on a unique set of assumptions about the future, frequently taken as the most likely, there are many events, unknown, uncertain or less likely at the time the budget is prepared, whose implications are not contemplated in the budget. Such events, if they come to materialize during the planning period may produce major disruptions in the company, with particular emphasis upon its expected cash flows. Those events that will produce a major increase in relation to expected cash outflows (e.g. an acquisition, an increase in R & D or marketing expenses in response to competition, etc.) and/or a major decrease in relation to expected cash inflows (e.g. a decline in sales, the loss of a major customer, etc.) are commonly viewed as the most disruptive of all. The purpose of this section is to understand HOW companies are PLANNING for events such as these, i.e. unexpected events which have, on materialization, major negative implications for the expected cash flow equilibrium of the firm.

## - "WHAT IF" PROJECTIONS -

1. Does the company prepare in the SHORT-RUN, "WHAT IF" PROJECTIONS IN CASH FLOW TERMS AT GROUP LEVEL for the purpose of:

	Yes (if regularly or occasionally)	No (if never)
(a) Estimating the cash flow implications of specific alternatives to the assumptions taken in the group's short-term cash flow plans (e.g. "what if" group sales volume goes down by 10% rather than increasing by 20% as expected; "what if" interest rates on short-term loans go up 1% rather than remaining constant, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>
(b) Making strategic decisions regarding unexpected events which, having materialized or being about to materialize, are producing or threatening to produce major negative deviations from the group's expected cash flows?	<input type="checkbox"/>	<input type="checkbox"/>

If you ticked Yes in both alternatives, please go to question 2.

If you ticked Yes in alternative a) and No in alternative b), please go to question 2.

If you ticked No in alternative a) and Yes in alternative b), please go to question 8.

If you ticked No in both alternatives, please go to question 16.

## - "WHAT IF" PROJECTIONS FOR ESTIMATING THE CASH FLOW IMPLICATIONS OF SPECIFIC ALTERNATIVES TO THE ASSUMPTIONS TAKEN IN THE GROUP'S SHORT-TERM CASH FLOW PLANS -

2. In which of the group's short-term cash flow plans does the company prepare these "WHAT IF" PROJECTIONS? (Please tick (✓) as appropriate).

- (a) In the GROUP'S CASH FLOW BUDGET.
- (b) In major revisions of the GROUP'S CASH FLOW BUDGET.
- (c) In the SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL.

3. What range of alternative values does the company test on the variables selected? (Please tick (✓) one box).

- (a) The widest range of likely alternative values.
- (b) The range of alternative values most likely to occur.
- (c) The most likely "optimistic" and "pessimistic" alternative value only.
- (d) Others (please specify):

4. When estimating the cash flow implications of specific alternatives to the assumptions taken in the group's short-term cash flow plan(s), does the company prepare possible responses to those alternatives? (Please tick (✓) one box).

- (a) No.
- (b) Yes, in general terms (if only broad financial strategy guidelines are issued).
- (c) Yes, in detailed terms (if, for each alternative, a closed and linked system of financial strategies is issued).

5. In your opinion, how effective are these "WHAT IF" PROJECTIONS in providing for capacity to reallocate resources at minimum cost? (Please tick (✓) one cell in the scale below).

1	2	3	4	5
<div style="border-top: 1px solid black; border-bottom: 1px solid black; height: 15px; margin: 0 auto; width: 100%;"></div>				
Not at all	Moderately			Very much

6. To whom are the following communicated in the company? (Please tick (✓) as appropriate).

The "WHAT IF" PROJECTIONS in question	The GROUP'S SHORT-TERM CASH FLOW PLAN(S) to which they apply	
<input type="checkbox"/>	<input type="checkbox"/>	(a) Group Directors.
<input type="checkbox"/>	<input type="checkbox"/>	(b) The headquarters finance officer.
<input type="checkbox"/>	<input type="checkbox"/>	(c) Group senior executives below the headquarters finance officer.
<input type="checkbox"/>	<input type="checkbox"/>	(d) Group senior executives below director level outside the headquarters finance department.
<input type="checkbox"/>	<input type="checkbox"/>	(e) Subsidiary company Directors.
<input type="checkbox"/>	<input type="checkbox"/>	(f) Subsidiary company finance officer.
<input type="checkbox"/>	<input type="checkbox"/>	(g) Group in general.
<input type="checkbox"/>	<input type="checkbox"/>	(f) Others (please specify):

If the company does not prepare "WHAT IF" PROJECTIONS for strategic decision making purposes (see alternative b) in Question 1 - SECTION 2), please go to question 7. Otherwise, go to question 9.

7. Please explain why the company does not prepare "WHAT IF" PROJECTIONS for strategic decision making purposes.

Go to question 11, please.

8. Please indicate why the company does not prepare "WHAT IF" PROJECTIONS for estimating the cash flow implications of specific alternatives to the assumptions taken in the group's short-term cash flow plans. (Please tick (✓) as appropriate).

- (a) The company has never considered the idea.
- (b) The company does not see any use in planning a priori for specific events whose probability is small or uncertain.
- (c) The preparation of these "WHAT IF" PROJECTIONS is more effective at the level of the individual company within the group than at group level.
- (d) The preparation of these "WHAT IF" PROJECTIONS is:
  - (d.1) An impracticable task since the range of alternatives is almost without limit.
  - (d.2) Counterproductive for organizational performance, i.e. it erodes commitment and motivation towards the group's cash flow plans.
  - (d.3) Too costly and/or sophisticated.
  - (d.4) Too time-consuming.
- (e) Other reasons (please specify):

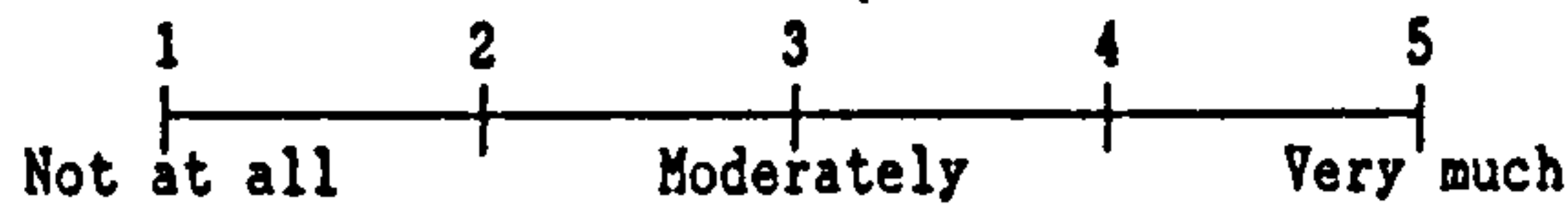


- "WHAT IF" PROJECTIONS FOR STRATEGIC DECISION MAKING PURPOSES -

9. What type of unexpected event makes the company prepare "WHAT IF" PROJECTIONS for strategic decision making purposes? (Please tick (✓) as appropriate).

- (a) Unexpected events which, having materialized, are producing major negative deviations from the group's expected cash flows (e.g. an actual fall in market share).
- (b) Unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the group's expected cash flows (e.g. a major acquisition in 3 months time).
- (c) Other events (please specify):

10. Using the scale below



please indicate how effective you consider "WHAT IF" PROJECTIONS prepared for strategic decision making purposes to be in handling:

(Enter number in box)

- (a) Unexpected events which, having materialized, are producing major negative deviations from the group's expected cash flows.
- (b) Unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the group's expected cash flows.

Please answer only where applicable.

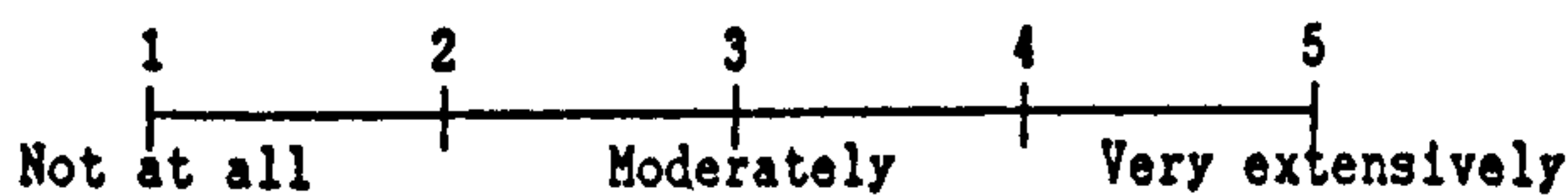
- "WHAT IF" PROJECTIONS: GENERAL INFORMATION -

11. What major reason(s) motivated the company to prepare SHORT-RUN "WHAT IF" PROJECTIONS IN CASH FLOW TERMS AT GROUP LEVEL?

12. For how long has the company been preparing "WHAT IF" PROJECTIONS? (if you do not know or you cannot remember, please indicate).

13. Who (indicate title) in the company headquarters took the initiative to start preparing "WHAT IF" PROJECTIONS? (if you do not know or you cannot remember, please indicate).

14. To what extent are senior people outside the headquarters finance department called to participate in the discussion of "WHAT IF" PROJECTIONS? (Please use the scale below; use 0 if not applicable).



- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> (a) Group Marketing Director.</li> <li><input type="checkbox"/> (b) Group Production Director.</li> <li><input type="checkbox"/> (c) Group R. &amp; D Director.</li> <li><input type="checkbox"/> (d) Group Managing Director.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> (e) Group Divisional Directors (e.g. Area/Product Directors).</li> <li><input type="checkbox"/> (f) Subsidiary company Directors.</li> <li><input type="checkbox"/> (g) Subsidiary company finance officer.</li> <li><input type="checkbox"/> (h) Others (please specify):</li> </ul> |
|---|---|



15.1. Are "WHAT IF" PROJECTIONS prepared through a computer simulation model?

Yes  No

15.2. If Yes, please indicate, by ticking (✓) one box, whether this model is:

- (a) An optimizing model (i.e. for each case, it sorts out the best feasible response on the part of the company, according to a pre-defined criterion), or
- (b) A satisficing model (i.e. for each case, it sorts out a range of feasible responses on the part of the company).

Go to question 17, please.

16. Please indicate why the company does not prepare any SHORT-RUN "WHAT IF" PROJECTIONS IN CASH FLOW TERMS AT GROUP LEVEL. (Tick (✓) as appropriate).

- (a) The company has never considered the idea.
- (b) The problem of occurrence of unexpected events is not relevant to the company because:
  - (b.1) The future is reasonably predictable.
  - (b.2) Cash can be obtained with very few restrictions.
- (c) "WHAT IF" PROJECTIONS do not help to improve response to those events.
- (d) The preparation of "WHAT IF" PROJECTIONS is more effective at the level of the individual company within the group than at group level.
- (e) The group's short-term cash flow plans (i.e. the CASH FLOW BUDGET and/or the SHORT-TERM CASH FLOW UPDATES/FORECASTS) are adequate to handle the problem.
- (f) "WHAT IF" PROJECTIONS are impracticable.
- (g) "WHAT IF" PROJECTIONS are too costly and/or sophisticated.
- (h) "WHAT IF" PROJECTIONS are too time-consuming.
- (i) Other reasons (please specify):

17. Is there any company within the group that usually prepares SHORT-RUN "WHAT IF" PROJECTIONS IN CASH FLOW TERMS at individual company level? (Please tick (✓) as appropriate).

	Yes	No
(a) The parent company.	<input type="checkbox"/>	<input type="checkbox"/>
(b) A subsidiary company.	<input type="checkbox"/>	<input type="checkbox"/>

- THE GROUP'S SHORT-TERM CASH FLOW PLANS -

18. Using the following scale



please indicate how effective you consider each of the following:

(Enter number in box)

- (a) Major revisions of the GROUP'S CASH FLOW BUDGET.
- (b) SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL.

to be in handling unexpected events which, having materialized, are producing major negative deviations from the group's expected cash flows. (Use 0 if not applicable).

19. Using the same scale as before, please indicate how effective you consider each of the following:

(Enter number in box)

(a) Major revisions of the GROUP's CASH FLOW BUDGET.

(b) SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL.

to be in handling unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the group's expected cash flows. (Use 0 if not applicable).

20. Please tick (✓) the advantages the company has generally gained from the preparation of the following:

(NOTE: Leave blank if not applicable; if the company does not prepare SHORT-TERM CASH FLOW UPDATES/FORECASTS AT GROUP LEVEL but prepares major revisions of the GROUP's CASH FLOW BUDGET, please replace the former by the latter).

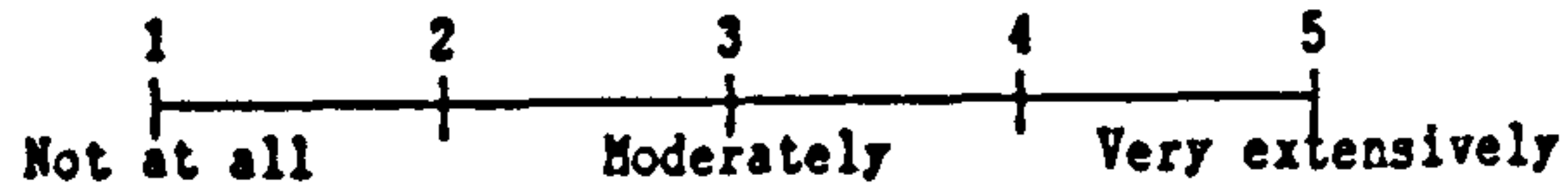
"WHAT IF" PROJECTIONS	SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL
--------------------------	--

- |                          |                          |   |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | (a) Better informed view of the likelihood of an event's occurring.                           |
| <input type="checkbox"/> | <input type="checkbox"/> | (b) Better understanding of the potential effect of events upon cash flows.                   |
| <input type="checkbox"/> | <input type="checkbox"/> | (c) Better understanding of how different areas in the company interact.                      |
| <input type="checkbox"/> | <input type="checkbox"/> | (d) Earlier recognition of the emergence of an event.   |
| <input type="checkbox"/> | <input type="checkbox"/> | (e) Faster response on the part of the company to events.                                     |
| <input type="checkbox"/> | <input type="checkbox"/> | (f) Greater confidence in the effectiveness of the response to events.                        |
| <input type="checkbox"/> | <input type="checkbox"/> | (g) Lesser need to hold large amounts of instant reserves (cash and/or borrowing facilities). |
| <input type="checkbox"/> | <input type="checkbox"/> | (h) Other advantages (please specify):  |

## SECTION 3 - PLANNING FINANCIAL RESOURCES

Planning financial resources aims at TAKING AN INVENTORY of the resources available to cover unexpected financial needs that may arise in the future.

1. To what extent does the company rely on each of the items below as possible resources to meet unexpected financial needs? (Please use the 1st column of the table below and the following scale; use 0 if not applicable).

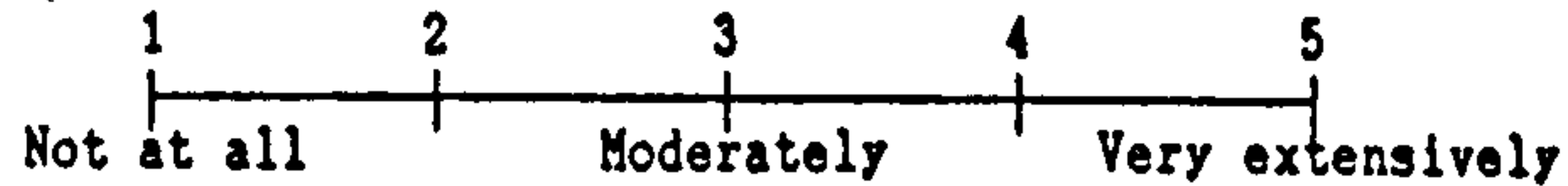


Please indicate in the 2nd column, who (give title(s)) in the company has or have control to activate each of these resources.

Resources	Scale of Relevance	Manager in Control
1. Surplus cash (i.e. Precautionary cash balances plus Short-term marketable securities)		
2. Unused lines of credit (e.g. Bank overdrafts)		
3. Additional commercial bank loans	3.1. Unsecured	
	3.2. Secured	
4. Additional long-term debt		
5. Issue of new equity		
6. Reduction of planned outflows	6.1. Change in production schedule	
	6.2. Reduction in marketing budget	
	6.3. Reduction in research and development budget	
	6.4. Reduction in administrative expenses	
	6.5. Reduction in capital expenditures	
	6.6. Reduction in dividend payments	
7. Deceleration of planned outflows (e.g. Renegotiation of suppliers' credit terms)		
8. Increase of planned inflows (e.g. Increase of unit sales price)		
9. Acceleration of planned inflows (e.g. Reduction of customers' credit terms)		
10. Liquidation of fixed assets (e.g. sale of division, shut-down, sale and leaseback of assets, etc.)		
11. Others (please specify):		



## 2. Using the scale below



please indicate to what extent does the company accept each of the following as feasible procedures for responding to unexpected financial needs: (Use 0 if not applicable).

(Enter number in box)

- (a) Revision or postponement of corporate objectives (e.g. return on investment, growth, etc.).
- (b) Revision or postponement of corporate strategies (e.g. marketing, R & D, capital investment strategies, etc.).
- (c) Violation of company dividend policy.
- (d) Violation of company debt policy.

## 3.1. Does the company usually TAKE, AT GROUP LEVEL, AN INVENTORY of the resources available to cover possible unexpected financial needs?

- Yes  No (go to question 10)

## 3.2. What is the maximum period of time covered by the INVENTORY OF RESOURCES?

## 3.3. When does the company prepare the INVENTORY OF RESOURCES? (Please tick (✓) as appropriate).

- (a) When preparing the GROUP'S CASH FLOW BUDGET.
- (b) When preparing major revisions of the GROUP'S CASH FLOW BUDGET.
- (c) When preparing the SHORT-TERM CASH FLOW UPDATES OR FORECASTS AT GROUP LEVEL.
- (d) At regular intervals.
- (e) Other occasions (please specify):

## 4. Which of the resources listed in question 1 above, that the company relies on to meet unexpected financial needs, does the company usually TAKE AN INVENTORY OF? (Please use the numbers allocated to the resources in the table).

## 5. What additional information, besides identification of the resources available to cover possible unexpected financial needs, does the INVENTORY OF RESOURCES provide in the company? (Please tick (✓) as appropriate).

Information as to:

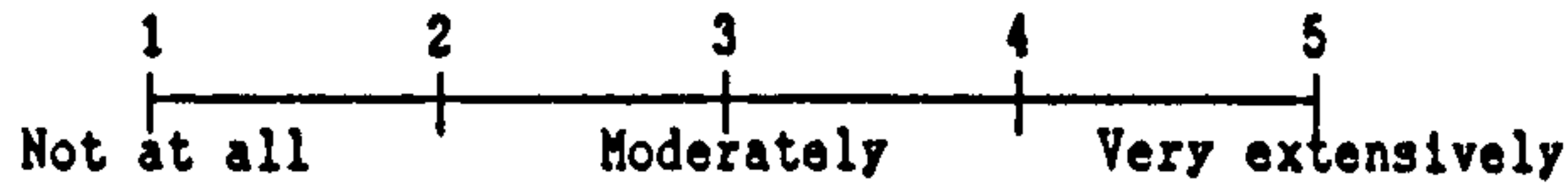
- (a) Magnitude of the resources.
- (b) Lead time required to activate the resources.
- (c) Certainty of availability.
- (d) Conditions of availability.
- (e) Other information (please specify):

## 6. Is there in the company any established criterion for judging the adequacy of the resources in the inventory, both in total amount and in distribution among specific resources?

- Yes  No

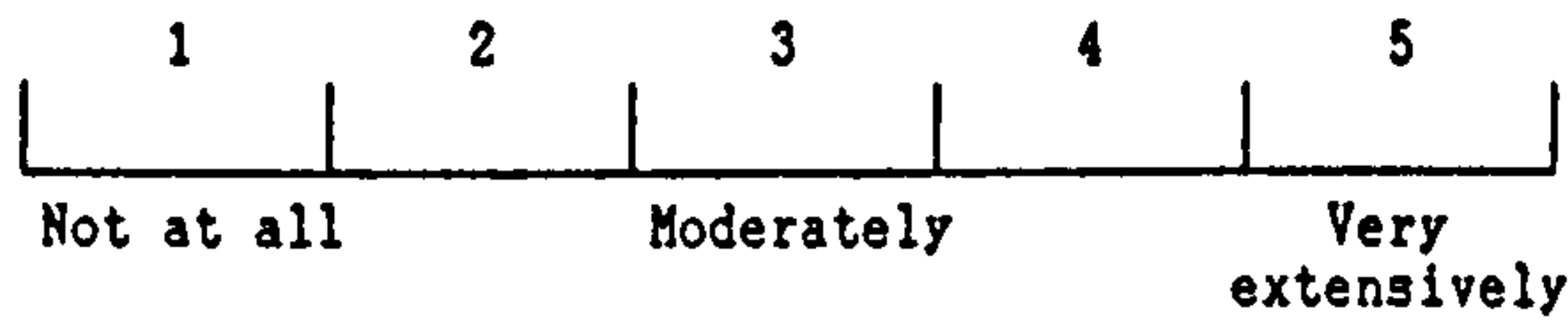
If Yes, please describe this criterion very briefly.

7. To what extent are senior people outside the headquarters finance department called to participate in the discussion of the INVENTORY OF RESOURCES? (Please use the scale below; use 0 if not applicable).

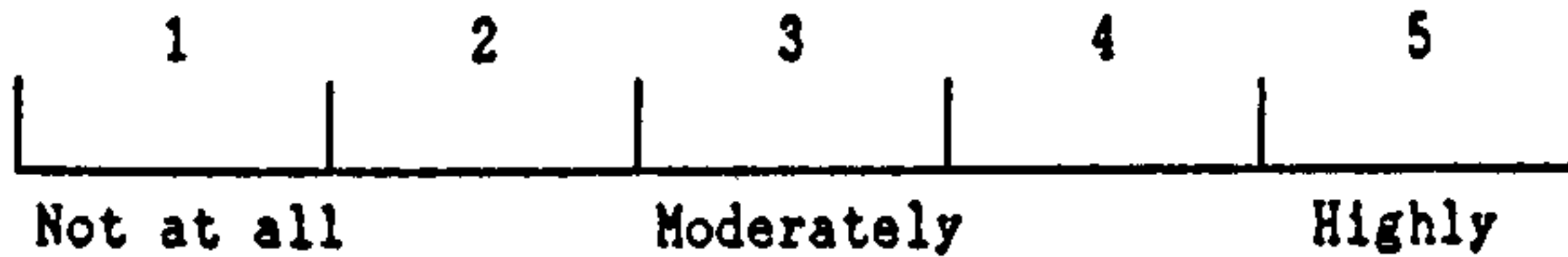


- |   |  |
|---|--|
| <input type="checkbox"/> (a) Group Marketing Director.  | <input type="checkbox"/> (e) Group Divisional Directors (e.g. Area/Product Directors). |
| <input type="checkbox"/> (b) Group Production Director. | <input type="checkbox"/> (f) Subsidiary company Directors.                             |
| <input type="checkbox"/> (c) Group R & D Director.      | <input type="checkbox"/> (g) Subsidiary company finance officer.                       |
| <input type="checkbox"/> (d) Group Managing Director.   | <input type="checkbox"/> (h) Others (please specify):                                  |

8. In your opinion, to what extent is the INVENTORY OF RESOURCES an indicator of the company's capacity to reallocate resources in time to meet unexpected financial needs? (Please tick (✓) one cell).



9. In your opinion, how effective is the INVENTORY OF RESOURCES in providing for capacity to reallocate resources at minimum cost? (Please tick (✓) one cell).



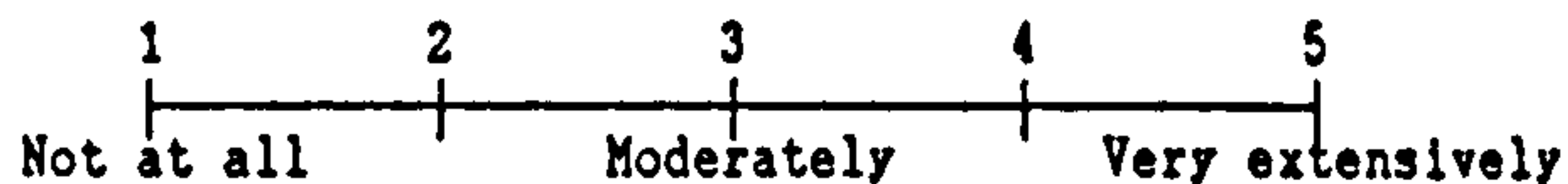
Please go to question 11.

10. Please explain why the company does not usually TAKE, AT GROUP LEVEL, AN INVENTORY of the resources available to cover possible unexpected financial needs.

11. Is there any company within the group that usually TAKES, at individual company level, AN INVENTORY of the resources available to cover possible unexpected financial needs? (Please tick (✓) as appropriate).

- |                           | Yes                      | No                       |
|---------------------------|--------------------------|--------------------------|
| (a) The parent company.   | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) A subsidiary company. | <input type="checkbox"/> | <input type="checkbox"/> |

12. In your opinion, to what extent is each of the following items an indicator of the company's capacity to reallocate resources in time to meet unexpected financial needs? (Please use the scale below; use 0 if not applicable).



(Enter number in box)

- (a) Liquid assets (i.e. Cash + Short-term marketable securities).
- (b) Liquid assets/Current assets.
- (c) Quick ratio (Liquid assets + Accounts receivable/Current liabilities).
- (d) Current ratio (Current assets/Current liabilities).
- (e) Working capital (Current assets - Current liabilities).
- (f) Working capital/Net assets.
- (g) Cash flow (Profit + Non-cash expenses)/Total debt.
- (h) Others (please specify):

13. Is there in the company a defined rationale setting out, at group level, the general sequence in which resources will be used to meet possible unexpected financial needs?

Yes (go to next question)

No (go to SECTION 4)

14. Please describe the company's rationale for activating resources when unexpected financial needs arise.



SECTION 4 - GENERAL INFORMATION

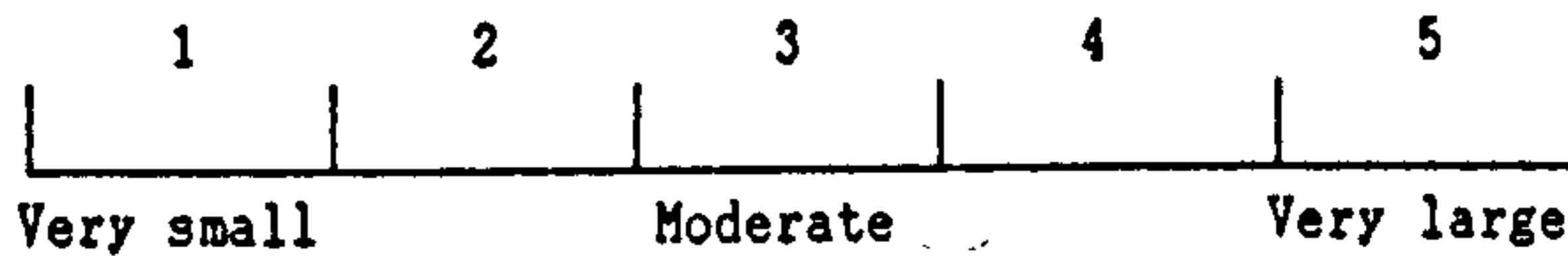
1. How long has the company been operating? (Please tick (✓) one box).

- (a) 5 years or less.  (c) More than 15 years up to 30 years.  
 (b) More than 5 years up to 15 years.  (d) More than 30 years.

2. As far as cash management is concerned, how would you define the group? (Please tick (✓) one box).

- (a) Mostly centralized (i.e. most decisions concerning cash are taken by the parent company; funds currently allocated to subsidiary companies by the parent company).  
 (b) Mostly decentralized (i.e. most decisions concerning cash are taken by the subsidiary companies; subsidiaries enjoy a high level of independence with respect to movement of funds).

3.1. Considering all possible sources of external financing available to the company (e.g. short-term borrowing, medium/long-term borrowing, equity financing) how would you presently rate the company's overall unused borrowing capacity? (Please tick (✓) one cell).



3.2. How would you say this overall unused borrowing capacity has evolved during the past 5 years (e.g. decreased, increased, etc.)?

4. Using the scale below, please tick (✓) the degree of predictability traditionally showed by the company's cash flows.

	1 Very low	2	3 Moderate	4	5 Very high
(a) Cash inflows.					
(b) Cash outflows.					

5.1. Do company headquarters carry out any operating (selling and/or productive) activity?

- Yes  No

5.2. Which percentage of total group sales does the largest individual company (parent or subsidiary) within the group account for? (Please tick (✓) one box).

- (a) 90% or more.  (d) Between 30 and 49%.  
 (b) Between 70 and 89%.  (e) Between 10 and 29%.  
 (c) Between 50 and 69%.  (f) Less than 10%.

6. How much of the headquarters finance department's time is generally spent with the management (planning and control) of cash at group level? (Please tick (✓) one box).

- (a) Less than 10%.  (c) Between 30 and 60%.  
 (b) Between 10 and 29%.  (d) More than 60%.

7. The number of senior and middle people (i.e. excluding clerical and secretarial staff) employed in the headquarters finance department is, including yourself,.....

8. Could you please draw in the space provided below or attach to this questionnaire a diagram describing the organizational structure of the headquarters finance department?

9. Please indicate your name, title and company name below. A copy of the results of the study will be sent to you in due course.

Name:

Title:

Company Name:

THANK YOU VERY MUCH FOR YOUR COOPERATION AND ASSISTANCE.

B.2 Questionnaire final version - non-group form



CONFIDENTIALQUESTIONNAIRE ON SHORT-TERM CASH FLOW PLANNINGGENERAL INSTRUCTIONS FOR COMPLETION

- \* The survey is addressed to major U.K.-based companies. The questionnaire should be answered by the senior executive who is responsible for corporate cash flow management in the company.
- \* The questionnaire will take only a little time to complete. Alternative answers are already provided for most questions and the respondent is asked simply to tick the box(es) which best describe(s) his/her opinion or the company's practice. Space for comments is generally provided.
- \* If you wish to inform us about any specific aspect of your company's practice relating to the subject of this research project which you think is not covered or only partially covered in this questionnaire, we should be pleased if you would do so. Please return such information with the completed questionnaire.
- \* All of the information provided here will be held in strict confidence, and will be presented in aggregate form only. In all circumstances, the anonymity of individual respondents and company names will be carefully protected.
- \* Thank you very much for your assistance and cooperation. Should you have any questions concerning this study, please contact:

Mrs. Maria M. Marques  
University of Glasgow  
Department of Accountancy  
67 Southpark Avenue  
Glasgow G12 8LE

Phone: (041) 339 8855 Extension 501

**SECTION 1 - SHORT-TERM CASH FLOW PLANNING**

This section aims at a characterization of the short-term cash flow planning process as it is operated in practice. In this sense, it is concerned with the characteristics of the **CASH FLOW BUDGET** and other short-term cash flow forecasts. The **CASH FLOW BUDGET** is understood as that "one-off" estimate of the company's cash flows into the future, produced at least once a year as the final result of the overall budget procedure. Other short-term cash flow forecasts comprise those regular **CASH FLOW UPDATES OR FORECASTS** prepared during the year, usually in pure cash terms, i.e. with no links to Profit & Loss account figures.

1. What period of time is covered by the **CASH FLOW BUDGET**?
  
2. How is the **CASH FLOW BUDGET** divided? (Please tick (✓) as appropriate).

The <b>CASH FLOW BUDGET</b> is divided by:					
Days	Weeks	Months	Quarters	Years	Others (please specify)
Period covered:					
(a) Up to the 1st month.					
(b) Between the 1st and 3rd month.					
(c) Between the 3rd and 6th month.					
(d) After the 6th month.					
(e) Others (please specify):					

3. Is the **CASH FLOW BUDGET** prepared on a continuous roll-over basis?

Yes  No

If **Yes**, please describe briefly how the system works (e.g. every 3 months, the company drops 1 quarter and adds another in order to maintain a 12 month forecast):

4. When are major revisions (i.e. linked to modifications at the level of the assumptions and objectives stated in the overall budget) made to the **CASH FLOW BUDGET**? (Please tick (✓) one box).

- (a) Never.
- (b) Occasionally.
- (c) Regularly:
  - (c.1) Six monthly.
  - (c.2) Quarterly.
  - (c.3) Monthly.
  - (c.4) Weekly.
  - (c.5) Others (please specify):

- 5.1. Does the company prepare, in addition to the **CASH FLOW BUDGET**, any **SHORT-TERM CASH FLOW UPDATES OR FORECASTS**?

(a) Yes (go to question 5.2)  (b) No (go to question 6)

- 5.2. When are these **CASH FLOW UPDATES OR FORECASTS** prepared? (Please tick (✓) one box).

- (a) Daily.
- (b) Weekly.
- (c) Monthly.
- (d) Others (please specify):

5.3. Please indicate the period of time ahead for which the company prepares these CASH FLOW UPDATES OR FORECASTS.

5.4. What major reason(s) led the company to prepare these CASH FLOW UPDATES OR FORECASTS?

6. For how long has the company been preparing the following? (For each column, if applicable, please tick (✓) the appropriate box).

CASH FLOW BUDGETS

SHORT-TERM CASH FLOW UPDATES OR FORECASTS



(a) For 5 years or less.



(b) For more than 5 years up to 10 years.



(c) For more than 10 years up to 20 years.



(d) For more than 20 years.



(e) Do not know or cannot remember.

7. What objectives does the company usually set for the following? (For each column, if applicable, please tick (✓) as appropriate).

The CASH FLOW BUDGET

The SHORT-TERM CASH FLOW UPDATES OR FORECASTS



(a) To plan for business growth, investment in projects, introduction of new products, etc..



(b) To express in cash terms the objectives, strategies and plans of the business.



(c) To plan the need for financing.



(d) To manage and control the cash position.



(e) Others (please specify):

8. Using the scale below, please indicate the degree of commitment the company generally has with respect to each of the following: (For each alternative, if applicable, please tick (✓) one cell).

1 Very low	2	3 Moderate	4	5 Very high

(a) The CASH FLOW BUDGET.

(b) The SHORT-TERM CASH FLOW UPDATES OR FORECASTS.



## SECTION 2 - PLANNING FOR UNCERTAINTY

Because the budget is based on a unique set of assumptions about the future, frequently taken as the most likely, there are many events, unknown, uncertain or less likely at the time the budget is prepared, whose implications are not contemplated in the budget. Such events, if they come to materialize during the planning period may produce major disruptions in the company, with particular emphasis upon its expected cash flows. Those events that will produce a major increase in relation to expected cash outflows (e.g. an acquisition, an increase in R & D or marketing expenses in response to competition, etc.) and/or a major decrease in relation to expected cash inflows (e.g. a decline in sales, the loss of a major customer, etc.) are commonly viewed as the most disruptive of all. The purpose of this section is to understand HOW companies are PLANNING for events such as these, i.e. unexpected events which have, on materialization, major negative implications for the expected cash flow equilibrium of the firm.

## - "WHAT IF" PROJECTIONS -

1. Does the company prepare in the SHORT-RUN, "WHAT IF" PROJECTIONS IN CASH FLOW TERMS for the purpose of:

	Yes (if regularly or occasionally)	No (if never)
(a) Estimating the cash flow implications of specific alternatives to the assumptions taken in the short-term cash flow plans (e.g. "what if" sales volume goes down by 10% rather than increasing by 20% as expected; "what if" interest rates on short-term loans go up 1% rather than remaining constant, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>
(b) Making strategic decisions regarding unexpected events which, having materialized or being about to materialize, are producing or threatening to produce major negative deviations from the company's expected cash flows?	<input type="checkbox"/>	<input type="checkbox"/>

If you ticked Yes in both alternatives, please go to question 2.

If you ticked Yes in alternative a) and No in alternative b), please go to question 2.

If you ticked No in alternative a) and Yes in alternative b), please go to question 8.

If you ticked No in both alternatives, please go to question 16.

## - "WHAT IF" PROJECTIONS FOR ESTIMATING THE CASH FLOW IMPLICATIONS OF SPECIFIC ALTERNATIVES TO THE ASSUMPTIONS TAKEN IN THE SHORT-TERM CASH FLOW PLANS -

2. In which of the short-term cash flow plans does the company prepare these "WHAT IF" PROJECTIONS? (Please tick (✓) as appropriate).

- (a) In the CASH FLOW BUDGET.
- (b) In major revisions of the CASH FLOW BUDGET.
- (c) In the SHORT-TERM CASH FLOW UPDATES OR FORECASTS.

3. What range of alternative values does the company test on the variables selected? (Please tick (✓) one box).

- (a) The widest range of likely alternative values.
- (b) The range of alternative values most likely to occur.
- (c) The most likely "optimistic" and "pessimistic" alternative value only.
- (d) Others (please specify):

4. When estimating the cash flow implications of specific alternatives to the assumptions taken in the short-term cash flow plan(s), does the company prepare possible responses to those alternatives? (Please tick (✓) one box).

- (a) No.
- (b) Yes, in general terms (if only broad financial strategy guidelines are issued).
- (c) Yes, in detailed terms (if, for each alternative, a closed and linked system of financial strategies is issued).

5. In your opinion, how effective are these "WHAT IF" PROJECTIONS in providing for capacity to reallocate resources at minimum cost? (Please tick (✓) one cell in the scale below).

1	2	3	4	5
Not at all	Moderately		Very much	

6. To whom are the following communicated in the company? (Please tick (✓) as appropriate).

The "WHAT IF" PROJECTIONS in question	The SHORT-TERM CASH FLOW PLAN(S) to which they apply	
<input type="checkbox"/>	<input type="checkbox"/>	(a) Board of Directors.
<input type="checkbox"/>	<input type="checkbox"/>	(b) The finance officer.
<input type="checkbox"/>	<input type="checkbox"/>	(c) Senior executives below the finance officer.
<input type="checkbox"/>	<input type="checkbox"/>	(d) Senior executives below director level outside the finance department.
<input type="checkbox"/>	<input type="checkbox"/>	(g) Company in general.
<input type="checkbox"/>	<input type="checkbox"/>	(f) Others (please specify):

If the company does not prepare "WHAT IF" PROJECTIONS for strategic decision making purposes (see alternative b) in Question 1 - SECTION 2), please go to question 7. Otherwise, go to question 9.

7. Please explain why the company does not prepare "WHAT IF" PROJECTIONS for strategic decision making purposes.

Go to question 11, please.

8. Please indicate why the company does not prepare "WHAT IF" PROJECTIONS for estimating the cash flow implications of specific alternatives to the assumptions taken in the short-term cash flow plans. (Please tick (✓) as appropriate).

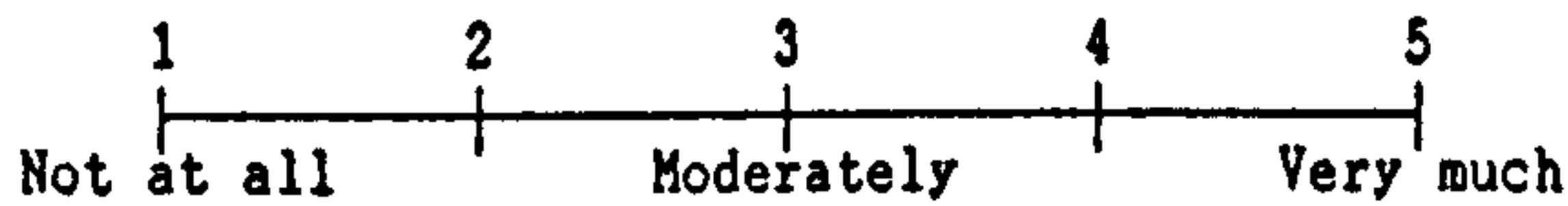
<input type="checkbox"/>	(a) The company has never considered the idea.
<input type="checkbox"/>	(b) The company does not see any use in planning a priori for specific events whose probability is small or uncertain.
	(c) The preparation of these "WHAT IF" PROJECTIONS is:
<input type="checkbox"/>	(c.1) An impracticable task since the range of alternatives is almost without limit.
<input type="checkbox"/>	(c.2) Counterproductive for organizational performance, i.e. it erodes commitment and motivation towards the cash flow plans.
<input type="checkbox"/>	(c.3) Too costly and/or sophisticated.
<input type="checkbox"/>	(c.4) Too time-consuming.
<input type="checkbox"/>	(d) Other reasons (please specify):

- "WHAT IF" PROJECTIONS FOR STRATEGIC DECISION MAKING PURPOSES -

9. What type of unexpected event makes the company prepare "WHAT IF" PROJECTIONS for strategic decision making purposes? (Please tick (✓) as appropriate).

- (a) Unexpected events which, having materialized, are producing major negative deviations from the company's expected cash flows (e.g. an actual fall in market share).
- (b) Unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the company's expected cash flows (e.g. a major acquisition in 3 months time).
- (c) Other events (please specify):

10. Using the scale below



please indicate how effective you consider "WHAT IF" PROJECTIONS prepared for strategic decision making purposes to be in handling:

(Enter number in box)

- (a) Unexpected events which, having materialized, are producing major negative deviations from the company's expected cash flows.
- (b) Unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the company's expected cash flows.

Please answer only where applicable.

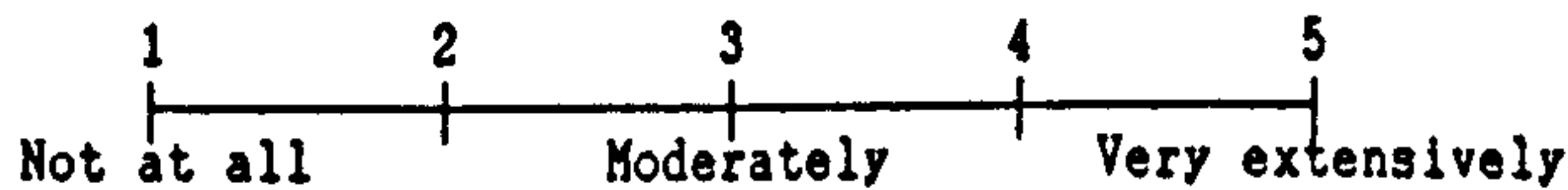
- "WHAT IF" PROJECTIONS: GENERAL INFORMATION -

11. What major reason(s) motivated the company to prepare SHORT-RUN "WHAT IF" PROJECTIONS IN CASH FLOW TERMS?

12. For how long has the company been preparing "WHAT IF" PROJECTIONS? (if you do not know or you cannot remember, please indicate).

13. Who (indicate title) in the company took the initiative to start preparing "WHAT IF" PROJECTIONS? (if you do not know or you cannot remember, please indicate).

14. To what extent are senior people outside the finance department called to participate in the discussion of "WHAT IF" PROJECTIONS? (Please use the scale below; use 0 if not applicable).



- (a) Marketing Director.
- (b) Production Director.
- (c) R & D Director.
- (d) Managing Director.
- (e) Divisional Directors (e.g. Area/Product Directors).
- (f) Others (please specify):



15.1. Are "WHAT IF" PROJECTIONS prepared through a computer simulation model?

Yes  No

15.2. If Yes, please indicate, by ticking (✓) one box, whether this model is:

- (a) An optimizing model (i.e. for each case, it sorts out the best feasible response on the part of the company, according to a pre-defined criterion), or
- (b) A satisficing model (i.e. for each case, it sorts out a range of feasible responses on the part of the company).

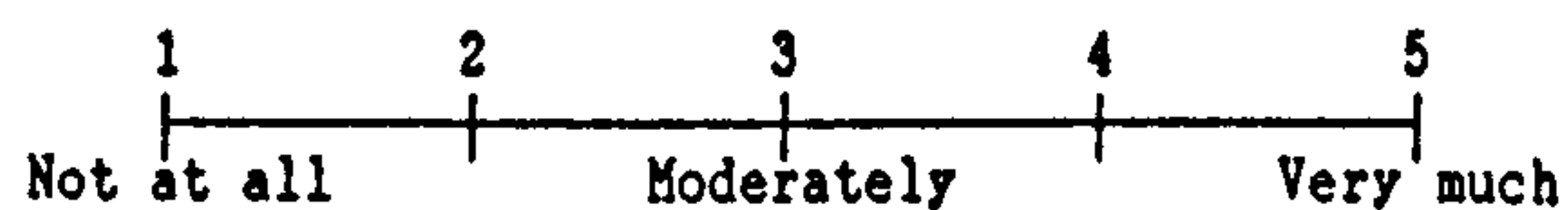
Go to question 17, please.

16. Please indicate why the company does not prepare any SHORT-RUN "WHAT IF" PROJECTIONS IN CASH FLOW TERMS. (Tick (✓) as appropriate).

- (a) The company has never considered the idea.
- (b) The problem of occurrence of unexpected events is not relevant to the company because:
- (b.1) The future is reasonably predictable.
- (b.2) Cash can be obtained with very few restrictions.
- (c) "WHAT IF" PROJECTIONS do not help to improve response to those events.
- (d) The short-term cash flow plans (i.e. the CASH FLOW BUDGET and/or the SHORT-TERM CASH FLOW UPDATES/FORECASTS) are adequate to handle the problem.
- (e) "WHAT IF" PROJECTIONS are impracticable.
- (f) "WHAT IF" PROJECTIONS are too costly and/or sophisticated.
- (g) "WHAT IF" PROJECTIONS are too time-consuming.
- (h) Other reasons (please specify):

- THE SHORT-TERM CASH FLOW PLANS -

17. Using the following scale



please indicate how effective you consider each of the following:

(Enter number in box)

(a) Major revisions of the CASH FLOW BUDGET.

(b) SHORT-TERM CASH FLOW UPDATES OR FORECASTS.

to be in handling unexpected events which, having materialized, are producing major negative deviations from the company's expected cash flows. (Use 0 if not applicable).

18. Using the same scale as before, please indicate how effective you consider each of the following:

(Enter number in box)

(a) Major revisions of the CASH FLOW BUDGET.

(b) SHORT-TERM CASH FLOW UPDATES OR FORECASTS.

to be in handling unexpected events which, having materialized or being about to materialize, threaten to produce major negative deviations from the company's expected cash flows. (Use 0 if not applicable).

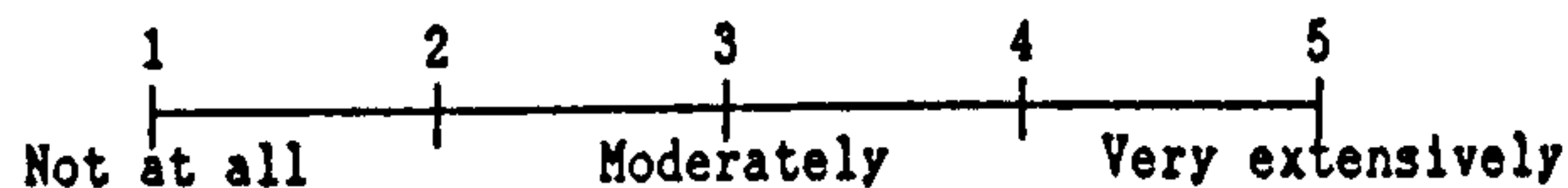
19. Please tick (✓) the advantages the company has generally gained from the preparation of the following:  
 (NOTE: Leave blank if not applicable; if the company does not prepare SHORT-TERM CASH FLOW UPDATES/FORECASTS but prepares major revisions of the CASH FLOW BUDGET, please replace the former by the latter).

"WHAT IF" PROJECTIONS	SHORT-TERM CASH FLOW UPDATES OR FORECASTS	
<input type="checkbox"/>	<input type="checkbox"/>	(a) Better informed view of the likelihood of an event's occurring.
<input type="checkbox"/>	<input type="checkbox"/>	(b) Better understanding of the potential effect of events upon cash flows.
<input type="checkbox"/>	<input type="checkbox"/>	(c) Better understanding of how different areas in the company interact.
<input type="checkbox"/>	<input type="checkbox"/>	(d) Earlier recognition of the emergence of an event.
<input type="checkbox"/>	<input type="checkbox"/>	(e) Faster response on the part of the company to events.
<input type="checkbox"/>	<input type="checkbox"/>	(f) Greater confidence in the effectiveness of the response to events.
<input type="checkbox"/>	<input type="checkbox"/>	(g) Lesser need to hold large amounts of instant reserves (cash and/or borrowing facilities).
<input type="checkbox"/>	<input type="checkbox"/>	(h) Other advantages (please specify):

SECTION 3 - PLANNING FINANCIAL RESOURCES

Planning financial resources aims at TAKING AN INVENTORY of the resources available to cover unexpected financial needs that may arise in the future.

1. To what extent does the company rely on each of the items below as possible resources to meet unexpected financial needs? (Please use the 1st column of the table below and the following scale; use 0 if not applicable).



Please indicate in the 2nd column, who (give title(s)) in the company has or have control to activate each of these resources.

Resources		Scale of Relevance	Manager in Control
1. Surplus cash (i.e. Precautionary cash balances plus Short-term marketable securities)			
2. Unused lines of credit (e.g. Bank overdrafts)			
3. Additional commercial bank loans	3.1. Unsecured		
	3.2. Secured		
4. Additional long-term debt			
5. Issue of new equity			
6. Reduction of planned outflows	6.1. Change in production schedule		
	6.2. Reduction in marketing budget		
	6.3. Reduction in research and development budget		
	6.4. Reduction in administrative expenses		
	6.5. Reduction in capital expenditures		
	6.6. Reduction in dividend payments		
7. Deceleration of planned outflows (e.g. Renegotiation of suppliers' credit terms)			
8. Increase of planned inflows (e.g. Increase of unit sales price)			
9. Acceleration of planned inflows (e.g. Reduction of customers' credit terms)			
10. Liquidation of fixed assets (e.g. sale of division, shut-down, sale and leaseback of assets, etc.)			
11. Others (please specify):			



2. Using the scale below



please indicate to what extent does the company accept each of the following as feasible procedures for responding to unexpected financial needs: (Use 0 if not applicable).

(Enter number in box)

- (a) Revision or postponement of corporate objectives (e.g. return on investment, growth, etc.).
- (b) Revision or postponement of corporate strategies (e.g. marketing, R & D, capital investment strategies, etc.).
- (c) Violation of company dividend policy.
- (d) Violation of company debt policy.

3.1. Does the company usually TAKE AN INVENTORY of the resources available to cover possible unexpected financial needs?

- Yes  No (go to question 10)

3.2. What is the maximum period of time covered by the INVENTORY OF RESOURCES?

3.3. When does the company prepare the INVENTORY OF RESOURCES? (Please tick (✓) as appropriate).

- (a) When preparing the CASH FLOW BUDGET.
- (b) When preparing major revisions of the CASH FLOW BUDGET.
- (c) When preparing the SHORT-TERM CASH FLOW UPDATES OR FORECASTS.
- (d) At regular intervals.
- (e) Other occasions (please specify):

4. Which of the resources listed in question 1 above, that the company relies on to meet unexpected financial needs, does the company usually TAKE AN INVENTORY OF? (Please use the numbers allocated to the resources in the table).

5. What additional information, besides identification of the resources available to cover possible unexpected financial needs, does the INVENTORY OF RESOURCES provide in the company? (Please tick (✓) as appropriate).

Information as to:

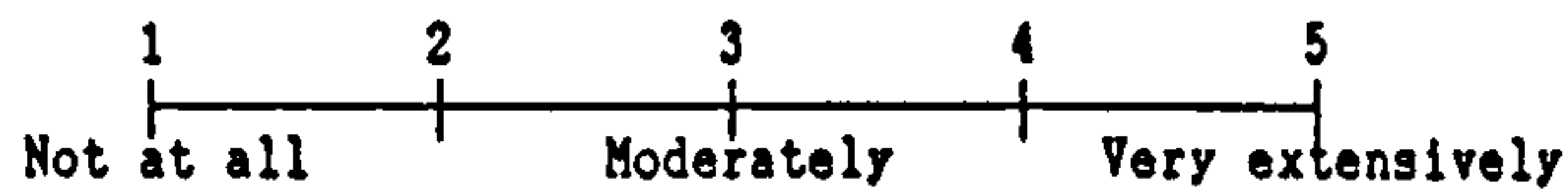
- (a) Magnitude of the resources.
- (b) Lead time required to activate the resources.
- (c) Certainty of availability.
- (d) Conditions of availability.
- (e) Other information (please specify):

6. Is there in the company any established criterion for judging the adequacy of the resources in the inventory, both in total amount and in distribution among specific resources?

- Yes  No

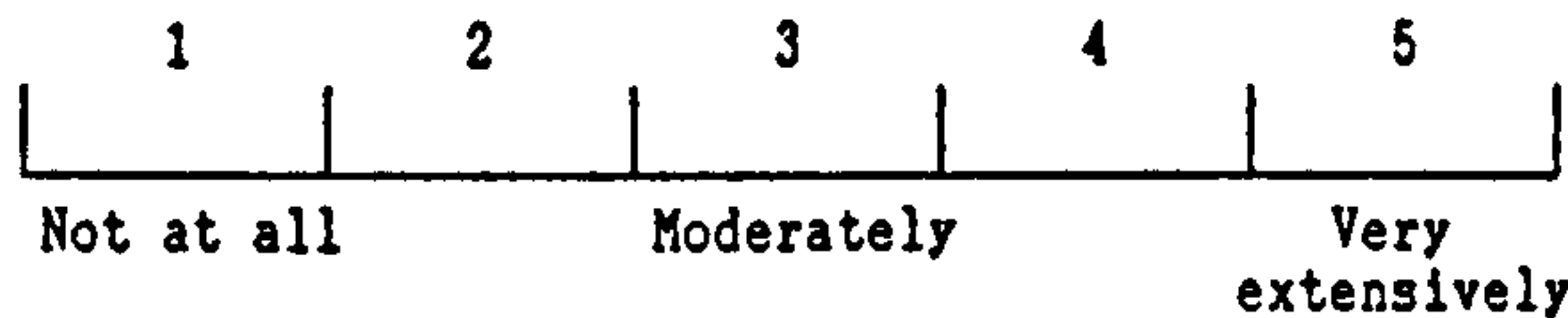
If Yes, please describe this criterion very briefly.

7. To what extent are senior people outside the finance department called to participate in the discussion of the INVENTORY OF RESOURCES? (Please use the scale below; use 0 if not applicable).

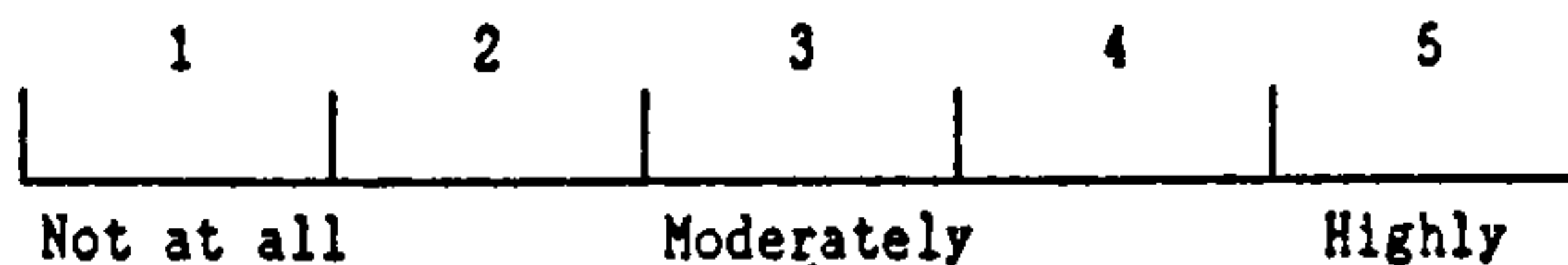


- (a) Marketing Director.
- (b) Production Director.
- (c) R & D Director.
- (d) Managing Director.
- (d) Managing Director.
- (e) Divisional Directors (e.g. Area/Product Directors).
- (f) Others (please specify):

8. In your opinion, to what extent is the INVENTORY OF RESOURCES an indicator of the company's capacity to reallocate resources in time to meet unexpected financial needs? (Please tick (✓) one cell).



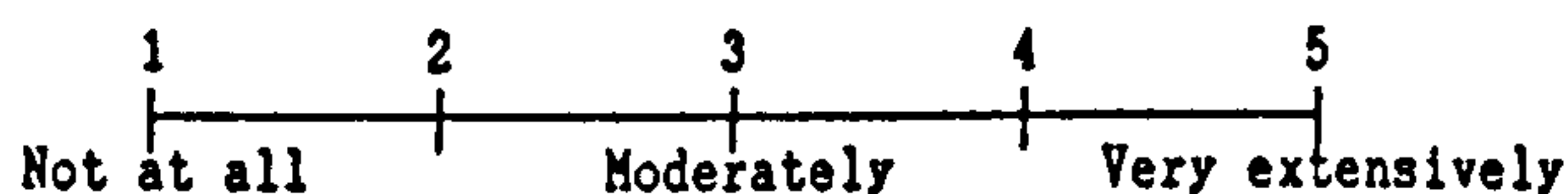
9. In your opinion, how effective is the INVENTORY OF RESOURCES in providing for capacity to reallocate resources at minimum cost? (Please tick (✓) one cell).



Please go to question 11.

10. Please explain why the company does not usually TAKE AN INVENTORY of the resources available to cover possible unexpected financial needs.

11. In your opinion, to what extent is each of the following items an indicator of the company's capacity to reallocate resources in time to meet unexpected financial needs? (Please use the scale below; use 0 if not applicable).



(Enter number in box)

- (a) Liquid assets (i.e. Cash + Short-term marketable securities).
- (b) Liquid assets/Current assets.
- (c) Quick ratio (Liquid assets + Accounts receivable/Current liabilities).
- (d) Current ratio (Current assets/Current liabilities).
- (e) Working capital (Current assets - Current liabilities).
- (f) Working capital/Net assets.
- (g) Cash flow (Profit + Non-cash expenses)/Total debt.
- (h) Others (please specify):

12. Is there in the company a defined rationale setting out the general sequence in which resources will be used to meet possible unexpected financial needs?

Yes (go to next question)

No (go to SECTION 4)

13. Please describe the company's rationale for activating resources when unexpected financial needs arise.



SECTION 4 - GENERAL INFORMATION

1. How long has the company been operating? (Please tick (✓) one box).

- (a) 5 years or less.  (c) More than 15 years up to 30 years.  
 (b) More than 5 years up to 15 years.  (d) More than 30 years.

2.1. Considering all possible sources of external financing available to the company (e.g. short-term borrowing, medium/long-term borrowing, equity financing) how would you presently rate the company's overall unused borrowing capacity? (Please tick (✓) one cell).



2.2. How would you say this overall unused borrowing capacity has evolved during the past 5 years (e.g. decreased, increased, etc.)?

3. Using the scale below, please tick (✓) the degree of predictability traditionally showed by the company's cash flows.

	1 Very low	2	3 Moderate	4	5 Very high
(a) Cash inflows.					
(b) Cash outflows.					

4. How much of the finance department's time is generally spent with the management (planning and control) of cash? (Please tick (✓) one box).

- (a) Less than 10%.  (c) Between 30 and 60%.  
 (b) Between 10 and 29%.  (d) More than 60%.

5. The number of senior and middle people (i.e. excluding clerical and secretarial staff) employed in the finance department is, including yourself,.....

6. Could you please draw in the space provided below or attach to this questionnaire a diagram describing the organizational structure of the finance department?

7. Please indicate your name, title and company name below. A copy of the results of the study will be sent to you in due course.

Name:

Title:

Company Name:

THANK YOU VERY MUCH FOR YOUR COOPERATION AND ASSISTANCE.

### B.3 First request letters

&NAME&  
&TITLE&  
&COMPANYNAME&  
&ADDRES1&  
&ADDRES2&  
&ADDRES3/0&  
&ADDRES4/0&

10th August 1983

Dear &FINANCEDIRECTOR&

I have pleasure in informing you that the University of Glasgow is carrying out a major project in the field of short-term cash flow planning. The researcher involved is Mrs. Marques who is endeavouring to gather evidence of practice in this area as a basis for a greater understanding of the problems involved and for possible improvements in corporate financial policy.

It would be greatly appreciated if your firm could co-operate in this project by completing the attached questionnaire which should take only a little of your time. I hope that you will consider the effort worthwhile. A copy of the final report will be forwarded to you in due course.

Yours sincerely,

S. J. Gray  
Professor of Accountancy



&NAME&  
&TITLE&  
&COMPANYNAME&  
&ADDRES1&  
&ADDRES2&  
&ADDRES3/O&  
&ADDRES4/O&

10th August 1983

Dear &FINANCEDIRECTOR&

I am writing to ask if your company would be prepared to participate in a research project that is being carried out at Glasgow University in the field of short-term cash flow planning. The purpose of this research project is to achieve an understanding of how companies handle the problem of unexpected events which have, on materialization, major negative implications for the expected cash flow equilibrium of the firm. Unexpected events are those events not contemplated in the budget because they are unknown, uncertain or less likely at the time of its preparation.

The project in question is an exploratory study, since very little is yet known about this aspect of corporate planning. The study attempts to gain a first insight as to how companies are dealing in practice with the problem and hopes to make a relevant contribution to policy development in the area, particularly at a time when companies are being so negatively affected by the instability and unpredictability of the business environment.

The study includes a survey based on a questionnaire to be mailed to a large number of U.K.-based companies. This being so, the cooperation of experienced members of the business community is of great importance to this research effort. Your firm's participation in this survey would be very much appreciated.

Would you be kind enough to take some minutes to complete the enclosed questionnaire? A stamped and addressed envelope is enclosed.

Please note that all of the information provided by your company will be kept strictly confidential. The results of the research will be presented in aggregate form, without any reference to specific firms or individuals participating in the study. The findings of this research will be made available and a copy of the final report will be forwarded to each participant.

Thank you in advance for your interest and cooperation. Your assistance will be greatly appreciated.

Yours sincerely,

Maria M. Marques (M.Com.)

## B.4 Second request letter



&NAME&  
&TITLE&  
&COMPANYNAME&  
&ADDRES1&  
&ADDRES2&  
&ADDRES3/0&  
&ADDRES4/0&

7th September 1983

Dear &FINANCEDIRECTOR&

Four weeks ago Professor Gray and I wrote inviting you to participate in a research project which is being conducted in this University on the subject of short-term cash flow planning. We have not heard from you since, so I am writing to reaffirm our interest in your participation in the study. The cooperation of a large number of experienced members of the business community is absolutely vital for the achievement of valid and meaningful results.

Please find enclosed another copy of the questionnaire sent to you earlier. I would be most grateful if you or one of your colleagues could spend a few minutes to complete it.

I would like to emphasize that all the information provided will be kept strictly confidential. The results of the survey will be reported in aggregate only. When the research is completed, a copy of its findings will be sent to each participant. It will hopefully be of interest to you in the formulation of policy decisions in this area.

I will be most grateful for your interest and support.

Yours sincerely,

Maria M. Marques

## B.5 Acknowledgement letter

&NAME&  
&TITLE&  
&COMPANYNAME&  
&ADDRES1&  
&ADDRES2&  
&ADDRES3/O&  
&ADDRES4/O&

Day/Month/Year

Dear &FINANCEDIRECTOR&

I write to acknowledge receipt of the questionnaire on short-term cash flow planning. I am very grateful to you for giving time and attention to its completion and for returning it to me. Your contribution is an important one for the overall success of this research project.

I hope to let you have the results of the study by mid-1984 and I trust you will find them to be of interest to you. Once again, thank you very much for your cooperation.

Yours sincerely,

Maria M. Marques



## Appendix C Elements of the Archival Analysis

- C.1 Decomposition of financial indicators into first and second component elements
- C.2 Special structure of three first component elements of the cash flow indicators
- C.3 Data collection sheet
- C.4 Definition of second component elements

C.1 Decomposition of financial indicators into first  
and second component elements

Exhibit C.1.1

Decomposition of financial indicators into first component elements

First component elements	Financial indicators							
	TURNOVER	<u>FIXED ASSETS</u> N. OF EMPLOYEES	<u>NET INCOME</u> NET WORTH	<u>TURNOVER</u> NET ASSETS	<u>TOTAL DEBT</u> NET ASSETS	<u>LIQUID ASSETS</u> CURRENT ASSETS	<u>NET INCOME</u> DIVIDENDS PROPOSED	<u>NET INCOME</u> N. OF ORD. SHARES
. TURNOVER	X			X				
. NET INCOME			X				X	X
. DIVIDENDS PROPOSED							X	
. N. OF ORD. SHARES								X
. LIQUID ASSETS						X		
. CURRENT ASSETS						X		
. FIXED ASSETS		X						
. NET ASSETS				X	X			
. TOTAL DEBT					X			
. NET WORTH			X					
. N. OF EMPLOYEES		X						
First component elements	Financial indicators							
	<u>INTERNAL CASH FLOW</u> TOTAL CASH BEARING	<u>OPERATING CASH FLOW</u> TOTAL CASH BEARING	<u>WORKING CAPITAL INV.</u> TOTAL CASH BEARING	<u>CAPITAL EXPENDITURES</u> TOTAL CASH PLOUGH-BACK	<u>EBIT</u> INTEREST PAID			
. EBIT					X			
. OPERATING CASH FLOW		X						
. WORKING CAPITAL INV.			X					
. INTERNAL CASH FLOW	X							
. CAPITAL EXPENDITURES				X				
. INTEREST PAID					X			
. TOTAL CASH BEARING	X	X	X					
. TOTAL CASH PLOUGH-BACK				X				



Exhibit C.1.2

Decomposition of first component elements into second component elements

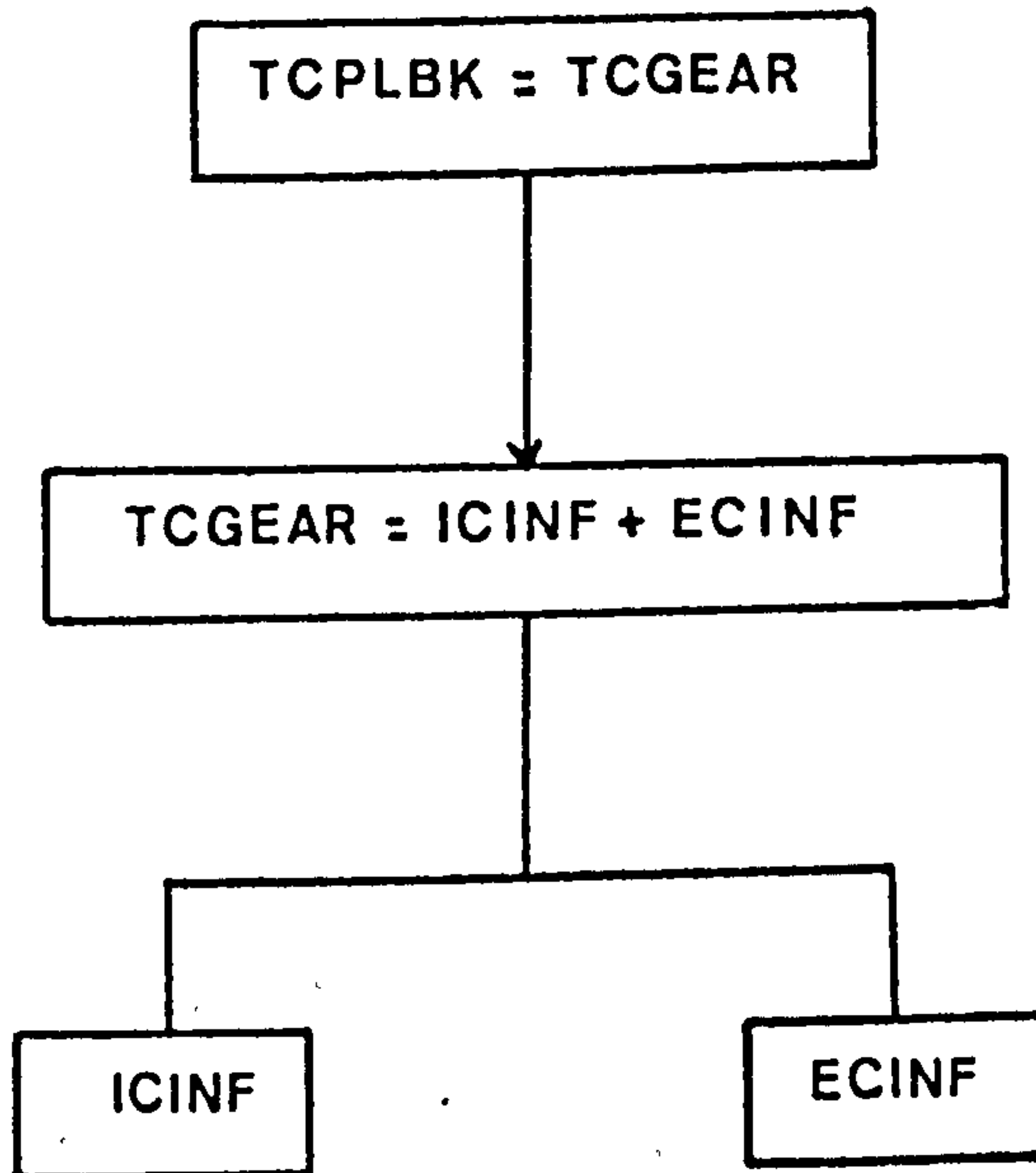
Second component elements	First component elements										
	TURNOVER	EDIT	NET INCOME	DIVIDENDS PROPOSED	N. OF ORD. SHARES	LIQUID ASSETS	CURRENT ASSETS	FIXED ASSETS	NET ASSETS	TOTAL DEBT	NET WORTH
. Turnover	X										
. Operating profit/(loss)		X									
. Net profit/(loss)			X								
. Dividends proposed				X							
. No. of ordinary shares					X						
. Liquid assets						X	X		X		
. Accounts receivable							X				
. Inventories							X				
. Working capital									X		
. Fixed assets								X	X		
. Short-term debt										X	
. Medium and long-term debt										X	
. Equity											X
Second component elements	First component elements										
	OPERATING CASH FLOW	WORKING CAPITAL INV.	INTERNAL CASH FLOW	CAPITAL EXPENDITURES	INTEREST PAID	TOTAL CASH <sup>§</sup> GEARING	TOTAL CASH <sup>§</sup> PLOUGH-BACK	N. OF EMPLOYEES			
. Funds generated from operations	X		X			X	X				
. Inc./(Dec.) in working capital	X	X	X			X	X				
. Inc./(Dec.) in liquid assets		X	X			X	X				
. Sale of fixed assets			X			X					
. Increase in short-term debt						X					
. Increase in medium and long-term debt						X					
. Increase in equity						X					
. Capital expenditures				X			X				
. Taxes paid/(received)						X	X				
. Dividends paid/(received)						X	X				
. Interest paid/(received)					X	X	X				
. Repayment of short-term debt							X				
. Repayment of medium and long-term debt							X				
. Other cash outflows/(inflows)						X	X				
. Number of employees								X			

<sup>§</sup> The special structure of these three first component elements is presented in Appendix C.2.

C.2 Special structure of three first component elements  
of the cash flow indicators

Exhibit C.2.1

Structure of total cash gearing and total cash plough-back



TCPLB = Total cash plough-back

TCGEAR = Total cash gearing

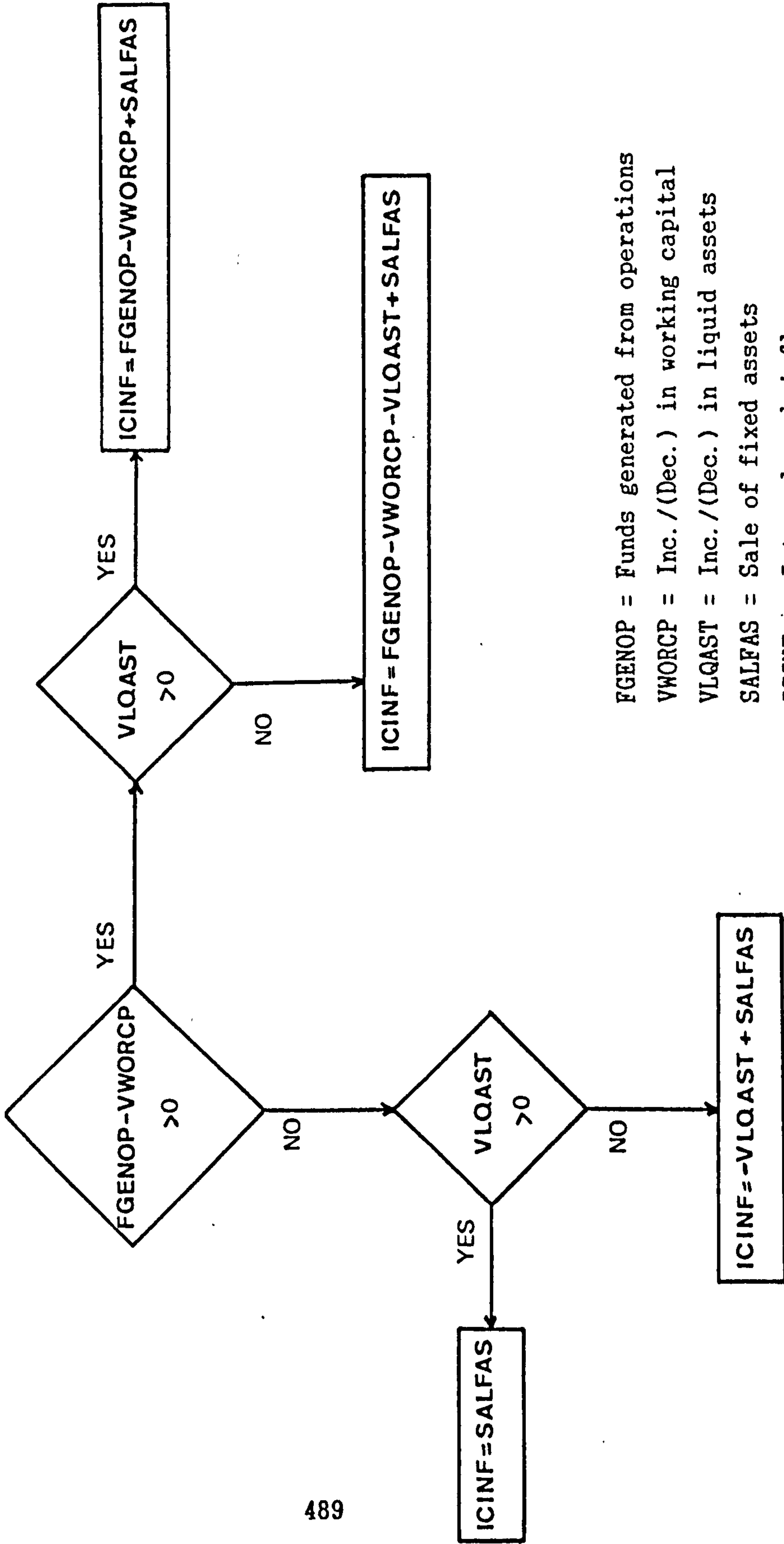
ICINF = Internal cash inflow

ECINF = External cash inflow



Exhibit C.2.2

Structure of internal cash inflow

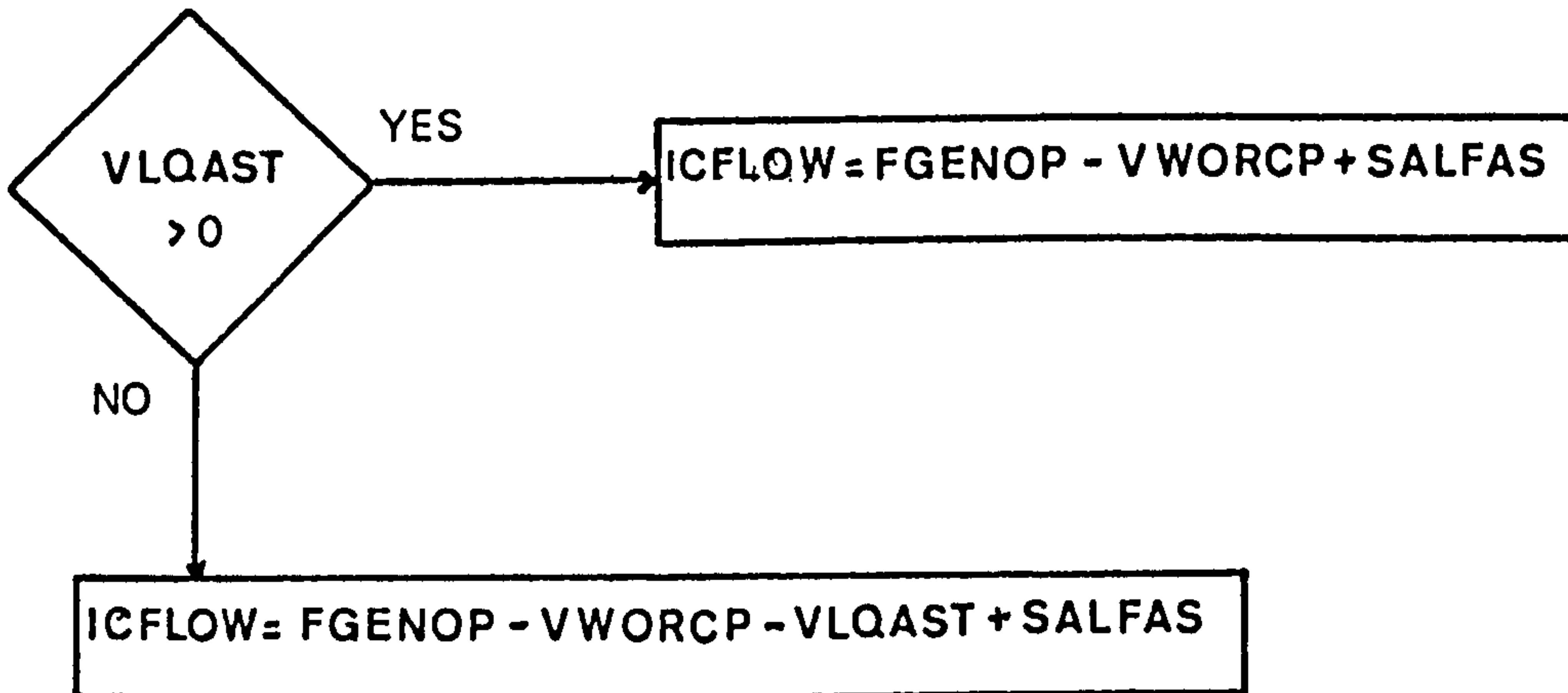


FGENOP = Funds generated from operations  
 VWORCP = Inc. / (Dec.) in working capital  
 VLQAST = Inc. / (Dec.) in liquid assets  
 SALFAS = Sale of fixed assets  
 ICINF = Internal cash inflow



Exhibit C.2.4

Structure of internal cash flow



FGENOP = Funds generated from operations

VWORCP = Inc./ (Dec.) in working capital

VLQAST = Inc./ (Dec.) in liquid assets

SALFAS = Sale of fixed assets

ICFLOW = Internal cash flow



### C.3 Data collection sheet

YEAR:

1. Company number		<input type="text"/>	<input type="text"/>	<input type="text"/>
2. Turnover	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3. Operating profit/(loss)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4. Net profit/(loss)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5. Dividends proposed		<input type="text"/>	<input type="text"/>	<input type="text"/>
6. No. of ordinary shares	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7. Liquid assets		<input type="text"/>	<input type="text"/>	<input type="text"/>
8. Accounts receivable		<input type="text"/>	<input type="text"/>	<input type="text"/>
9. Inventories		<input type="text"/>	<input type="text"/>	<input type="text"/>
10. Working capital	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
11. Fixed assets	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
12. Short-term debt		<input type="text"/>	<input type="text"/>	<input type="text"/>
13. Medium and long-term debt	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
14. Equity	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
15. Funds generated from operations	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
16. Increase/(Decrease) in working capital	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
17. Increase/(Decrease) in liquid assets		<input type="text"/>	<input type="text"/>	<input type="text"/>
18. Sale of fixed assets		<input type="text"/>	<input type="text"/>	<input type="text"/>

19. Increase in short-term debt	<input type="text"/> <input type="text"/>	.	<input type="text"/>
20. Increase in medium and long-term debt	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
21. Increase in equity	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
22. Capital expenditures	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
23. Taxes paid/(received)	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
24. Dividends paid/(received)	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
25. Interest paid/(received)	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
26. Repayment of short-term debt	<input type="text"/> <input type="text"/>	.	<input type="text"/>
27. Repayment of medium and long-term debt	<input type="text"/> <input type="text"/>	.	<input type="text"/>
28. Other cash outflows/(inflows)	<input type="text"/> <input type="text"/> <input type="text"/>	.	<input type="text"/>
29. Number of employees	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		



#### C.4 Definition of second component elements

## 2. Turnover

- . Shown at invoice value and excluding sales between subsidiary companies;
- . Units - £ millions; 5 integers and a decimal point; no box for negative values;

## 3. Operating profit/(loss)

- . This is profit/(loss) before interest and taxes;
- . Equals Sales - Materials and services - Employment costs + Share of profits of associated companies;
- . Units - £ millions; 4 integers and a decimal point; 1 box for negative values;

## 4. Net profit/(loss)

- . Equals Operating profit/(loss) - Net interest - Net taxes - Exceptional items - Minority interests - Preference dividends;
- . Units - £ millions; 4 integers and a decimal point; 1 box for negative values;

## 5. Dividends proposed

- . Equal Ordinary dividends (interim + final);
- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

## 6. No. of ordinary shares

- . Units - £ millions; 4 integers and a decimal point; no box for negative values;

## 7. Liquid assets

- . Equal Cash + Bank balances + Short-term marketable securities;
- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

## 8. Accounts receivable

## 9. Inventories

- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

## 10. Working capital

- . Equals Current assets - Current liabilities, excluding Liquid assets and Short-term debt;
- . Units - £ millions; 3 integers and a decimal point; 1 box for negative values;

**11. Fixed assets**

- . Equal Property + Equipment + Plant + Assets leased + Investments in associated companies + Intangibles;
- . Shown at net value (taking out depreciation);
- . Units - £ millions; 4 integers allowed and a decimal point; no box for negative values;

**12. Short-term debt**

- . Equals Bank loans + Overdrafts;
- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

**13. Medium and long-term debt**

- . Units - £ millions; 4 integers and a decimal point; no box for negative values;

**14. Equity**

- . Equals Share capital (ordinary) + Share premium + Retained earnings - Goodwill;
- . Units - £ millions; 4 integers and a decimal point; no box for negative values;

**15. Funds generated from operations**

- . Equal Operating profit/(loss) + Depreciation + Other non-cash items in profit;
- . Units - £ millions; 3 integers and a decimal point; 1 box for negative values;

**16. Increase/(Decrease) in working capital**

- . Units - £ millions; 3 integers and a decimal point; 1 box for negative values;

**17. Increase/(Decrease) in liquid assets**

- . Units - £ millions; 2 integers and a decimal point; 1 box for negative values;

**18. Sale of fixed assets**

- . Units - £ millions; 3 integers and a decimal point; no box for negative values;



## 19. Increase in short-term debt

- . Units - £ millions; 2 integers and a decimal point; no box for negative values;

## 20. Increase in medium and long-term debt ]

## 21. Increase in equity ]

- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

## 22. Capital expenditures

- . Units - £ millions; 3 integers and a decimal point; no box for negative values;

## 23. Taxes paid/(received) ]

## 24. Dividends paid/(received) ]

- . Calculated net;
- . Units - £ millions; 2 integers and a decimal point; 1 box for negative values;

## 25. Interest paid/(received)

- . Calculated net;
- . Assumed equal to interest for the period;
- . Units - £ millions: 2 integers and a decimal point; 1 box for negative values;

## 26. Repayment of short-term debt ]

## 27. Repayment of medium and long-term debt ]

- . Units - £ millions; 2 integers and a decimal point; no box for negative values;

## 28. Other cash outflows/(inflows)

- . Units - £ millions; 2 integers and a decimal point; 1 box for negative values;

## 29. Number of employees

- . Measured at year end;
- . Units - thousands; 6 integers; no decimal point or box for negative values;

## Appendix D Preparation of the Data Matrix

- D.1 Alphabetical list of questionnaire variables with indication of location by question and section of the questionnaire
- D.2 Questionnaire variables coding frame
- D.3 Generation of the questionnaire system file FSPSSQ
- D.4 Intermediate variables involved in the preparation of the financial indicators data matrix
- D.5 Generation of the financial indicators system file FSPSSR
- D.6 Generation of the final system file FSPSS

D.1 Alphabetical list of questionnaire variables with indication of location by question and section of the questionnaire



Questionnaire variables in alphabetical order	Questionnaire sections	SECTION 1	SECTION 2	SECTION 3	SECTION 4
ACCPIN				Q. 1	
ADSB				Q. 1	
ADUSBL				Q. 1	
BORCAPEV					Q. 3/Q. 2
BORCAPR					Q. 3/Q. 2
CASHR1					Q. 8/Q. 6
CASHR2					Q. 8/Q. 6
CFBCOMM		Q. 8			
CFBDIV1		Q. 2			
CFBDIV12		Q. 2			
CFBDIV3		Q. 2			
CFBDIV6		Q. 2			
CFBDIVO		Q. 2			
CFBHORIZN		Q. 1			
CFBREX		Q. 4			
CFBROLOV		Q. 3			
CFBTIME		Q. 6			
CFPBD			Q. 6		
CFPFD			Q. 6		
CFPGEN			Q. 6		
CFPOTH			Q. 6		
CFPSD			Q. 6		
CFPSEIN			Q. 6		
CFPSEOU			Q. 6		
CFPSFD			Q. 6		
CFTDREAL				Q. 12/Q. 11	
CHPROD				Q. 1	
CIPREDCT					Q. 4/Q. 3
CMFUNCT					Q. 2/ -
COEXIST					Q. 1
COPREDCT					Q. 4/Q. 3
CORPMOD1					Q. 8/Q. 6
CORPMOD2					Q. 8/Q. 6
CRATREAL				Q. 12/Q. 11	
CRITADQY				Q. 6	
DECPOU				Q. 1	
FINCONT1					Q. 8/Q. 6
FINCONT2					Q. 8/Q. 6
HEADFDEP					Q. 8/Q. 6
HQOPACT					Q. 5/ -
INCPIN				Q. 1	
INFCERT				Q. 5	
INFCOND				Q. 5	
INFMAGN				Q. 5	
INFOTH				Q. 5	
INFTIME				Q. 5	
IV				Q. 3	

Questionnaire variables in alphabetical order	Questionnaire sections	SECTION 1	SECTION 2	SECTION 3	SECTION 4
IVACCPIN				Q.4	
IVADSBL				Q.4	
IVADUSBL				Q.4	
IVCFB				Q.3	
IVCHPROD				Q.4	
IVDECPOU				Q.4	
IVDISR				Q.9	
IVDSCDVD				Q.7	
IVDSCMD				Q.7	
IVDSCMGD				Q.7	
IVDSCOTH				Q.7	
IVDSCPD				Q.7	
IVDSCRD				Q.7	
IVDSCSD				Q.7	
IVDSCSFD				Q.7	
IVHRZ				Q.3	
IVINCPIN				Q.4	
IVLIQFA				Q.4	
IVLTDEBT				Q.4	
IVNWEQTY				Q.4	
IVOTH				Q.3	
IVOTHERS				Q.4	
IVPC				Q.11/ -	
IVRCFB				Q.3	
IVRDADM				Q.4	
IVRDCKXP				Q.4	
IVRDDIV				Q.4	
IVRDMARK				Q.4	
IVRDRDEV				Q.4	
IVREAL				Q.8	
IVSC				Q.11/ -	
IVSCASH				Q.4	
IVTIME				Q.3	
IVUNCRDT				Q.4	
IVUPDT				Q.3	
LIQFA				Q.1	
LTDEBT				Q.1	
MGACCPIN				Q.1	
MGADSBL				Q.1	
MGADUSBL				Q.1	
MGCHPROD				Q.1	
MGDECPOU				Q.1	
MGINCPIN				Q.1	
MGLIQFA				Q.1	
MGLTDEBT				Q.1	
MGNWEQTY				Q.1	
MGOTHERS				Q.1	

Questionnaire variables in alphabetical order	Questionnaire sections	SECTION 1	SECTION 2	SECTION 3	SECTION 4
MGRDADM				Q. 1	
MGRDCEXP				Q. 1	
MGRDDIV				Q. 1	
MGRDMARK				Q. 1	
MGRDRDEV				Q. 1	
MGSCASH				Q. 1	
MGUNCRDT				Q. 1	
MICAREAL				Q. 12/Q. 11	
MIREAL				Q. 12/Q. 11	
NIVREAS				Q. 10	
NWEQTY				Q. 1	
NWFASCOM			Q. 8		
NWFASCOS			Q. 8		
NWFASEFE			Q. 8		
NWFASIMP			Q. 8		
NWFASOTH			Q. 8		
NWFASREM			Q. 8		
NWFASTIM			Q. 8		
NWFASUSE			Q. 8		
NWFCASH			Q. 16		
NWFCFP			Q. 16		
NWFCOS			Q. 16		
NWFEFE			Q. 16		
NWFIMP			Q. 16		
NWFOTH			Q. 16		
NWFPD			Q. 7		
NWFPRD			Q. 16		
NWFREM			Q. 16		
NWFRESP			Q. 16		
NWFTIM			Q. 16		
OBJCSHT1		Q. 7			
OBJCSHT2		Q. 7			
OBJMCSH1		Q. 7			
OBJMCSH2		Q. 7			
OBJOTH1		Q. 7			
OBJOTH2		Q. 7			
OBJPBGR1		Q. 7			
OBJPBGR2		Q. 7			
OBJPFIN1		Q. 7			
OBJPFIN2		Q. 7			
OTHERS				Q. 1	
OTREAL				Q. 12/Q. 11	
PEOPLE					Q. 7/Q. 5
PERCSAL					Q. 5/ -
PLSTRMG1					Q. 8/Q. 6
PLSTRMG2					Q. 8/Q. 6
QRATREAL				Q. 12/Q. 11	



Questionnaire variables in alphabetical order	Questionnaire sections	SECTION 1	SECTION 2	SECTION 3	SECTION 4
RANGEVAL			Q. 3		
RCFBCOP			Q. 18/Q. 17		
RCFBPLAN			Q. 19/Q. 18		
RDADM				Q. 1	
RDCEXP				Q. 1	
RDDIV				Q. 1	
RDMARK				Q. 1	
RDRDEV				Q. 1	
RESPALT			Q. 4		
REVFREQ		Q. 4			
REVOBJ				Q. 2	
REVSTRAT				Q. 2	
ROLOVPRE		Q. 3			
SCASH				Q. 1	
STRTSEQR				Q. 13/Q. 12	
TIMECM					Q. 6/Q. 4
TREAS1					Q. 8/Q. 6
TREAS2					Q. 8/Q. 6
UNCRDT				Q. 1	
UPDT		Q. 5			
UPDTCASH			Q. 20/Q. 19		
UPDTCOMM		Q. 8			
UPDTCONF			Q. 20/Q. 19		
UPDTCOP			Q. 18/Q. 17		
UPDTEFCT			Q. 20/Q. 19		
UPDTEMRG			Q. 20/Q. 19		
UPDTHRZA		Q. 5			
UPDTHRZB		Q. 5			
UPDTHRZC		Q. 5			
UPDTINTR			Q. 20/Q. 19		
UPDTLKHD			Q. 20/Q. 19		
UPDTOTH			Q. 20/Q. 19		
UPDTPLAN			Q. 19/Q. 18		
UPDTPREP		Q. 5			
UPDTPRP		Q. 5			
UPDTREAS		Q. 5			
UPDTRESP			Q. 20/Q. 19		
UPDTTIME		Q. 6			
VDEBTPOL				Q. 2	
VDIVPOL				Q. 2	
WCNAREAL				Q. 12/Q. 11	
WCREAL				Q. 12/Q. 11	
WFAS			Q. 1		
WFASBD			Q. 6		
WFASDISR			Q. 5		
WFASFD			Q. 6		
WFASGEN			Q. 6		

Questionnaire variables in alphabetical order	Questionnaire sections	SECTION 1	SECTION 2	SECTION 3	SECTION 4
WFASOTH			Q. 6		
WFASSD			Q. 6		
WFASSEIN			Q. 6		
WFASSEOD			Q. 6		
WFASSFD			Q. 6		
WFCASH			Q. 20/Q. 19		
WFCFBAS			Q. 2		
WFCOMPUT			Q. 15		
WFCONE			Q. 20/Q. 19		
WFDSCDVD			Q. 14		
WFDSCMD			Q. 14		
WFDSCMGD			Q. 14		
WFDSCOTH			Q. 14		
WFDSCPD			Q. 14		
WFDSCRD			Q. 14		
WFDSCSD			Q. 14		
WFDSCSFD			Q. 14		
WFEFCT			Q. 20/Q. 19		
WFEMRG			Q. 20/Q. 19		
WFINTR			Q. 20/Q. 19		
WFLKHD			Q. 20/Q. 19		
WFOTH			Q. 20/Q. 19		
WFPC			Q. 17/ -		
WFPD			Q. 1		
WFPDACT			Q. 9		
WFPDACTD			Q. 10		
WFPDFUT			Q. 9		
WFPDFUTD			Q. 10		
WFPDOH			Q. 9		
WRCFBAS			Q. 2		
WREAS			Q. 11		
WFRESP			Q. 20/Q. 19		
WFSC			Q. 17/ -		
WFTIME			Q. 12		
WFUPDTAS			Q. 2		
WFWHO			Q. 13		

\* Where two questions are indicated for a variable, the first shows the location of this variable in the group version of the questionnaire; the second shows its location in the non-group version.

\* Where a "-" is indicated for a variable; it means that the variable was not identified in the non-group version of the questionnaire.

## D.2 Questionnaire variables coding frame



INTRODUCTORY VARIABLES

## \* CN

(Company identification number)

n Three-digit number

## \* IC

(Industry classification according to the Financial Times Actuaries Equity Index, as at January 1, 1982)

2	Building Materials
3	Contracting and Construction
4	Electricals
6	Mechanical Engineering
22	Brewers and Distillers
25	Food Manufacturing
26	Food Retailing
29	Leisure
33	Packaging and Paper
34	Stores
35	Textiles

## \* REQUEST

(Number of questionnaire requests)

1	One
2	Two

## \* GROUP

(Organization into group structure)

1	Yes
2	No

SECTION 1 - SHORT-TERM CASH FLOW PLANNING

Q.1

\* CFBHORZN

(Period of time covered by the cash flow budget)

n	Number of months
99	Not determined
999	Not applicable

Q.2

\* CFBDIV1

(Interval of division used up to first month of the cash flow budget)

1	Day	4	Others
2	Week	99	Not determined
3	Month	999	Not applicable

\* CFBDIV3

(Interval of division used between first and third month, or up to third month of the cash flow budget)

1	Day	5	Others
2	Week	99	Not determined
3	Month	999	Not applicable
4	Quarter		

\* CFBDIV6

(Interval of division used between third and sixth month, or up to sixth month of the cash flow budget)

1	Day	5	Others
2	Week	99	Not determined
3	Month	999	Not applicable
4	Quarter		

\* CFBDIV12

(Interval of division used between sixth and twelfth month, or up to first year of the cash flow budget)

1	Day	5	Year
2	Week	6	Others
3	Month	99	Not determined
4	Quarter	999	Not applicable

## SECTION 1

Q.2

\* CFBDIVO

(Interval of division used after first year of the cash flow budget)

1	Day	5	Year
2	Week	6	Others
3	Month	99	Not determined
4	Quarter	999	Not applicable

Q.3

\* CFBROLOV

(Nature of the cash flow budget revisions)

1	Prepared on a continuous roll-over basis
2	Not prepared on a continuous roll-over basis
99	Not determined
999	Not applicable

\* ROLOVPRE

(Timing of roll-over preparation)

1	Monthly	4	Others
2	Quarterly	99	Not determined
3	Six monthly	999	Not applicable

Q.4

\* CFBREV

(Character of the cash flow budget revisions)

1	Non-existent	4	Regular
2	Occasional	99	Not determined
3	Occasional and regular	999	Not applicable

\* REVFREQ

(Frequency of the cash flow budget revisions)

1	Six monthly	5	Others
2	Quarterly	99	Not determined
3	Monthly	999	Not applicable
4	Weekly		



## SECTION 1

Q.5

## \* UPDT

(Existence of a cash flow updating or forecasting system)

1	Yes	99	Not determined
2	No		

## \* UPDTPRP

(Character of the cash flow updates or forecasts)

1	Occasional	99	Not determined
2	Regular	999	Not applicable

## \* UPDTPREP

(Frequency of the cash flow updates or forecasts)

1	Daily	4	Others
2	Weekly	99	Not determined
3	Monthly	999	Not applicable

## \* UPDTHRZA

(Nature of the period of time covered by the cash flow updates or forecasts)

1	Variable	99	Not determined
2	Decreasing	999	Not applicable
3	Fixed		

## \* UPDTHRZB

(Period of time covered by the cash flow updates or forecasts)

1	One month or less ahead
2	Between 1 and 3 months ahead
3	Between 3 and 6 months ahead
4	Between 6 and 12 months ahead
5	More than 12 months ahead
99	Not determined
999	Not applicable

## SECTION 1

Q.5

## \* UPDTHRZC

(Number of planning processes operated over the period of time covered by the cash flow updates or forecasts)

1	One	99	Not determined
2	Two	999	Not applicable

## \* UPDTREAS

(Main reasons for the preparation of cash flow updates or forecasts)

1	The occurrence of a particular major event
2	The need for cash flow control in general
3	The need to invest surplus funds on the money market
4	Other reasons
99	Not determined
999	Not applicable

Q.6

## \* CFBTIME

(Number of years for which the cash flow budgeting system has been in operation)

1	For 5 years or less
2	For more than 5 years up to 10 years
3	For more than 10 years up to 20 years
4	For more than 20 years
99	Not determined
999	Not applicable

## \* UPDTTIME

(Number of years for which the cash flow updating or forecasting system has been in operation)

1	For 5 years or less
2	For more than 5 years up to 10 years
3	For more than 10 years up to 20 years
4	For more than 20 years
99	Not determined
999	Not applicable

## SECTION 1

Q.7

Objectives set for the cash flow budgeting system:

## \* OBJPBGR1

(To plan for business growth, investment in projects, introduction of new products, etc.)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* OBJCSHT1

(To express in cash terms the objectives, strategies and plans of the business)

-idem-

## \* OBJPFIN1

(To plan the need for financing)

-idem-

## \* OBJMCSH1

(To manage and control the cash position)

-idem-

## \* OBJOTH1

(Others)

-idem-

Objectives set for the cash flow updating or forecasting system:

## \* OBJPBGR2

(To plan for business growth, investment in projects, introduction of new products, etc.)

-idem-

## \* OBJCSHT2

(To express in cash terms the objectives, strategies and plans of the business)

-idem-



SECTION 1

Q.7

\* OBJPFIN2

(To plan the need for financing)

-idem-

\* OBJMCSH2

(To manage and control the cash position)

-idem-

\* OBJOTH2

(Others)

-idem-

Q.8

\* CFBCOMM

(Degree of commitment attached to cash budgets in general)

- 1 Very low
- 2
- 3 Moderate
- 4
- 5 Very high
- 99 Not determined
- 999 Not applicable

\* UPDTCOMM

(Degree of commitment attached to cash flow updates or forecasts)

-idem-

SECTION 2 - PLANNING FOR UNCERTAINTY

Q.1

\* WFAS

(Implementation of proactive contingency planning)

1	Yes	99	Not determined
2	No		

\* WFPD

(Implementation of reactive contingency planning)

-idem-

Q.2

Cash flow plans at the level of which proactive contingency planning is carried out:

\* WFCFBAS

(The cash flow budget)

1	Yes	99	Not determined
2	No	999	Not applicable

\* WFCFBAS

(Cash flow budget revisions)

-idem-

\* WFUPDTAS

(Cash flow updates or forecasts)

-idem-





## SECTION 2

Q.6

## \* WFASFD

(The (HQ) finance officer)

-idem-

## \* WFASSEIN

((Group) senior executives below the (HQ) finance officer)

-idem-

## \* WFASSEOU

((Group) senior executives below director level outside the (HQ)finance department)

-idem-

## \* WFASSD

(Subsidiary company Directors)

-idem-

## \* WFASSEFD

(Subsidiary company finance officer)

-idem-

## \* WFASGEN

(Group or company in general)

-idem-

## \* WFASOTH

(Others)

-idem-

## SECTION 2

Q.6

People in the company to whom the cash flow plans to which they apply are communicated:

## \* CFPBD

(Group or Board of Directors)

-idem-

## \* CFPFD

(The (HQ) finance officer)

-idem-

## \* CFPSEIN

((Group) senior executives below the (HQ) finance officer)

-idem-

## \* CFPSEOU

((Group) senior executives below director level outside the (HQ) finance department)

-idem-

## \* CFPSD

(Subsidiary company Directors)

-idem-

## \* CFPSFD

(Subsidiary company finance officer)

-idem-

## \* CFPGEN

(Group or company in general)

-idem-

## SECTION 2

Q.6

\* CFPOTH

(Others)

-idem-

Q.7

\* NWFPD

(Main reasons for not carrying out reactive contingency planning)

99 Not determined  
 999 Not applicable

Q.8

Reasons for not carrying out proactive contingency planning:

\* NWFASREM

(The company has never considered the idea)

1	Yes	99	Not determined
2	No	999	Not applicable

\* NWFASUSE

(The company does not see any use in planning a priori for specific events whose probability is small or uncertain)

-idem-

\* NWFASEFE

(Proactive contingency planning is more effective at the level of the individual company within the group than at group level)

-idem-

\* NWFASIMP

(Proactive contingency planning is an impracticable task since the range of alternatives is almost without limit)

-idem-



## SECTION 2

Q.8

## \* NWFASCOM

(Proactive contingency planning is counterproductive for organizational performance)

-idem-

## \* NWFASCOS

(Proactive contingency planning is too costly and/or sophisticated)

-idem-

## \* NWFASIM

(Proactive contingency planning is too time-consuming)

-idem-

## \* NWFASOTH

(Other reasons)

-idem-

Q.9

Types of unexpected event leading to reactive contingency planning:

## \* WFPDACT

(Unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* WFPDFUT

(Unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm)

-idem-

## SECTION 2

Q. 9

\* WFPDOTH

(Other events)

-idem-

Q. 10

\* WFPDACTD

(Effectiveness of reactive contingency planning in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm)

- 1 Null
- 2
- 3 Moderate
- 4
- 5 High
- 99 Not determined
- 999 Not applicable

\* WFPDFUTD

(Effectiveness of reactive contingency planning in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm)

. -idem-

Q. 11

\* WFREAS

(Main reasons for carrying out contingency planning)

- 1 Nature of the business
- 2 The need to ensure consistent and effective control of resource allocation
- 3 The need to check the financial feasibility of certain courses of action in response to major deviations from expected cash flows
- 4 The occurrence of a major financial crisis in the past
- 5 Logical complement to cash flow projections
- 6 Opportunity provided by the availability of computer-based financial simulation models
- 7 Other reasons
- 99 Not determined
- 999 Not applicable

## SECTION 2

Q. 12

\* WFTIME

(Number of years for which contingency planning has been carried out)

- 1 For 1 year or less
- 2 For more than 1 year up to 5 years
- 3 For more than 5 years
- 99 Not determined
- 999 Not applicable

Q. 13

\* WFWHO

(Who in the company took the initiative to carry out contingency planning)

- 1 The Group or Board of Directors
- 2 A (group) Director above the (HQ) finance officer
- 3 The (HQ) finance officer
- 4 A (group) senior executive below the (HQ) finance officer
- 99 Not determined
- 999 Not applicable

Q. 14

Extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of contingency plans:

\* WDSCMD

((Group) Marketing Director)

- 1 Not at all
- 2
- 3 Moderately
- 4
- 5 Very extensively
- 9 Ticked, but not assigned a rating
- 99 Not determined
- 999 Not applicable

\* WFDSCPD

((Group) Production Director)

-idem-



## SECTION 2

Q. 14

\* WFDSCRD

((Group) R &amp; D Director)

-idem-

\* WFDSMGRD

((Group) Managing Director)

-idem-

\* WFDSDVD

((Group) Divisional Directors)

-idem-

\* WFDSBSD

(Subsidiary company Directors)

-idem-

\* WFBSBFD

(Subsidiary company finance officer)

-idem-

\* WFBSOTH

(Others)

-idem-

Q. 15

\* WFCOMPUT

(Use of a computer simulation model in carrying out contingency planning)

- 1 Contingency planning resorts to an optimizing model
- 2 Contingency planning resorts to a satisficing model
- 3 Contingency planning does not resort to a computer simulation model
- 99 Not determined
- 999 Not applicable

Q.16

Reasons for not carrying out any form of contingency planning:

## \* NWFREM

(The company has never considered the idea)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* NWFPRED

(The problem of occurrence of unexpected events is not relevant to the company because the future is reasonably predictable)

-idem-

## \* NWFCASH

(The problem of occurrence of unexpected events is not relevant to the company because cash can be obtained with very few restrictions)

-idem-

## \* NWFRESP

(Contingency planning does not help to improve response to unexpected events)

-idem-

## \* NWFEEFE

(Contingency planning is more effective at the level of the individual company within the group than at group level)

-idem-

## \* NWFCFP

(Traditional early warning systems are adequate to handle the problem)

-idem-

## \* NWFIMP

(Contingency planning is impracticable)

-idem-

SECTION 2

Q. 16

\* NWFCOS

(Contingency planning is too costly and/or sophisticated)

-idem-

\* NWFIM

(Contingency planning is too time-consuming)

-idem-

\* NWFOTH

(Other reasons)

-idem-

Q. 17/-

\* WFPC

(Implementation of contingency planning at parent company level)

1	Yes	99	Not determined
2	No	999	Not applicable

\* WFSC

(Implementation of contingency planning at subsidiary company level)

-idem-

Q. 18/Q. 17

\* RCFBCOP

(Effectiveness of cash flow budget revisions in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm)

1	Null
2	
3	Moderate
4	
5	High
99	Not determined
999	Not applicable



SECTION 2  
Q. 18/Q. 17  
\* UPDTCOP

(Effectiveness of cash flow updates or forecasts in handling unexpected events which, having occurred, are currently producing major negative deviations from the expected cash flows of the firm)

-idem-

Q. 19/Q. 18  
\* RCFBPLAN

(Effectiveness of cash flow budget revisions in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm)

1	Null
2	
3	Moderate
4	
5	High
99	Not determined
999	Not applicable

\* UPDTPLAN

(Effectiveness of cash flow updates or forecasts in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm)

-idem-

Q. 20/Q. 19  
Advantages generally gained from the preparation of contingency plans:

\* WFLKHD

(Better informed view of the likelihood of an event's occurring)

1	Yes	99	Not determined
2	No	999	Not applicable

\* WFEFCT

(Better understanding of the potential effect of events upon cash flows)

-idem-

SECTION 2  
Q.20/Q.19  
\* WFINTR

(Better understanding of how different areas in the company interact)

-idem-

\* WFEMRG

(Earlier recognition of the emergence of an event)

-idem-

\* WFRESP

(Faster response on the part of the company to events)

-idem-

\* WFCONF

(Greater confidence in the effectiveness of the response to events)

-idem-

\* WFCASH

(Lesser need to hold large amounts of instant reserves)

-idem-

\* WFOTH

(Other advantages)

-idem-

Advantages generally gained from the preparation of cash flow updates or forecasts:

\* UPDTLKHD

(Better informed view of the likelihood of an event's occurring)

-idem-

SECTION 2  
Q.20/Q.19  
\* UPDTEFCT

(Better understanding of the potential effect of events upon cash flows)

-idem-

\* UPDTINTR

(Better understanding of how different areas in the company interact)

-idem-

\* UPDTEMRG

(Earlier recognition of the emergence of an event)

-idem-

\* UPDTRESP

(Faster response on the part of the company to events)

-idem-

\* UPDTCONF

(Greater confidence in the effectiveness of the response to events)

-idem-

\* UPDTCASH

(Lesser need to hold large amounts of instant reserves)

-idem-

\* UPDTOTH

(Other advantages)

-idem-



SECTION 3 - PLANNING FINANCIAL RESOURCES

Q. 1

Extent to which companies rely on the resources of liquidity to meet unexpected financial needs:

## \* SCASH

(Precautionary liquid asset balance)

- 1 Not at all
- 2
- 3 Moderately
- 4
- 5 Very extensively
- 99 Not determined
- 999 Not applicable

## \* UNCRDT

(Negotiated short-term lines of credit)

-idem-

## \* ADUSBL

(Unsecured short-term debt financing capacity)

-idem-

## \* ADSBL

(Secured short-term debt financing capacity)

-idem-

## \* LTDEBT

(Medium and long-term debt financing capacity)

-idem-

## \* NWEQTY

(Equity financing capacity)

-idem-

## SECTION 3

Q.1

\* CHPROD

(Curtailement of planned cash outflows associated with  
the production plan)

-idem-

\* RDMARK

(Curtailement of planned cash outflows associated with  
the marketing plan)

-idem-

\* RDRDEV

(Curtailement of planned cash outflows associated with  
the R & D plan)

-idem-

\* RDADM

(Curtailement of planned cash outflows associated with  
administrative overheads)

-idem-

\* RDCEXP

(Curtailement of planned cash outflows associated with  
capital expenditures)

-idem-

\* RDDIV

(Curtailement of planned cash flows associated with  
dividends)

-idem-

\* DECPOU

(Postponement of planned cash outflows)

-idem-

## SECTION 3

Q.1

## \* INCPIN

(New additions to planned cash inflows)

-idem-

## \* ACCPIN

(Anticipation of planned cash inflows)

-idem-

## \* LIQFA

(Fixed assets available for sale)

-idem-

## \* OTHERS

-idem-

Manager in control of the resources of liquidity:

## \* MGSCASH

(Precautionary liquid asset balance)

- 1 The (HQ) finance officer
- 2 A (group) senior executive below the (HQ) finance officer
- 3 A (group) Director at the level of the (HQ) finance officer
- 4 A (group) senior executive below director level outside the (HQ) finance department
- 5 A (group) Director above the (HQ) finance officer
- 6 The Group or Board of Directors
- 7 Subsidiary company Directors
- 8 Subsidiary company finance officer
- 9 Others
- 99 Not determined
- 999 Not applicable

## \* MGUNCRDT

(Negotiated short-term lines of credit)

-idem-



## SECTION 3

Q.1

\* MGADUSBL

(Unsecured short-term debt financing capacity)

-idem-

\* MGADSBL

(Secured short-term debt financing capacity)

-idem-

\* MGLTDEBT

(Medium and long-term debt financing capacity)

-idem-

\* MGNWEQTY

(Equity financing capacity)

-idem-

\* MGCHPROD

(Curtailement of planned cash outflows associated with the production plan)

-idem-

\* MGRDMARK

(Curtailement of planned cash outflows associated with the marketing plan)

-idem-

\* MGRDRDEV

(Curtailement of planned cash outflows associated with the R &amp; D plan)

-idem-

## SECTION 3

Q.1

\* MGRDADM

(Curtailement of planned cash outflows associated with  
administrative overheads)

-idem-

\* MGRDCEXP

(Curtailement of planned cash outflows associated with  
capital expenditures)

-idem-

\* MGRDDIV

(Curtailement of planned cash outflows associated with  
dividends)

-idem-

\* MGDECPOU

(Postponement of planned cash outflows)

-idem-

\* MGINCPIN

(New additions to planned cash inflows)

-idem-

\* MGACCPIN

(Anticipation of planned cash inflows)

-idem-

\* MGLIQFA

(Fixed assets available for sale)

-idem-

## SECTION 3

Q.1

\* MGOOTHERS

(Others)

-idem-

Q.2

Extent to which companies accept certain procedures as a means of responding to unexpected financial needs:

\* REVOBJ

(Revision or postponement of corporate objectives)

1	Not at all
2	
3	Moderately
4	
5	Very extensively
99	Not determined
999	Not applicable

\* REVSTRAT

(Revision or postponement of corporate strategies)

-idem-

\* VDIVPOL

(Violation of company dividend policy)

-idem-

\* VDEBTPOL

(Violation of company debt policy)

-idem-

Q.3

\* IV

(Preparation of an inventory of the resources of liquidity)

1	Yes	99	Not determined
2	No		



## SECTION 3

Q.3

\* IVHRZ

(Period of time covered by the inventory of resources)

- 1 One day ahead
- 2 Between 1 day and 1 week ahead
- 3 Between 1 week and 1 month ahead
- 4 Between 1 and 3 months ahead
- 5 Between 3 and 6 months ahead
- 6 Between 6 and 12 months ahead
- 7 More than 12 months ahead
- 8 Other periods
- 99 Not determined
- 999 Not applicable

Time of preparation of the inventory of resources:

\* IVCFB

(When preparing the cash flow budget)

- |   |     |     |                |
|---|-----|-----|----------------|
| 1 | Yes | 99  | Not determined |
| 2 | No  | 999 | Not applicable |

\* IVRCFB

(When preparing the cash flow budget revisions)

-idem-

\* IVUPDT

(When preparing the cash flow updates or forecasts)

-idem-

\* IVTIME

(At regular intervals)

-idem-

\* IVOTH

(On other occasions)

-idem-

## SECTION 3

Q.4

Resources of liquidity included in the inventory:

## \* IVSCASH

(Precautionary liquid asset balance)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* IVUNCRDT

(Negotiated short-term lines of credit)

-idem-

## \* IVADUSBL

(Unsecured short-term debt financing capacity)

-idem-

## \* IVADSBL

(Secured short-term debt financing capacity)

-idem-

## \* IVLTDEBT

(Medium and long-term debt financing capacity)

-idem-

## \* IVNWEQTY

(Equity financing capacity)

-idem-

## \* IVCHPROD

(Curtailement of planned cash outflows associated with the production plan)

-idem-

## SECTION 3

Q.4

\* IVRDMARK

(Curtailement of planned cash outflows associated with  
the marketing plan)

-idem-

\* IVRDRDEV

(Curtailement of planned cash outflows associated with  
the R & D plan)

-idem-

\* IVRDADM

(Curtailement of planned cash outflows associated with  
administrative overheads)

-idem-

\* IVRDCEXP

(Curtailement of planned cash outflows associated with  
capital expenditures)

-idem-

\* IVRDDIV

(Curtailement of planned cash outflows associated with  
dividends)

-idem-

\* IVDECPOU

(Postponement of planned cash outflows)

-idem-

\* IVINCPIN

(New additions to planned cash inflows)

-idem-



## SECTION 3

Q.4

## \* IVACCPIN

(Anticipation of planned cash inflows)

-idem-

## \* IVLIQFA

(Fixed assets available for sale)

-idem-

## \* IVOTHERS

(Others)

-idem-

Q.5

Information provided by the inventory of resources:

## \* INFMAGN

(Magnitude of the resources)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* INFTIME

(Lead time required to deploy the resources)

-idem-

## \* INFCERT

(Certainty of availability)

-idem-

## \* INFCOND

(Conditions of availability)

-idem-

## SECTION 3

Q.5

\* INFOTH

(Other information)

-idem-

Q.6

\* CRITADQY

(Existence of an established criterion for evaluating the adequacy of the resources in the inventory)

1	Yes	99	Not determined
2	No	999	Not applicable

Q.7

Extent to which senior managers outside the (headquarters) finance department are called on to participate in the discussion of the inventory of resources:

\* IVDSCMD

((Group) Marketing Director)

1	Not at all
2	
3	Moderately
4	
5	Very extensively
9	Ticked, but not assigned a rating
99	Not determined
999	Not applicable

\* IVDSCPD

((Group) Production Director)

-idem-

\* IVDSCRD

((Group) R &amp; D Director)

-idem-

\* IVDSMGMGD

((Group) Managing Director)

-idem-

## SECTION 3

Q.7

\* IVDSCDVD

((Group) Divisional Directors)

-idem-

\* IVDSCSD

(Subsidiary company Directors)

-idem-

\* IVDSCSFD

(Subsidiary company finance officer)

-idem-

\* IVDSCOTH

(Others)

-idem-

Q.8

\* IVREAL

(Extent to which the inventory of resources is viewed as an indicator of financial mobility)

- 1 Not at all
- 2
- 3 Moderately
- 4
- 5 Very extensively
- 99 Not determined
- 999 Not applicable

Q.9

\* IVDISR

(Effectiveness of the inventory of resources in providing for financial mobility at minimum cost)

- 1 Null
- 2
- 3 Moderate
- 4
- 5 High
- 99 Not determined
- 999 Not applicable



## SECTION 3

Q. 10

\* NIVREAS

(Reasons for not preparing an inventory of the resources of liquidity)

- 1 Substantial resources to meet any eventuality. High borrowing potential.
- 2 Low risk type of business, seldom exposed to major unexpected financial needs.
- 3 Other reasons
- 99 Not determined
- 999 Not applicable

Q. 11/-

\* IVPC

(Preparation of an inventory of the resources of liquidity at parent company level)

- |   |     |     |                |
|---|-----|-----|----------------|
| 1 | Yes | 99  | Not determined |
| 2 | No  | 999 | Not applicable |

\* IVSC

(Preparation of an inventory of the resources of liquidity at subsidiary company level)

-idem-

Q. 12/Q. 11

Extent to which certain items are viewed as indicators of financial mobility:

\* MIREAL

(Liquid assets)

- 1 Not at all
- 2
- 3 Moderately
- 4
- 5 Very extensively
- 9 Ticked, but not assigned a rating
- 99 Not determined

\* MICAREAL

(Liquid assets/Current assets)

-idem-

## SECTION 3

Q. 12/Q. 11

\* QRATREAL

(Quick ratio)

-idem-

\* CRATREAL

(Current ratio)

-idem-

\* WCREAL

(Working capital)

-idem-

\* WCNAREAL

(Working capital/Net assets)

-idem-

\* CFTDREAL

(Cash flow/Total debt)

-idem-

\* OTHREAL

(Others)

-idem-

Q. 13/Q. 12

\* STRTSEQR

(Existence of a rationale for the deployment of resources)

1 Yes  
2 No

99 Not determined

SECTION 4 - GENERAL INFORMATION

Q.1

\* COEXIST

(Age of the firm)

The company has been operating:

- 1 For 5 years or less
- 2 For more than 5 years up to 15 years
- 3 For more than 15 years up to 30 years
- 4 For more than 30 years
- 99 Not determined

Q.2/-

\* CMFUNCT

(Character of cash management carried out in the group)

- 1 Mostly centralized                      99 Not determined
- 2 Mostly decentralized                999 Not applicable

Q.3/Q.2

\* BORCAPR

(Overall unused borrowing capacity of the firm)

- 1 Very small
- 2
- 3 Moderate
- 4
- 5 Very large
- 99 Not determined

\* BORCAPEV

(Evolution of the firm's overall unused borrowing capacity)

- 1 Increased                                      4 Others
- 2 Decreased                                    99 Not determined
- 3 Stable



## SECTION 4

Q.4/Q.3

## \* CIPREDCT

(Degree of predictability of company's cash inflows)

- 1 Very low
- 2
- 3 Moderate
- 4
- 5 Very high
- 99 Not determined

## \* COPREDCT

(Degree of predictability of company's cash outflows)

-idem-

Q.5/-

## \* HQOPACT

(Role of company headquarters)

- 1 Company headquarters carry out an operating activity
- 2 Company headquarters do not carry out an operating activity
- 99 Not determined
- 999 Not applicable

## \* PERCSAL

(Degree of fragmentation in group turnover)

The percentage of total group sales accounted for by the largest individual company within the group is:

- |   |                    |     |                    |
|---|--------------------|-----|--------------------|
| 1 | 90% or more        | 5   | Between 10 and 29% |
| 2 | Between 70 and 89% | 6   | Less than 10%      |
| 3 | Between 50 and 69% | 99  | Not determined     |
| 4 | Between 30 and 49% | 999 | Not applicable     |

Q.6/Q.4

## \* TIMECM

(Percentage of (headquarters) finance department's time devoted to the management of cash (at group level))

- |   |                    |     |                |
|---|--------------------|-----|----------------|
| 1 | Less than 10%      | 4   | More than 60%  |
| 2 | Between 10 and 29% | 99  | Not determined |
| 3 | Between 30 and 60% | 999 | Not applicable |

## SECTION 4

Q.7/Q.5

## \* PEOPLE

(Size of the (headquarters) finance department)

n	Number of senior and middle managers employed
99	Not determined
999	Not applicable

Q.8/Q.6

## \* HEADFDEP

((Group) senior executive in charge of the (headquarters) finance department)

1	A (group) Director
2	The (Group) Treasurer
3	The (Group) Financial Controller
4	The (Group) Chief Accountant
5	The Company Secretary
6	Others
99	Not determined
999	Not applicable

Title categories associated or potentially associated with cash management in the (headquarters) finance department:

## \* TREAS1

(Existence of a treasurer in the 1st layer of the organizational structure of the (headquarters) finance department)

1	Yes	99	Not determined
2	No	999	Not applicable

## \* FINCONT1

(Existence of a financial controller in the 1st layer ...)

-idem-

## \* CASHR1

(Existence of a cashier in the 1st layer...)

-idem-

SECTION 4  
Q.8/Q.6  
\* CORPMOD1

(Existence of a corporate modeller in the 1st layer ...)

-idem-

\* PLSTRMG1

(Existence of a planning and strategic manager in the 1st layer ...)

-idem-

\* TREAS2

(Existence of a treasurer in the 2nd layer of the organizational structure of the (headquarters) finance department)

-idem-

\* FINCONT2

(Existence of a financial controller in the 2nd layer ...)

-idem-

\* CASHR2

(Existence of a cashier in the 2nd layer...)

-idem-

\* CORPMOD2

(Existence of a corporate modeller in the 2nd layer ...)

-idem-

\* PLSTRMG2

(Existence of a planning and strategic manager in the 2nd layer ...)

-idem-



### D.3 Generation of the questionnaire system file FSPSSQ

Exhibit D.3.1 shows the steps undertaken in the generation of the questionnaire system file FSPSSQ.

Due to SPSS limitations<sup>(1)</sup>, the original raw input data file DATAQ had to be split in two: data file DATAQA containing the first 120 variables for each of the 122 cases, and data file DATAQB containing the remaining 108 variables. For each of these data files, a corresponding control file holding the information concerning the data was created. Control files CONTQA and CONTQB are shown in Exhibits D.3.2 and D.3.3, respectively.

With files CONTQA and DATAQA, a first system file FSPSSQA was generated, into which file DATAQB was subsequently incorporated with the help of control file CONTQB. The resulting system file FSPSSQB was then reordered by sorting the 122 cases according to the values of variable CN (Exhibit D.3.4). The final system file - FSPSSQ is the one supporting the questionnaire data matrix.

Exhibit D.3.1

Steps undertaken in the generation of the questionnaire system file FSPSSQ

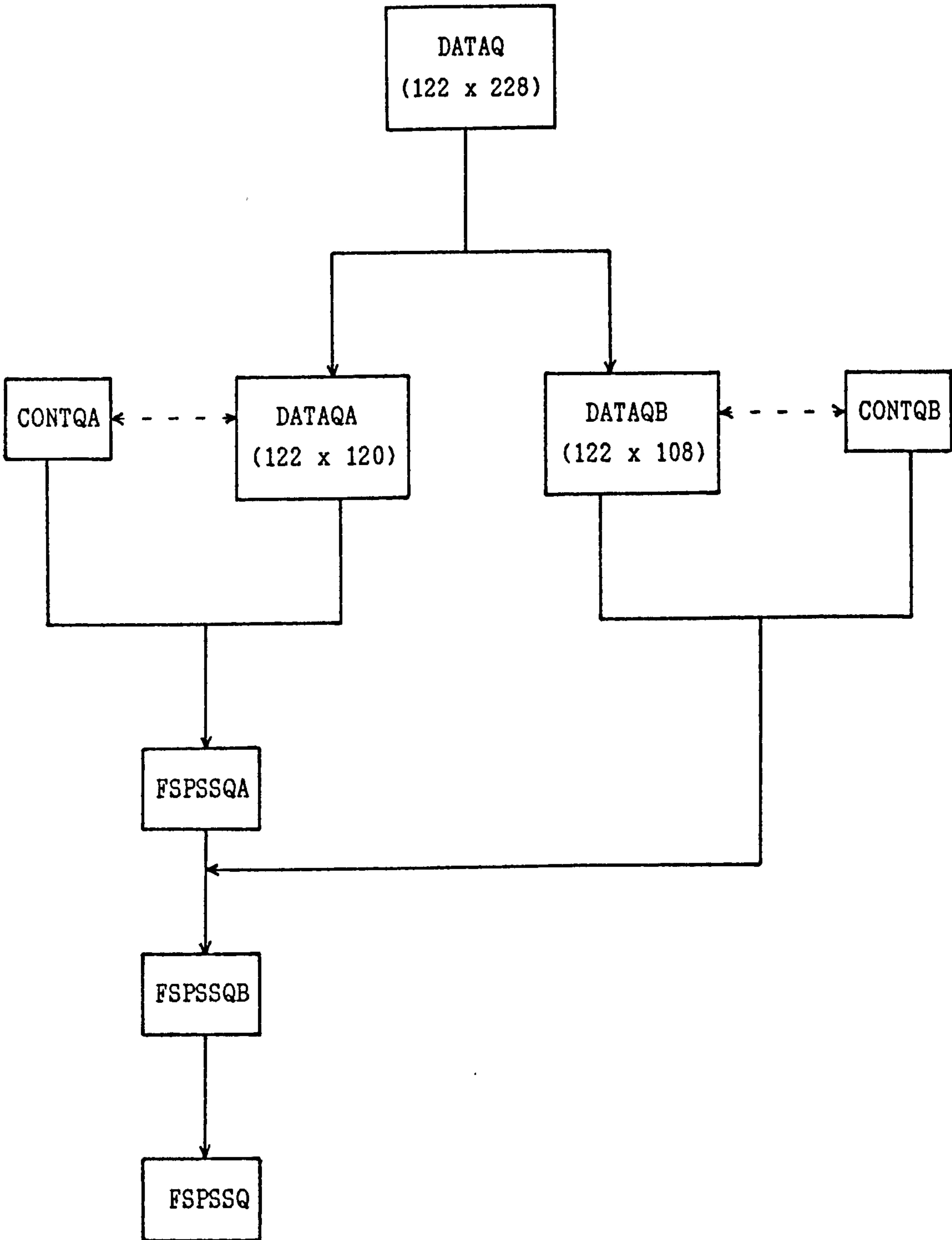




Exhibit D.3.2

CONTQA - Control file for data file DATAQA

RUN NAME                    CREATION OF SYSTEM FILE FOR QUESTIONNAIRE VARIABLES  
FILE NAME                   FSPSSQA  
DATA LIST                   FIXED(6)/1 CN 1-3 IC 5-7 REQUEST 9-11 GROUP 13-15  
                             CFBHORZN 17-19 CFBDIV1 21-23 CFBDIV3 25-27 CFBDIV6 29-31  
                             CFBDIV12 33-35 CFBDIV0 37-39 CFBROLOV 41-43 ROLOVPRE 45-47  
                             CFBREV 49-51 REVFREQ 53-55 UPDT 57-59 UPDTPRP 61-63  
                             UPDTPREP 65-67 UPDTHRZA 69-71 UPDTHRZB 73-75 UPDTHRZC 77-79  
                             /2 UPDTREAS 1-3 CFBTIME 5-7 UPDTPRE 9-11 OBJPBGR1 13-15  
                             OBJCSHT1 17-19 OBJPFIN1 21-23 OBJMCSH1 25-27 OBJJOTH1 29-31  
                             OBJPBGR2 33-35 OBJCSHT2 37-39 OBJPFIN2 41-43 OBJMCSH2 45-47  
                             OBJJOTH2 49-51 CFBCOMM 53-55 UPDTCOMM 57-59 WFAS 61-63  
                             WFPD 65-67 WFCFBAS 69-71 WRCFBAS 73-75 WFUPDTAS 77-79  
                             /3 RANGEVAL 1-3 RESPALT 5-7 WFASDISR 9-11 WFASBD 13-15  
                             WFASFD 17-19 WFASSEIN 21-23 WFASSEOU 25-27 WFASSD 29-31  
                             WFASSFD 33-35 WFASGEN 37-39 WFASOTH 41-43 CFPBD 45-47  
                             CFPFD 49-51 CFPSEIN 53-55 CFPSEOU 57-59 CFPD 61-63  
                             CFPD 65-67 CFPGEN 69-71 CFPOTH 73-75 NWFDP 77-79  
                             /4 NWFASREM 1-3 NWFASUSE 5-7 NWFASEFE 9-11 NWFASIMP 13-15  
                             NWFASCOM 17-19 NWFASCOS 21-23 NWFASIM 25-27 NWFASOTH 29-31  
                             WFPDACT 33-35 WFPDEFUT 37-39 WFPDOTH 41-43 WFPDACTD 45-47  
                             WFPDEFUTD 49-51 WPREAS 53-55 WFTIME 57-59 WFWHO 61-63  
                             WFDSCMD 65-67 WFDSCPD 69-71 WFDSCRD 73-75 WFDSCMGD 77-79  
                             /5 WFDSCDVD 1-3 WFDSCSD 5-7 WFDSCSFD 9-11 WFDSCOTH 13-15  
                             WFCOMPUT 17-19 NWFREM 21-23 NWFPRD 25-27 NWFECASH 29-31  
                             NWFRESP 33-35 NWFEEFE 37-39 NWFCEP 41-43 NWFIMP 45-47  
                             NWFECOS 49-51 NWFETIM 53-55 NWFOTH 57-59 WFPC 61-63  
                             WFSC 65-67 RCFBCOP 69-71 UPDTCOP 73-75 RCFBPLAN 77-79  
                             /6 UPDTPLAN 1-3 WFLKHD 5-7 WFEFCT 9-11 WFINTR 13-15  
                             WFEMRG 17-19 WFRESP 21-23 WFCONF 25-27 WFCASH 29-31  
                             WFOTH 33-35 UPDTLKHD 37-39 UPDTEFCT 41-43 UPDTINTR 45-47  
                             UPDTEMRG 49-51 UPDTRESP 53-55 UPDTCNF 57-59 UPDTCASH 61-63  
                             UPDTOTH 65-67 SCASH 69-71 UNCRDT 73-75 ADUSBL 77-79  
  
INPUT MEDIUM                DISK  
N OF CASES                   UNKNOWN  
MISSING VALUES             WFDSCMD TO WFDSCOTH (9,99,999)/CFBHORZN TO REVFREQ,UPDTPRP  
                             TO UPDTCOMM,WFCFBAS TO WFWHO,WFCOMPUT TO ADUSBL (99,999)/  
                             UPDT,WFAS,WFPD (99)  
  
READ INPUT DATA  
SAVE FILE  
FINISH

Exhibit D.3.3

CONTQB - Control file for data file DATAQB

RUN NAME            ADDING MORE QUESTIONNAIRE VARIABLES TO SYSTEM FILE  
GET FILE            FSPSSQA  
ADD DATA LIST     FIXED(7)/1 ADSBL 1-3 LTDEBT 5-7 NWEQTY 9-11 CHPROD 13-15  
                   RDMARK 17-19 RDRDEV 21-23 RDADM 25-27 RDCEXP 29-31  
                   RDDIV 33-35 DECPOU 37-39 INCPIN 41-43 ACCPIN 45-47  
                   LIQFA 49-51 OTHERS 53-55 MGSCASH 57-59 MGUNCRDT 61-63  
                   MGADUSBL 65-67 MGADSBLL 69-71 MGLTDEBT 73-75 MGNWEQTY 77-79  
                   /2 MGCHPROD 1-3 MGRDMARK 5-7 MGRDRDEV 9-11 MGRDADM 13-15  
                   MGRDCEXP 17-19 MGRDDIV 21-23 MGDECPOU 25-27 MGINCPIN 29-31  
                   MGACCPIN 33-35 MGLIQFA 37-39 MGOOTHERS 41-43 REVOBJ 45-47  
                   REVSTRAT 49-51 VDIVPOL 53-55 VDEBTPOL 57-59 IV 61-63  
                   IVHRZ 65-67 IVCFB 69-71 IVRCFB 73-75 IVUPDT 77-79  
                   /3 IVTIME 1-3 IVOTH 5-7 IVSCASH 9-11 IVUNCRDT 13-15  
                   IVADUSBL 17-19 IVADSBLL 21-23 IVLTDEBT 25-27 IVNWEQTY 29-31  
                   IVCHPROD 33-35 IVRDMARK 37-39 IVRDRDEV 41-43 IVRDADM 45-47  
                   IVRDCEXP 49-51 IVRDDIV 53-55 IVDECPOU 57-59 IVINCPIN 61-63  
                   IVACCPIN 65-67 IVLIQFA 69-71 IVOTHERS 73-75 INFMAGN 77-79  
                   /4 INFTIME 1-3 INFCERT 5-7 INFCOND 9-11 INFOTH 13-15  
                   CRITADQY 17-19 IVDSCMD 21-23 IVDSCPD 25-27 IVDSCRD 29-31  
                   IVDSCMGD 33-35 IVDSCDVD 37-39 IVDSCSD 41-43 IVDSCSFD 45-47  
                   IVDSCOTH 49-51 IVREAL 53-55 IVDISR 57-59 NIVREAS 61-63  
                   IVPC 65-67 IVSC 69-71 MIREAL 73-75 MICAREAL 77-79  
                   /5 QRATREAL 1-3 CRATREAL 5-7 WCREAL 9-11 WCNAREAL 13-15  
                   CFTDREAL 17-19 OTHREAL 21-23 STRTSEQR 25-27 COEXIST 29-31  
                   CMFUNCT 33-35 BORCAPR 37-39 BORCAPEV 41-43 CIPREDCT 45-47  
                   COPREDCT 49-51 HQOPACT 53-55 PERCSAL 57-59 TIMECM 61-63  
                   PEOPLE 65-67 HEADFDEP 69-71 TREAS1 73-75 FINCONT1 77-79  
                   /6 CASHR1 1-3 CORPMOD1 5-7 PLSTRMG1 9-11 TREAS2 13-15  
                   FINCONT2 17-19 CASHR2 21-23 CORPMOD2 25-27 PLSTRMG2 29-31  
INPUT MEDIUM        DISK  
MISSING VALUES    IVDSCMD TO IVDSCOTH (9,99,999)/ADSBL TO VDEBTPOL, IVHRZ  
                   TO CRITADQY, IVREAL TO IVSC, CMFUNCT, HQOPACT TO PLSTRMG2  
                   (99,999)/ MIREAL TO OTHREAL (9,99)/IV, STRTSEQR, COEXIST,  
                   BORCAPR TO COPREDCT (99)  
READ INPUT DATA  
SAVE FILE            FSPSSQB  
FINISH

Exhibit D.3.4

Computer programme PRGSORT

RUN NAME	SORTING CASES IN FILE FSPSSQB IN NUMERICAL ORDER
GET FILE	FSPSSQB
SORT CASES	CN (A)
SAVE FILE	FSPSSQ
FINISH	



Footnotes

- (1) These limitations originate in the DATA LIST control card which cannot contain more than a fixed number of lines. These limits were exceeded in the study due to the length of the names of the variables, and the large number of variables present in the questionnaire.

D.4 Intermediate variables involved in the preparation  
of the financial indicators data matrix

For each variable in the financial indicators data matrix, a group of five second-level variables was identified. These variables are identical in nature but different with respect to the time frame implied. Each second-level variable in a group represents the same characteristic but in a different year, over the five-year period from 1978 to 1982. The values, therefore, assumed by each second-level variable are the values taken on by the corresponding financial indicator for that particular year. The names of the 13 variables comprising the matrix, as well as the names of the 65 second-level variables in group form, are listed in Exhibit D.4.1.

Each of the 28 second component elements identified in Appendix C.1 was also associated with a group of five third-level variables, each variable representing that component element in a different year. The names of the 140 third-level variables in group form are listed in Exhibit D.4.2.



Exhibit D.4.1

Names of the variables comprising the financial indicators data matrix and names of the second-level variables in group form

Characteristics	Financial indicators	Names of the variables	Names of second-level variables in group form *
Financial	Size of the firm	TURN	TURNXX
	Degree of capital intensiveness	FAEMP	FAEMPXX
Financial	Level of return on investment	ROE	ROEXX
	Degree of capital turnover	TURPNA	TURPNAXX
	Amount of financial leverage	GEARNG	GEARNGXX
	Firm's cash position	LAPCA	LAPCAXX
	Proportion of internal cash flow generation	ICFGR	ICFGRXX
	Proportion of operating cash flow generation	OCFGR	OCFGRXX
	Proportion of investment in working capital	WCIPGR	WCIPGRXX
	Proportion of capital investment	CEXPB	CEXPBXX
	Degree of interest coverage	INTCRT	INTCRTXX
	Degree of dividend coverage	DIVCRT	DIVCRTXX
	Amount of earnings per share	ERNPSH	ERNPSHXX

\* In the group form, XX can take any value between 78 and 82.

Exhibit D.4.2

Names of the third-level variables in group form

Second component elements	Names of third-level variables in group form*
. Turnover	TURNXX
. Operating profit/(loss)	OPRINCXX
. Net profit/(loss)	NETINCXX
. Dividends proposed	DIVXX
. No. of ordinary shares	ORDSHRXX
. Liquid assets	LQASSTXX
. Accounts receivable	ACCRECXX
. Inventories	INVXX
. Working capital	WORKCPXX
. Fixed assets	FXASSTXX
. Short-term debt	STDEBTXX
. Medium & long-term debt	LOANCPXX
. Equity	EQTYXX
. Funds generated from operations	FGENOPXX
. Inc./(Dec.) in working capital	VWORCPXX
. Inc./(Dec.) in liquid assets	VLQASTXX
. Sale of fixed assets	SALFASXX
. Increase in short-term debt	INSTDTXX
. Increase in medium & long-term debt	INLNCPXX
. Increase in equity	INEQTYXX
. Capital expenditures	CAPEXPXX
. Taxes paid/(received)	NTTAXXX
. Dividends paid/(received)	NTDIVXX
. Interest paid/(received)	NTINTXX
. Repayment of short-term debt	PYSTDTXX
. Repayment of medium & long-term debt	PYLNCPXX
. Other cash outflows/(inflows)	OCOFIFXX
. Number of employees	EMPLOYXX

\* In the group form, XX can take any value between 78 and 82.

D.5 Generation of the financial indicators system file  
FSPSSR



Given the correspondence between third-level variables and second component elements (Appendix D.4), the values taken on by the former were directly provided by the data gathered on the latter during the data collection stage. The data sheets of all sample firms were grouped according to year, and the data fed into the computer, producing five different raw input data files (of the type DATAXX), each supporting a matrix of 122 rows (i.e. the cases) and 29 columns (i.e. 29 variables, 28 being third-level variables). The additional variable CN provided the company or case identification number. As with questionnaire data, the reliability of the computer data was checked by comparing computer printouts of the data files above against the corresponding data sheets. For each raw input data file (DATAXX), an identical control file (CONTXX) was developed (Exhibit D.5.1). The objective of these control files was twofold: to hold both the information describing the data and the necessary instructions to transform third-level variables into second-level variables. These instructions followed the decomposition process presented in Appendix C.1 and the notes in Appendix C.2 on the special structure of three first component elements of the cash flow indicators.

Subsequent steps which led to the generation of the financial indicators system file FSPSSR are depicted in Exhibit D.5.2.

From each set of files - CONTXX and DATAXX - , a system file FSPSSXX3 was produced, bringing together the original data concerning third-level variables, and new data generated by control file CONTXX, concerning second-level variables. Next, all third-level variables (with the exception of TURNXX) and associated data were deleted from files FSPSSXX3 (Exhibit D.5.3). The resulting files FSPSSXX2 were then reordered into files FSPSSXX by sorting the 122 cases according to the values of variable CN (Exhibit D.5.4). The analysis proceeded to merge files FSPSSXX into a unique system file FSPSSALL (Exhibit D.5.5) - containing for every case the values assumed by the 65 second-level variables and the value assumed by variable CN.

Finally, the average of the five-year values taken on by each financial indicator was calculated for every case, and the 65 second-level variables converted into the 13 variables of the matrix (Exhibit D.5.6). It was decided that for every case a particular variable would be considered missing if three or more of its second-level variables were also missing. The final system file - FSPSSR is the one supporting the financial indicators data matrix.



Exhibit D.5.1

CONTRX - Control file for data file DATAXX

RUN NAME VARIABLE TRANSFORMATION WITH CREATION OF SYSTEM FILE FOR 19XX

FILE NAME FSPSSXX3

DATA LIST FIXED(3)/1 CNXX 1-3 TURNXX 5-11 OPRINCXX 13-19  
NETINCXX 21-27 DIVXX 29-33 ORDSHRXX 35-40 LQASSTXX 42-46  
ACCRECXX 48-52 INVXX 54-58 WORKCPXX 60-65 FXASSTXX 67-72  
/2 STDEBTXX 1-5 LOANCPXX 7-12 EQTYXX 14-19 FGENOPXX 21-26  
VWORCPXX 28-33 VLQASTXX 35-39 SALFASXX 41-45 INSTDTXX 47-50  
INLNCPPX 52-56 INEQTYXX 58-62 CAPEXPXX 64-68 NTTAXXX 70-74  
/3 NTDIVXX 1-5 NTINTXX 7-11 PYSTDTXX 13-16 PYLNCPPX 18-21  
OCOFIFXX 23-27 EMPLOYXX 29-34

INPUT MEDIUM DISK

N OF CASES UNKNOWN

MISSING VALUES TURNXX TO NETINCXX (99999.9)/  
ORDSHRXX,WORKCPXX,FXASSTXX,LOANCPXX TO VWORCPXX (9999.9)/  
DIVXX,LQASSTXX TO INVXX,STDEBTXX,VLQASTXX,SALFASXX,  
INLNCPPX TO NTINTXX,OCOFIFXX (999.9)/  
INSTDTXX,PYSTDTXX,PYLNCPPX (99.9)/  
EMPLOYXX (999999)

PRINT FORMATS TURNXX TO FXASSTXX (1)/STDEBTXX TO NTTAXXX (1)/  
NTDIVXX TO OCOFIFXX (1)

TASK NAME CALCULATION OF DEGREE OF CAPITAL INTENSIVENESS

COMPUTE FAPEMPXX=FXASSTXX\*1000/EMPLOYXX

ASSIGN MISSING FAPEMPXX (99.99)

PRINT FORMATS FAPEMPXX (2)

TASK NAME CALCULATION OF LEVEL OF RETURN ON INVESTMENT

COMPUTE ROEXX=NETINCXX\*100/EQTYXX

ASSIGN MISSING ROEXX (999.9)

PRINT FORMATS ROEXX (1)

TASK NAME CALCULATION OF DEGREE OF CAPITAL TURNOVER

COMPUTE TURPNAXX=TURNXX/(LQASSTXX+WORKCPXX+FXASSTXX)

ASSIGN MISSING TURPNAXX (99.99)

PRINT FORMATS TURPNAXX (2)

TASK NAME CALCULATION OF AMOUNT OF FINANCIAL LEVERAGE

COMPUTE GEARNGXX=(STDEBTXX+LOANCPXX)\*100/(LQASSTXX+WORKCPXX+  
+FXASSTXX)

ASSIGN MISSING GEARNGXX (999.9)

PRINT FORMATS GEARNGXX (1)

TASK NAME CALCULATION OF FIRM'S CASH POSITION

COMPUTE LAPCAXX=LQASSTXX/(LQASSTXX+ACCRECXX+INVXX)

ASSIGN MISSING LAPCAXX (9.99)

PRINT FORMATS LAPCAXX (2)

TASK NAME CALCULATION OF THREE FIRST COMPONENT ELEMENTS OF THE CASH  
FLOW INDICATORS

TASK NAME CALCULATION OF INTERNAL CASH INFLOW

IF ((FGENOPXX-VWORCPXX) GE 0 AND VLQASTXX GE 0)  
ICINFXX=FGENOPXX-VWORCPXX+SALFASXX

IF ((FGENOPXX-VWORCPXX) GE 0 AND VLQASTXX LT 0)  
ICINFXX=FGENOPXX-VWORCPXX-VLQASTXX+SALFASXX

IF ((FGENOPXX-VWORCPXX) LT 0 AND VLQASTXX GE 0)  
ICINFXX=SALFASXX

IF ((FGENOPXX-VWORCPXX) LT 0 AND VLQASTXX LT 0)  
ICINFXX=-VLQASTXX+SALFASXX



Exhibit D.5.1

Contd.

```

ASSIGN MISSING ICINFXX (99999.9)
PRINT FORMATS ICINFXX (1)
TASK NAME CALCULATION OF EXTERNAL CASH INFLOW
IF (NTTAXXX GE 0 AND NTDIVXX GE 0 AND NTINTXX GE 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX
IF (NTTAXXX GE 0 AND NTDIVXX GE 0 AND NTINTXX GE 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-OCOFIFXX
IF (NTTAXXX GE 0 AND NTDIVXX GE 0 AND NTINTXX LT 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTINTXX
IF (NTTAXXX GE 0 AND NTDIVXX GE 0 AND NTINTXX LT 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTINTXX-
-OCOFIFXX
IF (NTTAXXX GE 0 AND NTDIVXX LT 0 AND NTINTXX GE 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTDIVXX
IF (NTTAXXX GE 0 AND NTDIVXX LT 0 AND NTINTXX GE 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTDIVXX-
-OCOFIFXX
IF (NTTAXXX GE 0 AND NTDIVXX LT 0 AND NTINTXX LT 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTDIVXX-
-NTINTXX
IF (NTTAXXX GE 0 AND NTDIVXX LT 0 AND NTINTXX LT 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTDIVXX-
-NTINTXX-OCOFIFXX
IF (NTTAXXX LT 0 AND NTDIVXX GE 0 AND NTINTXX GE 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX
IF (NTTAXXX LT 0 AND NTDIVXX GE 0 AND NTINTXX GE 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-OCOFIFXX
IF (NTTAXXX LT 0 AND NTDIVXX GE 0 AND NTINTXX LT 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTINTXX
IF (NTTAXXX LT 0 AND NTDIVXX GE 0 AND NTINTXX LT 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTINTXX-OCOFIFXX
IF (NTTAXXX LT 0 AND NTDIVXX LT 0 AND NTINTXX GE 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTDIVXX
IF (NTTAXXX LT 0 AND NTDIVXX LT 0 AND NTINTXX GE 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTDIVXX-OCOFIFXX
IF (NTTAXXX LT 0 AND NTDIVXX LT 0 AND NTINTXX LT 0 AND
OCOFIFXX GE 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTDIVXX-NTINTXX
IF (NTTAXXX LT 0 AND NTDIVXX LT 0 AND NTINTXX LT 0 AND
OCOFIFXX LT 0) ECINFXX=INSTDTXX+INLNCPPXX+INEQTYXX-NTTAXXX-
-NTDIVXX-NTINTXX-OCOFIFXX
ASSIGN MISSING ECINFXX (9999.9)
PRINT FORMATS ECINFXX (1)
TASK NAME CALCULATION OF TOTAL CASH GEARING
COMPUTE TCGEARXX=ICINFXX+ECINFXX
TASK NAME CALCULATION OF TOTAL CASH PLOUGH-BACK
COMPUTE TCPLBKXX=TCGEARXX
ASSIGN MISSING TCGEARXX,TCPLBKXX (999999.9)

```

Exhibit D.5.1

Contd.

```
PRINT FORMATS  TCGEARXX,TCPLBKXX (1)
TASK NAME      CALCULATION OF INTERNAL CASH FLOW
IF             (VLQASTXX GE 0) ICFLOWXX=FGENOPXX-VWORCPXX+SALFASXX
IF             (VLQASTXX LT 0) ICFLOWXX=FGENOPXX-VWORCPXX-VLQASTXX+
              +SALFASXX
ASSIGN MISSING ICFLOWXX (99999.9)
PRINT FORMATS  ICFLOWXX (1)
TASK NAME      CALCULATION OF THE CASH FLOW INDICATORS
COMPUTE        ICFPGRXX=ICFLOWXX*100/TCGEARXX
COMPUTE        OCFPGRXX=(FGENOPXX-VWORCPXX)*100/TCGEARXX
COMPUTE        WCIPGRXX=(VWORCPXX+VLQASTXX)*100/TCGEARXX
COMPUTE        CEXPPBXX=CAPEXPXX*100/TCPLBKXX
ASSIGN MISSING ICFPGRXX,OCFPGRXX,WCIPGRXX,CEXPPBXX (999.9)
PRINT FORMATS  ICFPGRXX,OCFPGRXX,WCIPGRXX,CEXPPBXX (1)
TASK NAME      CALCULATION OF DEGREE OF INTEREST COVERAGE
IF             (NTINTXX GT 0) INTCRTXX=OPRINCXX/NTINTXX
ASSIGN MISSING INTCRTXX (999.9)
PRINT FORMATS  INTCRTXX (1)
TASK NAME      CALCULATION OF DEGREE OF DIVIDEND COVERAGE
IF             (DIVXX GT 0) DIVCRTXX=NETINCXX/DIVXX
ASSIGN MISSING DIVCRTXX (99.9)
PRINT FORMATS  DIVCRTXX (1)
TASK NAME      CALCULATION OF AMOUNT OF EARNINGS PER SHARE
IF             (ORDSHRXX GT 0) ERNPSHXX=NETINCXX*100/ORDSHRXX
ASSIGN MISSING ERNPSHXX (99.99)
PRINT FORMATS  ERNPSHXX (2)
READ INPUT DATA
SAVE FILE
FINISH
```

Exhibit D.5.2

Steps undertaken in the generation of the financial indicators system file FSPSSR

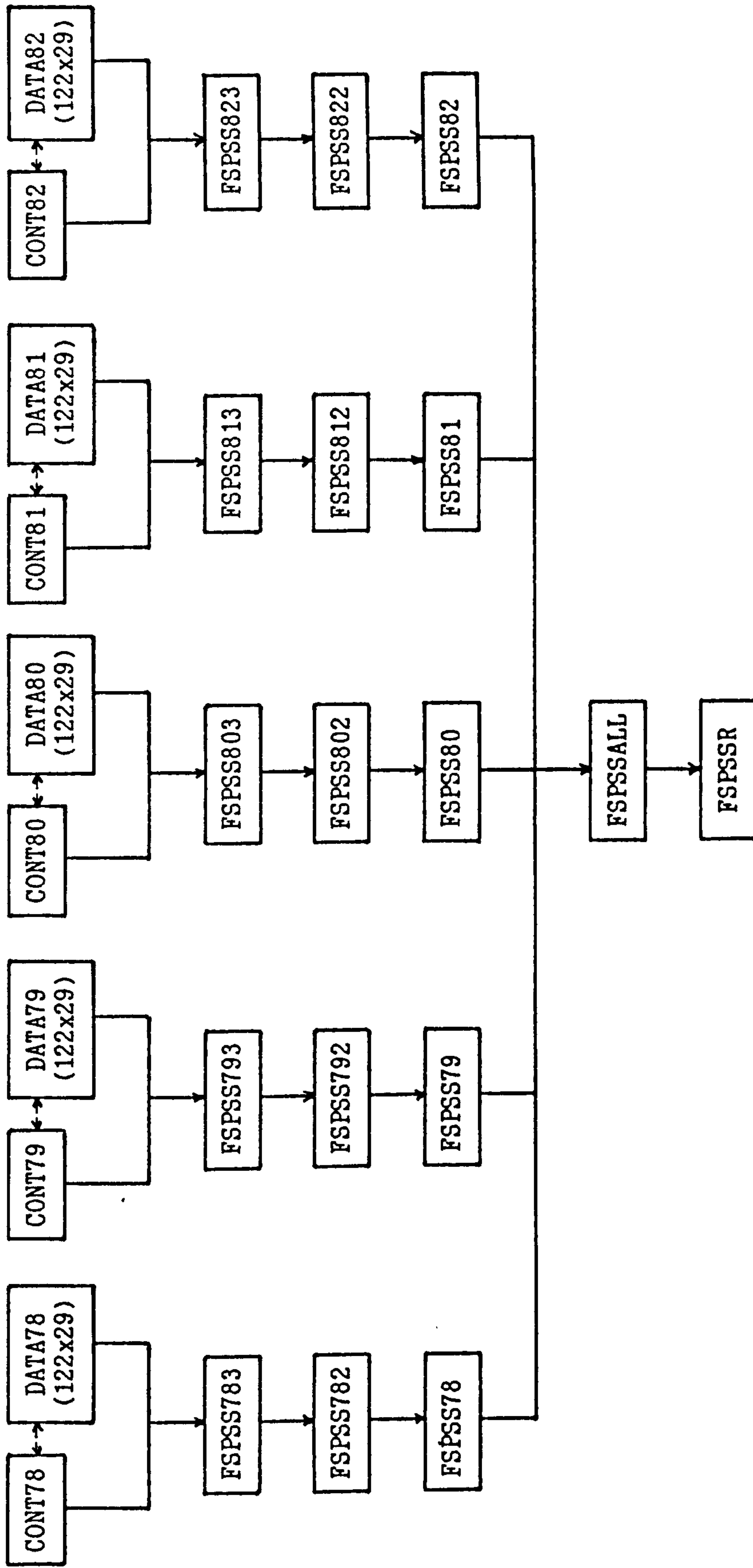




Exhibit D.5.3

Computer programme PRGDEL

RUN NAME	DELETION OF VARIABLES FROM SYSTEM FILE FSPSSXX3
GET FILE	FSPSSXX3
DELETE VARS	OPRINCXX TO EMPLOYXX, ICINFXX, ECINFXX, TCGEARXX, TCPLBKXX, ICFLOWXX
SAVE FILE	FSPSSXX2
FINISH	

Exhibit D.5.4

Computer programme PRGSORT2

RUN NAME	SORTING CASES IN FILE FSPSSXX2 IN NUMERICAL ORDER
GET FILE	FSPSSXX2
SORT CASES	CNXX(A)
SAVE FILE	FSPSSXX
FINISH	

Exhibit D.5.5

Computer programme PRGMERGE

RUN NAME	MERGING OF FSPSSXX SYSTEM FILES
MERGE FILES	FILE=FSPSS78 VARIABLES=ALL/FILE=FSPSS79 VARIABLES= TURN79 TO ERNPSH79/FILE=FSPSS80 VARIABLES=TURN80 TO ERNPSH80/FILE=FSPSS81 VARIABLES=TURN81 TO ERNPSH81/ FILE=FSPSS82 VARIABLES=TURN82 TO ERNPSH82
SAVE FILE	FSPSSALL
FINISH	



Exhibit D.5.6

Computer programme PRGAVRG

```

RUN NAME          CALCULATION OF 5-YEAR AVERAGE FOR EACH FINANCIAL INDICATOR
GET FILE          FSPSSALL
ALLOCATE          TRANSPACE=50000
COMPUTE           CN=CN78
COMPUTE           TURN=0
IF                (TURN78 NE 99999.9) TURN=TURN+TURN78
IF                (TURN79 NE 99999.9) TURN=TURN+TURN79
IF                (TURN80 NE 99999.9) TURN=TURN+TURN80
IF                (TURN81 NE 99999.9) TURN=TURN+TURN81
IF                (TURN82 NE 99999.9) TURN=TURN+TURN82
COUNT           MISSING=TURN78,TURN79,TURN80,TURN81,
                  TURN82 (99999.9)
COMPUTE           VALID=5-MISSING
IF                (VALID GE 3) TURN=TURN/VALID
IF                (VALID LT 3) TURN=99999.9
MISSING VALUES  TURN (99999.9)
PRINT FORMATS    TURN (1)
COMPUTE           FAPEMP=0
IF                (FAPEMP78 NE 99.99) FAPEMP=FAPEMP+FAPEMP78
IF                (FAPEMP79 NE 99.99) FAPEMP=FAPEMP+FAPEMP79
IF                (FAPEMP80 NE 99.99) FAPEMP=FAPEMP+FAPEMP80
IF                (FAPEMP81 NE 99.99) FAPEMP=FAPEMP+FAPEMP81
IF                (FAPEMP82 NE 99.99) FAPEMP=FAPEMP+FAPEMP82
COUNT           MISSING=FAPEMP78,FAPEMP79,FAPEMP80,FAPEMP81,
                  FAPEMP82 (99.99)
COMPUTE           VALID=5-MISSING
IF                (VALID GE 3) FAPEMP=FAPEMP/VALID
IF                (VALID LT 3) FAPEMP=99.99
MISSING VALUES  FAPEMP (99.99)
PRINT FORMATS    FAPEMP (2)
COMPUTE           ROE=0
IF                (ROE78 NE 999.9) ROE=ROE+ROE78
IF                (ROE79 NE 999.9) ROE=ROE+ROE79
IF                (ROE80 NE 999.9) ROE=ROE+ROE80
IF                (ROE81 NE 999.9) ROE=ROE+ROE81
IF                (ROE82 NE 999.9) ROE=ROE+ROE82
COUNT           MISSING=ROE78,ROE79,ROE80,ROE81,ROE82 (999.9)
COMPUTE           VALID=5-MISSING
IF                (VALID GE 3) ROE= ROE/VALID
IF                (VALID LT 3) ROE=999.9
MISSING VALUES  ROE (999.9)
PRINT FORMATS    ROE (1)
COMPUTE           TURPNA=0
IF                (TURPNA78 NE 99.99) TURPNA=TURPNA+TURPNA78
IF                (TURPNA79 NE 99.99) TURPNA=TURPNA+TURPNA79
IF                (TURPNA80 NE 99.99) TURPNA=TURPNA+TURPNA80
IF                (TURPNA81 NE 99.99) TURPNA=TURPNA+TURPNA81
IF                (TURPNA82 NE 99.99) TURPNA=TURPNA+TURPNA82
COUNT           MISSING=TURPNA78,TURPNA79,TURPNA80,TURPNA81,
                  TURPNA82 (99.99)
COMPUTE           VALID=5-MISSING
IF                (VALID GE 3) TURPNA=TURPNA/VALID
IF                (VALID LT 3) TURPNA=99.99

```

Exhibit D.5.6

Contd.

```

MISSING VALUES TURPNA (99.99)
PRINT FORMATS TURPNA (2)
COMPUTE GEARNG=0
IF (GEARNG78 NE 999.9) GEARNG=GEARNG+GEARNG78
IF (GEARNG79 NE 999.9) GEARNG=GEARNG+GEARNG79
IF (GEARNG80 NE 999.9) GEARNG=GEARNG+GEARNG80
IF (GEARNG81 NE 999.9) GEARNG=GEARNG+GEARNG81
IF (GEARNG82 NE 999.9) GEARNG=GEARNG+GEARNG82
COUNT MISSING=GEARNG78,GEARNG79,GEARNG80,GEARNG81,
GEARNG82 (999.9)

COMPUTE VALID=5-MISSING
IF (VALID GE 3) GEARNG=GEARNG/VALID
IF (VALID LT 3) GEARNG=999.9
MISSING VALUES GEARNG (999.9)
PRINT FORMATS GEARNG (1)
COMPUTE LAPCA=0
IF (LAPCA78 NE 9.99) LAPCA=LAPCA+LAPCA78
IF (LAPCA79 NE 9.99) LAPCA=LAPCA+LAPCA79
IF (LAPCA80 NE 9.99) LAPCA=LAPCA+LAPCA80
IF (LAPCA81 NE 9.99) LAPCA=LAPCA+LAPCA81
IF (LAPCA82 NE 9.99) LAPCA=LAPCA+LAPCA82
COUNT MISSING=LAPCA78,LAPCA79,LAPCA80,LAPCA81,
LAPCA82 (9.99)

COMPUTE VALID=5-MISSING
IF (VALID GE 3) LAPCA=LAPCA/VALID
IF (VALID LT 3) LAPCA=9.99
MISSING VALUES LAPCA (9.99)
PRINT FORMATS LAPCA (2)
DO REPEAT X=ICFPGR,OCFPGR,WCIPGR,CEXPPB/X78=ICFPGR78,OCFPGR78,
WCIPGR78,CEXPPB78/X79=ICFPGR79,OCFPGR79,WCIPGR79,
CEXPPB79/X80=ICFPGR80,OCFPGR80,WCIPGR80,CEXPPB80/
X81=ICFPGR81,OCFPGR81,WCIPGR81,CEXPPB81/X82=ICFPGR82,
OCFPGR82,WCIPGR82,CEXPPB82/

COMPUTE X=0
IF (X78 NE 999.9) X=X+X78
IF (X79 NE 999.9) X=X+X79
IF (X80 NE 999.9) X=X+X80
IF (X81 NE 999.9) X=X+X81
IF (X82 NE 999.9) X=X+X82
COUNT MISSING=X78,X79,X80,X81,X82 (999.9)
COMPUTE VALID=5-MISSING
IF (VALID GE 3) X=X/VALID
IF (VALID LT 3) X=999.9
MISSING VALUES X (999.9)
END REPEAT
PRINT FORMATS ICFPGR,OCFPGR,WCIPGR,CEXPPB (1)
COMPUTE INTCRT=0
IF (INTCRT78 NE 999.9) INTCRT=INTCRT+INTCRT78
IF (INTCRT79 NE 999.9) INTCRT=INTCRT+INTCRT79
IF (INTCRT80 NE 999.9) INTCRT=INTCRT+INTCRT80
IF (INTCRT81 NE 999.9) INTCRT=INTCRT+INTCRT81
IF (INTCRT82 NE 999.9) INTCRT=INTCRT+INTCRT82
COUNT MISSING=INTCRT78,INTCRT79,INTCRT80,INTCRT81,

```



Exhibit D.5.6

Contd.

```

                                INTCRT82 (999.9)
COMPUTE                          VALID=5-MISSING
IF                                (VALID GE 3) INTCRT=INTCRT/VALID
IF                                (VALID LT 3) INTCRT=999.9
MISSING VALUES INTCRT (999.9)
PRINT FORMATS INTCRT (1)
COMPUTE                          DIVCRT=0
IF                                (DIVCRT78 NE 99.9) DIVCRT=DIVCRT+DIVCRT78
IF                                (DIVCRT79 NE 99.9) DIVCRT=DIVCRT+DIVCRT79
IF                                (DIVCRT80 NE 99.9) DIVCRT=DIVCRT+DIVCRT80
IF                                (DIVCRT81 NE 99.9) DIVCRT=DIVCRT+DIVCRT81
IF                                (DIVCRT82 NE 99.9) DIVCRT=DIVCRT+DIVCRT82
COUNT MISSING=DIVCRT78, DIVCRT79, DIVCRT80, DIVCRT81,
                                DIVCRT82 (99.9)
COMPUTE                          VALID=5-MISSING
IF                                (VALID GE 3) DIVCRT=DIVCRT/VALID
IF                                (VALID LT 3) DIVCRT=99.9
MISSING VALUES DIVCRT (99.9)
PRINT FORMATS DIVCRT (1)
COMPUTE                          ERNPSH=0
IF                                (ERNPSH78 NE 99.99) ERNPSH=ERNPSH+ERNPSH78
IF                                (ERNPSH79 NE 99.99) ERNPSH=ERNPSH+ERNPSH79
IF                                (ERNPSH80 NE 99.99) ERNPSH=ERNPSH+ERNPSH80
IF                                (ERNPSH81 NE 99.99) ERNPSH=ERNPSH+ERNPSH81
IF                                (ERNPSH82 NE 99.99) ERNPSH=ERNPSH+ERNPSH82
COUNT MISSING=ERNPSH78, ERNPSH79, ERNPSH80, ERNPSH81,
                                ERNPSH82 (99.99)
COMPUTE                          VALID=5-MISSING
IF                                (VALID GE 3) ERNPSH=ERNPSH/VALID
IF                                (VALID LT 3) ERNPSH=99.99
MISSING VALUES ERNPSH (99.99)
PRINT FORMATS ERNPSH (2)
DELETE VARS CN78 TO ERNPSH82, MISSING, VALID
SAVE FILE FSPSSR
FINISH
```



## D.6 Generation of the final system file FSPSS

Exhibit D.6.1

Computer programme PRGMRGE2

RUN NAME	MERGING OF SYSTEM FILES FSPSSQ AND FSPSSR
MERGE FILES	FILE=FSPSSQ VARIABLES=ALL/FILE=FSPSSR VARIABLES=
SAVE FILE	TURN TO ERNPSH
FINISH	FSPSS

## Appendix E Statistical Techniques

E.1 Levels of measurement

E.2 Measures of central tendency and dispersion

E.3 Testing of hypotheses

E.4 Bivariate correlation statistics

E.5 Statistical tests for the comparison of samples



## K.1 Levels of measurement

The traditional classification of levels of measurement developed in Stevens [1946] distinguishes four measurement levels - nominal, ordinal, interval and ratio - on the basis of the ordering and distance relations inherent in the scales. Each of these levels of measurement and their formal properties are best described in Siegel [1956] and in Nie et al. [1975].

The nominal scale means measurement at its lowest level. Each of the values assigned to a variable is used to classify an object, person or characteristic in a distinct category. No assumption of ordering or distance between values is made. The only formal property enjoyed by the nominal scale of measurement is that of equivalence, which means that the elements in any one category must be identical in terms of the characteristic being measured. The equivalence property is reflexive, symmetrical and transitive.

The ordinal scale of measurement is achieved when it is possible to rank-order all the values assigned to a variable according to some criterion. There is now an ordering relation among the values, each one having a precise and unique position relative to the others. Yet, the distance between the values is not known. In these terms, the main difference between the nominal and the ordinal scale is that the latter incorporates not only the formal property of equivalence but also the formal property of "greater than". This one is irreflexive, asymmetrical and transitive.

The interval scale of measurement is reached when, in addition to ordering, the distance between any two values assigned to a variable is always of the same known size. This formal property joins the formal properties of equivalence and "greater than" also enjoyed by this level of measurement. Interval scales, however, do not possess an inherently determined zero point. Since this is arbitrarily assumed, interval scales measure differences between values - not their proportionate magnitudes.

Finally, the ratio scale of measurement displays all the formal properties of an interval scale with the additional property that a true zero point is inherently defined in the scale. The existence of an absolute zero allows distance as well as ratio comparisons between values.



## E.2 Measures of central tendency and dispersion

Exhibit E.2.1. shows the principal measures of central tendency and dispersion for each scale of measurement. The exhibit is a summary table built on information scattered over several sources, namely Champion [1970], Nie et al. [1975], Downie and Starry [1977], and Lapin [1978]. This table should be read as a cumulative table in the sense that statistics appropriate for lower levels are also applicable to higher levels of measurement.

The proportion is the only statistic available for nominal-level data [Lapin, 1978]. It is obtained from the corresponding adjusted relative frequency distribution. The proportion indicates how many observations, as a percentage of the total valid number, fall into a particular category. At this level, then, the only admissible measure to describe central tendency is the mode ( $M_o$ ) [Downie and Starry, 1977]. This is defined as the most frequently occurring value in a set of observations. It corresponds to the value with the highest proportion.

For ordinal-level data, the construction of a cumulative adjusted relative frequency distribution becomes possible. This allows the use of the percentile, i.e. that point in the distribution below which a certain percentage of the observations fall, once these have been rank ordered from lowest to highest [Downie and Starry, 1977; Lapin, 1978]. The most appropriate measure for describing the central tendency of ordinal-level data is the median ( $M_{dn}$ ) [Downie and Starry, 1977]. This is the value of the middle case, or the case lying exactly on the 50th percentile.

Measures of dispersion or variability have no meaning at the nominal and ordinal levels of measurement [Champion, 1970; Lapin, 1978]<sup>(1)</sup>.

Interval and ratio-level data are the truly quantitative data and so the most comprehensive statistics are applicable to them. The arithmetic mean ( $\bar{X}$ ) is the most appropriate statistic of central

Exhibit E.2.1

Principal measures of central tendency and dispersion for each level of measurement

Levels of measurement	Measures of central tendency	Measures of dispersion
Nominal	. Mode	
Ordinal	. Median	
Interval/Ratio	. Arithmetic mean	. Range . Interquartile range . Standard deviation



tendency for variables measured at these levels but only when the distribution of cases approximates to the shape of the normal curve [Downie and Starry, 1977]. When data depart from normality, the median provides a better measure of central tendency than the mean since the latter is particularly influenced by extreme observations present in the distribution [Downie and Starry, 1977; Lapin, 1978].

With respect to measures of dispersion for interval and ratio-level data, the range, the interquartile range and the standard deviation are the ones most frequently mentioned [e.g. Champion, 1970; Lapin, 1978]. Of these three statistics, the range is the simplest one. It measures variability in terms of the distance between the smallest (minimum) and the largest (maximum) observation value taken on by the variable. The range is an unreliable measure of dispersion since it ignores all but the two most extreme observations which may not be typical values [Champion, 1970; Downie and Starry, 1977; Lapin, 1978]. On the other hand, the interquartile range ignores the most extreme observations. Lapin [1978] defines it as the difference between the 75th and the 25th percentile or, in other words, as the difference between the third and the first quartile. Given that it represents the middle 50% of the observation values, it offers a better measure of dispersion than the range [Champion, 1970]. Finally, the standard deviation ( $s$ ) is the most important and the most reliable of the three statistics in question [Downie and Starry, 1977]. Variability is measured with it in terms of the average deviations of all individual observations about the mean of the distribution. To the extent that the standard deviation takes into account every observation in the distribution, it is a far better measure of dispersion than the range or the interquartile range [Lapin, 1978]. However, the standard deviation is best applied only when the distribution of cases is or approximates to a normal distribution. When data depart from normality, the best applied measure of dispersion becomes the interquartile range [Downie and Starry, 1977].

Footnotes

- (1) Mueller and Schuessler [1961] developed an index of qualitative variation (IQV) intended to provide a measure of variability among nominal-level data. This index, however, is a measure of attribute heterogeneity rather than a measure of score dispersion [Champion, 1970].

### E.3 Testing of hypotheses



Null hypothesis. In the testing of hypotheses, the sample is used in deciding between two complementary assumptions (or hypotheses) concerning the true nature of the population. In order to satisfy this condition, all possible outcomes of the test have to be divided between two hypothesis statements: the null hypothesis ( $H_0$ ) on the one hand, the alternative hypothesis ( $H_1$ ) on the other. These two hypotheses are always formulated as opposites so that when one is true the other is necessarily false. The null hypothesis should be the one the decision-maker wishes to disprove [Downie and Starry, 1977; Lapin, 1978]. As such, the objective of the test becomes to decide whether or not to reject the null hypothesis. When this is rejected, the test results are said to be statistically significant.

The way in which  $H_0$  is formulated determines the nature of the test. When the null hypothesis is a statement of no difference<sup>(1)</sup>, the test is said to be non-directional. In this case, the alternative hypothesis includes all possible outcomes of difference regardless of direction. When the null hypothesis contains both a statement of no difference and a statement of difference in a particular direction, the test is said to be directional. In this case, only the specific outcome expected by the decision-maker is included in the alternative hypothesis [Downie and Starry, 1977; Lapin, 1978].

Level of significance. This is an essential component in any decision model. Because of chance sampling error, there is always the possibility that the decision to reject or not to reject the null hypothesis is incorrect in which case a decision error is made. In hypotheses testing, two basic types of decision errors may occur: a Type I error if  $H_0$  is rejected when it is true, and a Type II error if  $H_0$  is not rejected when it is false. Both directional and non-directional hypothesis forms are subject to these two types of error. The probability of making a Type I error is usually identified by  $\alpha$  whereas the probability of making a Type II error is commonly identified by  $\beta$ . The former, or  $\alpha$ , is generally called the level of

significance of the test. It is directly under the control of the researcher who should specify it well in advance of the stage of statistical analysis [Downie and Starry, 1977; Lapin, 1978]. Yet the choice of a significance level is not straightforward. The lower the level of  $\alpha$ , the smaller the probability of incurring a Type I error. However, the chance of one error can be reduced only at the expense of increasing the probability of the other. Therefore, as  $\alpha$  decreases  $\beta$  increases, and vice-versa. The only way to decrease both types of error probability is to increase the sample size though  $\alpha$  and  $\beta$  can never be totally eliminated in the testing of hypotheses. Considerations of the control of error probabilities are contained in Downie and Starry [1977] and Lapin [1978]. The basic idea arising from these considerations is that any decision on the levels of  $\alpha$  and  $\beta$  must always be made on the basis of a subjective evaluation of how the chances of the two errors should be balanced. In particular, if one of the errors is thought to be more serious than the other, then the decision rule should provide a lower probability of occurrence for the former.

Decision criterion. The level of significance represents the test cut-off point on the basis of which the decision to reject or not to reject the null hypothesis is made. In other words,  $\alpha$  is the criterion which separates the region of rejection from the region of acceptance of the null hypothesis [Emory, 1980]. If the observed value of the test statistic calculated on sample data has, according to the test distribution, a probability of occurrence under  $H_0$  ( $\alpha'$ ) that is equal or smaller than  $\alpha$ , then the null hypothesis can be rejected and the test results considered statistically significant. On the other hand, if  $\alpha'$  is greater than  $\alpha$ , then the null hypothesis cannot be rejected, although it cannot be accepted as true either [Downie and Starry, 1977].

Footnotes

- (1) "Difference" has a broad meaning in this context. In order to accommodate any considerations of the null hypothesis in the light of both correlation analysis and comparison of samples, the word "difference" stands here as much for "association" as for "difference" in the strict sense of the word.



## E.4 Bivariate correlation statistics

The Pearson product-moment correlation coefficient  $r$  is the best known parametric measure of association. A number of quite stringent assumptions have to be met for  $r$  to be meaningfully interpreted. Firstly, interval-level of measurement is required at least for both intervening variables. Secondly, it is imperative that there be a linear relationship between those variables. And thirdly, the data need to possess homocedasticity, that is, for all values of one variable the variance of the other needs to be always the same [Champion, 1970; Koutsoyiannis, 1973; Downie and Starry, 1977]. Furthermore, in order to test the significance of an observed value of  $r$ , the variables must be normally distributed [Siegel, 1956].

Nonparametric correlation statistics are the appropriate ones for nominal and ordinal-level data. They are also the correct ones to use with interval and ratio-level data when the remaining conditions for the parametric statistics are not met [Siegel, 1956]. The use, in these circumstances, of nonparametric measures of correlation does not necessarily imply a reduction in the power to reject  $H_0$ . Even in cases where all the conditions for the use of the parametric statistics are met, some of the nonparametric measures of correlation achieve a power-efficiency as high as 90% [Siegel, 1956].

The Spearman and the Kendall rank-order correlation coefficients are two commonly used nonparametric measures of association. Since both measures require for their computation the use of rankings rather than the absolute values of the variables, the only condition for their application is that the variables involved be at least ordinal in measurement [Siegel, 1956; Champion, 1970; Emory, 1980]. Spearman's rho ( $r_s$ ) is a Pearson correlation coefficient for ranked data, being generally interpreted in the same manner as  $r$ . In this sense, it is a strong measure of association [Champion, 1970; Downie and Starry, 1977]. Kendall's tau ( $\tau$ ) is also a strong measure of association, but because it is a measure of concordance and discordance between pairs of ranked data, it is not a Pearson

correlation coefficient [Marascuilo and McSweeney, 1977]. This means that rho and tau have different supporting scales. Although both coefficients vary from -1.0 to +1.0 and have similar interpretation, numerically they are not directly comparable to each other even when computed for the same data. Yet they are equally powerful in detecting the existence of association in the population, inasmuch as they make equivalent use of the information in the data. In other words, the sampling distributions of rho and tau are such that for the same set of data both reject the null hypothesis at the same level of significance [Siegel, 1956]. Furthermore, both coefficients possess a power-efficiency of about 91% when used on data to which the Pearson correlation coefficient is properly applicable [Siegel, 1956; Emory, 1980].

A major weakness of the Spearman rank-order correlation coefficient is its sensitivity to distortion from ties in ranks. The effect of these ties is to inflate the value of rho. Authors, such as Siegel [1956] and Champion [1970], argue that if the proportion of ties in ranks is small, their effect on rho is negligible and they may be ignored. However, if the proportion of ties in ranks is large, their effect on rho is no longer negligible and a correction factor for ties should be used in the computation of the coefficient. Nevertheless, despite the correction, it is widely suggested that tau be used in preference to rho whenever the number of ties per rank is more than five [Champion, 1970]. Although tau is also sensitive to ties and a correction factor should be used in its calculation, tau seems to be somewhat more meaningful than rho when the data contain a large number of tied ranks [Nie et al., 1975].

The one-sample chi-square test of independence is a test of statistical significance. It indicates whether two variables are associated or not within a particular population [Nie et al., 1975; Downie and Starry, 1977]. In this sense, it is related to the previous correlational analysis.

In general, chi-square tests arise in connection with crosstabulation analysis inasmuch as the expected and actual frequencies falling in the cells of contingency tables are the basis for the computation of the chi-square statistic ( $\chi^2$ ). This being



so, the measurement level of the variables involved in the tests does not need to be higher than nominal, although chi-square tests may be applied to variables measured at higher levels [Nie et al., 1975; Downie and Starry, 1977].

In order to ensure that the approximation to the theoretical distribution is adequate, a basic assumption underlies the use of chi-square tests - that each expected cell frequency be at least ten in tables with one degree of freedom, and at least five in larger tables [Downie and Starry, 1977; Lapin, 1978]. Cochran [1954] demonstrated, however, that in tables with more than one degree of freedom, the assumption may be loosened and chi-square tests may be meaningfully applied, provided fewer than 20% of the cells have expected frequencies of less than five, and no cell has an expected frequency of less than one [Siegel, 1956]. To meet any of these requirements is a problem, particularly in chi-square tests of independence where expected frequencies are not under the direct control of the researcher. In tables with one degree of freedom (2x2 tables), this problem is relatively easy to overcome. The solutions which are proposed in the literature, although varying in detail from author to author [e.g. Siegel, 1956; Nie et al., 1975; Downie and Starry, 1977], are essentially the same. Cochran [1954], for instance, suggests that Yates' correction for continuity to the chi-square statistic be applied whenever the sample size is greater than 20 and all expected frequencies are five or more. If the smallest expected frequency is less than five or the sample size is less than 20, then Fisher's exact test is recommended [Siegel, 1956]. In Nie et al. [1975] the solution is slightly different. The SPSS programme applies Fisher's exact test only when there are fewer than 21 cases in the sample, the Yates corrected chi-square statistic being used for all other 2x2 tables. In tables with more than one degree of freedom, the problem cannot be overcome. Therefore the only alternative is to try to meet the requirement. The correct way of doing this would be by increasing the sample size. Yet in most circumstances such a practice is unviable due to the time and the costs involved [Downie and Starry, 1977]. For this reason, the approach most commonly suggested [Siegel, 1956; Downie and Starry, 1977; Lapin, 1978] is that, before calculating the chi-square statistic, adjacent categories in the tables (rows and/or columns) be

combined until the requirement is satisfied. In fact, expected cell frequencies can be increased by collapsing categories, thereby reducing the number of cells. Such an approach is acceptable provided the data keep their meaning.

The chi-square statistic only allows the rejection of the null hypothesis of independence, merely indicating the presence of association between variables. In contrast to the Spearman and the Kendall correlation statistics, it gives no numerical estimate of the strength of the relationship. This means that whenever  $H_0$  is rejected, chi-square tests of independence should be complemented by indices of association [Nie et al., 1975; Downie and Starry, 1977]. Three of these indices - the contingency coefficient  $C$ ,  $\phi$  and Cramer's  $V$  - use the chi-square statistic in their computation and so are suitable measures of association for nominal-level data. The contingency coefficient is a popular statistic and can be used with tables of any size. However, it has two major disadvantages. The first is that  $C$  has no precise interpretation, it is simply an index number. The second is that  $C$  has no upper limit, its maximum value depending upon the number of columns and rows in each table. Such limitations make the contingency coefficient neither directly comparable to any other correlation coefficient nor to any other  $C$ s unless they are all based on identical tables [Champion, 1970; Nie et al., 1975; Downie and Starry, 1977]. Both  $\phi$  (for a  $2 \times 2$  table) and Cramer's  $V$  (for a  $n \times m$  table) have the advantage of having 1 as an upper limit<sup>(1)</sup>. These two statistics range from zero where no association exists up to +1.0 where the variables are highly related [Nie et al., 1975].  $\phi$  enjoys a comparative advantage over Cramer's  $V$  in the sense that it has a proportional reduction in error interpretation. This makes it a special form of the Pearson  $r$  [Champion, 1970]. According to Costner [1965], proportional reduction in error statistics are preferable because they are easier to interpret. Furthermore they allow the analysis of relationships within a more general framework [Champion, 1970; Nie et al., 1975].  $\phi$ , however, is applicable only to tables with one degree of freedom. For larger tables,  $\lambda$  and the uncertainty coefficient are two statistics with an identical interpretation to  $\phi$ . Both these statistics are measures of association for contingency tables involving nominal-level variables though their computation is not



based on chi-square. The information conveyed by these two statistics is very similar. Asymmetric lambda gives the percent improvement in the ability to predict the value of the dependent variable once the value of the independent variable is known. Asymmetric uncertainty coefficient reveals the proportion by which uncertainty in the dependent variable is reduced by the knowledge of the independent variable. Both measures vary from zero which means no improvement in prediction, or no reduction in uncertainty, to +1.0 which means complete elimination of error in prediction, or complete elimination of uncertainty [Champion, 1970; Nie et al., 1975; Emory, 1980].



Footnotes

- (1) This happens only under certain conditions. When these are not met, the upper limit is nevertheless very close to 1 [Downie and Starry, 1977; Emory, 1980].

## 8.5 Statistical tests for the comparison of samples

Exhibit K.5.1

Statistical tests for the comparison of samples taking into account the number of samples to be compared, the test design and the level of measurement of the variables involved

Levels of measurement	Statistical tests for the comparison of samples					
	Two-sample case			K-sample case		
	Related samples	Independent samples		Related samples	Independent samples	
Nominal	<ul style="list-style-type: none"> <li>• McNemar test for the significance of changes</li> </ul>	<ul style="list-style-type: none"> <li>• Chi-square test of homogeneity for two independent samples</li> </ul>		<ul style="list-style-type: none"> <li>• Cochran Q test</li> </ul>	<ul style="list-style-type: none"> <li>• Chi-square test of homogeneity for k independent samples</li> </ul>	
	<ul style="list-style-type: none"> <li>• Sign test</li> <li>• Wilcoxon matched-pairs signed-ranks test</li> </ul>	<ul style="list-style-type: none"> <li>• Median test</li> <li>• Mann-Whitney U test</li> <li>• Kolmogorov-Smirnov two-sample test</li> <li>• Wald-Wolfowitz runs test</li> <li>• Moses test of extreme reactions</li> </ul>		<ul style="list-style-type: none"> <li>• Friedman two-way analysis of variance (ANOVA)</li> </ul>	<ul style="list-style-type: none"> <li>• Extension of the median test</li> <li>• Kruskal-Wallis one-way analysis of variance (ANOVA)</li> </ul>	
Interval/Ratio	<ul style="list-style-type: none"> <li>• t test of differences</li> </ul>	<ul style="list-style-type: none"> <li>• t test</li> </ul>		<ul style="list-style-type: none"> <li>• Two-way analysis of variance (ANOVA)</li> </ul>	<ul style="list-style-type: none"> <li>• One-way analysis of variance (ANOVA)</li> </ul>	

Source: Adapted from Siegel [1956] and Emory [1980, p. 444]



## Appendix F Contingency Tables

F.1 Contingency tables for results and conclusions I

F.2 Contingency tables for results and conclusions II

F.3 Contingency tables for results and conclusions III

F.1 Contingency tables for results and conclusions I

Table F.1.1

Contingency table between the periodicity of cash flow budget revision and the number of years for which the cash flow budgeting system has been in operation

CFBUPDT	CFBTIME					ROW TOTAL	
	COUNT	I	For 5	For more			
	ROW PCT	I	years	than 5			
	COL PCT	I	or less	I	years		
	TOT PCT	I			I		
		I	5	I	45	I	50
Low periodicity		I	10.0	I	90.0	I	48.1
		I	25.0	I	53.6	I	
		I	4.8	I	43.3	I	
		I	15	I	39	I	54
High periodicity		I	27.8	I	72.2	I	51.9
		I	75.0	I	46.4	I	
		I	14.4	I	37.5	I	
		I		I		I	
	COLUMN		20		84		104
	TOTAL		19.2		80.8		100.0

CORRECTED CHI SQUARE = 4.19998 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0404  
PHI = 0.22537



Table F.1.2

Contingency table between the periodicity of cash flow budget revision and the objective set for the cash flow budgeting system of planning the need for financing

		OBJPFIN1					
		COUNT	I				
		ROW PCT	I			ROW	
		COL PCT	I			TOTAL	
		TOT PCT	I	No	I	Yes	I
CFBUPDT		-----	I	-----	I	-----	I
			I	19	I	42	I
	Low		I	31.1	I	68.9	I
	periodicity		I	70.4	I	46.2	I
			I	16.1	I	35.6	I
			-----	-----	-----	-----	-----
			I	8	I	49	I
	High		I	14.0	I	86.0	I
	periodicity		I	29.6	I	53.8	I
			I	6.8	I	41.5	I
			-----	-----	-----	-----	-----
	COLUMN			27		91	118
	TOTAL			22.9		77.1	100.0

CORRECTED CHI SQUARE = 3.96827 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0464  
PHI = 0.20357

Table F.1.3

Contingency table between the periodicity of cash flow budget revision and the objective set for the cash flow budgeting system of managing and controlling the cash position

		OBJMCSH1						
		COUNT	I					
		ROW PCT	I			ROW		
		COL PCT	I			TOTAL		
		TOT PCT	I	No	I	Yes	I	
CFBUPDT		-----	I	-----	I	-----	I	
			I	42	I	19	I	61
	Low		I	68.9	I	31.1	I	51.7
	periodicity		I	68.9	I	33.3	I	
			I	35.6	I	16.1	I	
			-----	-----	-----	-----	-----	
			I	19	I	38	I	57
	High		I	33.3	I	66.7	I	48.3
	periodicity		I	31.1	I	66.7	I	
			I	16.1	I	32.2	I	
			-----	-----	-----	-----	-----	
	COLUMN			61		57		118
	TOTAL			51.7		48.3		100.0

CORRECTED CHI SQUARE = 13.49855 WITH 1 DEGREE OF FREEDOM  
 SIGNIFICANCE = 0.0002  
 PHI = 0.35519

Table F.1.4

Contingency table between the preparation of cash flow updates or forecasts for cash control purposes and the overall unused borrowing capacity of the firm

		BORCAPR				ROW TOTAL
		Very small	to	Above		
CONTROL	Count	Very small	to	Above		
		to moderate	to moderate	moderate		
No		3		23		26
	ROW PCT	11.5		88.5		29.9
	COL PCT	12.5		36.5		
	TOT PCT	3.5		26.4		
Yes		21		40		61
	ROW PCT	34.4		65.6		70.1
	COL PCT	87.5		63.5		
	TOT PCT	24.1		46.0		
COLUMN TOTAL		24		63		87
TOTAL		27.6		72.4		100.0

CORRECTED CHI SQUARE = 3.70344 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0543  
PHI = 0.23441



Table F.1.5

Contingency table between the preparation of cash flow updates or forecasts for cash control purposes and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level)

		TIMECM					
COUNT		I					
ROW	PCT	I	Less	10%		ROW	
COL	PCT	I	than	or		TOTAL	
TOT	PCT	I	10%	I	more	I	
CONTROL		-----	I	-----	I	-----	I
		I	12	I	14	I	26
No		I	46.2	I	53.8	I	29.5
		I	46.2	I	22.6	I	
		I	13.6	I	15.9	I	
		-I	-----	-I	-----	-I	
		I	14	I	48	I	62
Yes		I	22.6	I	77.4	I	70.5
		I	53.8	I	77.4	I	
		I	15.9	I	54.6	I	
		-I	-----	-I	-----	-I	
COLUMN			26		62		88
TOTAL			29.5		70.5		100.0

CORRECTED CHI SQUARE = 3.82323 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0505  
PHI = 0.23573

Table F.1.6

Contingency table between the effectiveness of cash flow budget revisions in handling unexpected events which, having occurred or being about to occur, threaten to produce major negative deviations from the expected cash flows of the firm and the periodicity of the revisions

		CFBUPDT				
		COUNT			ROW	
		PCT	Low	High	TOTAL	
		TOT	periodicity	periodicity		
RCFBPLAN						
	Less than moderate	12 70.6 33.3 13.0	5 29.4 8.9 5.4	17 18.5		
	Moderate	9 33.3 25.0 9.8	18 66.7 32.1 19.6	27 29.3		
	More than moderate	15 31.3 41.7 16.3	33 68.7 59.0 35.9	48 52.2		
	COLUMN TOTAL	36 39.1	56 60.9	92 100.0		

RAW CHI SQUARE = 8.69547 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0129

CRAMER'S V = 0.307

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH RCFBPLAN DEPENDENT = 0.04602

F.2 Contingency tables for results and conclusions II



Table F.2.1

Contingency table between the implementation of contingency planning at group level and the implementation of contingency planning at parent company level

		WFPC				
COUNT		I		I		
ROW	PCT	I		I		ROW
COL	PCT	I		I		TOTAL
TOT	PCT	I	No	I	Yes	I
WF		-----I-----		I-----		I-----
		I	23	I	0	I 23
No		I	100.0	I	0.0	I 25.3
		I	41.8	I	0.0	I
		I	25.3	I	0.0	I
		-I-----		I-----		I-----
		I	32	I	36	I 68
Yes		I	47.1	I	52.9	I 74.7
		I	58.2	I	100.0	I
		I	35.2	I	39.5	I
		-I-----		I-----		I-----
	COLUMN		55		36	91
	TOTAL		60.4		39.6	100.0

CORRECTED CHI SQUARE = 17.99318 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0000  
PHI = 0.47052

Table F.2.2

Contingency table between the implementation of contingency planning at group level and the implementation of contingency planning at subsidiary company level

		WFSC					
		COUNT	I				
		ROW PCT	I			ROW	
		COL PCT	I			TOTAL	
		TOT PCT	I	No	I	Yes	I
			I		I		I
WF			I		I		I
			I	21	I	4	I
	No	I	84.0	I	16.0	I	24.8
		I	40.4	I	8.2	I	
		I	20.8	I	4.0	I	
				I		I	
	Yes	I	31	I	45	I	76
		I	40.8	I	59.2	I	75.2
		I	59.6	I	91.8	I	
		I	30.7	I	44.5	I	
			I		I		
	COLUMN		52		49		101
	TOTAL		51.5		48.5		100.0

CORRECTED CHI SQUARE = 12.38550 WITH 1 DEGREE OF FREEDOM  
 SIGNIFICANCE = 0.0004  
 PHI = 0.37314

Table F.2.3

Contingency table between the implementation of reactive contingency planning and the degree of commitment attached to cash budgets in general

WFPD	CFBCOMM						ROW TOTAL		
	COUNT	I	Very low	I	Very high	I			
	ROW PCT	I	to	I		I			
	COL PCT	I	moderate	I		I			
TOT PCT	I		I		I				
No		I	16	I	4	I	6	I	26
		I	61.5	I	15.4	I	23.1	I	21.8
		I	37.2	I	28.6	I	9.7	I	
Yes		I	13.4	I	3.4	I	5.0	I	
		I	27	I	10	I	56	I	93
		I	29.0	I	10.8	I	60.2	I	78.2
	I	62.8	I	71.4	I	90.3	I		
	I	22.7	I	8.4	I	47.1	I		
	COLUMN		43		14		62		119
	TOTAL		36.1		11.8		52.1		100.0

1 OUT OF 6 ( 16.7%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.

MINIMUM EXPECTED CELL FREQUENCY = 3.059

RAW CHI SQUARE = 11.69142 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0029

CRAMER'S V = 0.31344

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH WFPD DEPENDENT = 0.09609





Table F.2.5

Contingency table between the implementation of reactive contingency planning and the degree of predictability of company's cash inflows

WFPD	CIPREDCT				ROW TOTAL
	COUNT	I	Very low	Above	
	ROW PCT	I	to	I	
	COL PCT	I	moderate	I moderate	
No	7	25.0	13.7	5.8	28
Yes	44	47.8	86.3	36.7	92
COLUMN TOTAL	51	42.5	69	57.5	120
					100.0

CORRECTED CHI SQUARE = 3.69049 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0547

Table F.2.6

Contingency table between the effectiveness of proactive contingency planning and the number of types of cash flow plan at the level of which proactive contingency planning is carried out

WFASDISR	NCFP						ROW TOTAL
	COUNT	One	Two	Three			
Null	14	14	2			30	
to moderate	46.7	46.7	6.6			54.5	
More than moderate	7	10	8			25	
	28.0	40.0	32.0			45.5	
	33.3	41.7	80.0				
	12.7	18.2	14.5				
COLUMN TOTAL	21	24	10			55	
	38.2	43.6	18.2			100.0	

1 OUT OF 6 ( 16.7%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.

MINIMUM EXPECTED CELL FREQUENCY = 4.545

RAW CHI SQUARE = 6.19666 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0451

CRAMER'S V = 0.33566

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH WFASDISR DEPENDENT = 0.08508



Table F.2.7

Contingency table between the implementation of proactive contingency planning and the degree of predictability of company's cash inflows

WFAS	CIPREDCT			ROW TOTAL
	Very low	to moderate	Very high	
No	COUNT	16	7	12
	ROW PCT	45.7	20.0	34.3
	COL PCT	36.4	24.1	63.2
	TOT PCT	17.4	7.6	13.0
Yes	COUNT	28	22	7
	ROW PCT	49.1	38.6	12.3
	COL PCT	63.6	75.9	36.8
	TOT PCT	30.5	23.9	7.6
COLUMN TOTAL	44	29	19	92
	47.8	31.5	20.7	100.0

RAW CHI SQUARE = 7.51606 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0233

CRAMER'S V = 0.28583

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH WFAS DEPENDENT = 0.06121

Table F.2.8

Contingency table between the implementation of proactive contingency planning and the degree of predictability of company's cash outflows

WFAS	COPREDCT			ROW TOTAL
	COUNT	Very low to moderate	Very high	
No	15	7	13	35
	42.9	20.0	37.1	38.0
	39.5	22.6	56.5	
Yes	16.3	7.6	14.1	
	23	24	10	57
	40.4	42.1	17.5	62.0
	60.5	77.4	43.5	
	25.0	26.1	10.9	
COLUMN TOTAL	38	31	23	92
	41.3	33.7	25.0	100.0

RAW CHI SQUARE = 6.50946 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0386

CRAMER'S V = 0.26600

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH WFAS DEPENDENT = 0.05428

### F.3 Contingency tables for results and conclusions III



Table F.3.1

Contingency table between the degree of reliance on the resources of liquidity and the evolution of the firm's overall unused borrowing capacity

		BORCAPEV				
		COUNT			ROW	
RESRELY	PCT	Increased	Decreased	TOTAL		
		or remained	or			
		stable	varied			
		86	13	99		
Moderate		86.9	13.1	90.0		
or less		93.5	72.2			
		78.2	11.8			
More		6	5	11		
than		54.5	45.5	10.0		
moderate		6.5	27.8			
		5.5	4.5			
		92	18	110		
		83.6	16.4	100.0		

CORRECTED CHI SQUARE = 5.38043 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0204  
PHI = 0.26212

Table F.3.2

Contingency table between the preparation of an inventory of the resources of liquidity and the implementation of reactive contingency planning

		WFPD							
		COUNT	I						
		ROW PCT	I			ROW			
		COL PCT	I			TOTAL			
		TOT PCT	I	No	I	Yes	I		
IV		-----	I	-----	I	-----	I		
			I	11	I	17	I	28	
	No		I	39.3	I	60.7	I	23.5	
			I	39.3	I	18.7	I		
			I	9.2	I	14.3	I		
			-----	I	-----	I	-----	I	
				I	17	I	74	I	91
	Yes		I	18.7	I	81.3	I	76.5	
			I	60.7	I	81.3	I		
			I	14.3	I	62.2	I		
		-----	I	-----	I	-----	I		
	COLUMN			28		91		119	
	TOTAL			23.5		76.5		100.0	

CORRECTED CHI SQUARE = 3.97180 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0463  
PHI = 0.20604

Table F.3.3

Contingency table between the preparation of an inventory of the resources of liquidity and the implementation of reactive contingency planning

		CIPREDCT				
	COUNT	I		I		ROW TOTAL
	ROW PCT	I	Very low	I	Above	
	COL PCT	I	to	I	moderate	
	TOT PCT	I	moderate	I	moderate	
IV		-----I-----I-----I				
		I	7	I	22	I 29
	No	I	24.1	I	75.9	I 24.4
		I	14.0	I	31.9	I
		I	5.9	I	18.5	I
		-----I-----I-----I				
		I	43	I	47	I 90
	Yes	I	47.8	I	52.2	I 75.6
		I	86.0	I	68.1	I
		I	36.1	I	39.5	I
	-----I-----I-----I					
	COLUMN		50		69	119
	TOTAL		42.0		58.0	100.0

CORRECTED CHI SQUARE = 4.10749 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0427  
PHI = 0.20562



Table F.3.4

Contingency table between the preparation of an inventory of the resources of liquidity and the percentage of (headquarters) finance department's time devoted to the management of cash (at group level)

		TIMECM				
	COUNT	I	Less	10%	ROW	
	ROW PCT	I	than	or	TOTAL	
	COL PCT	I	10%	I more	I	
	TOT PCT	I				
IV		I	I	I	I	
	No	I 13	I 15	I 28		
		I 46.4	I 53.6	I 23.7		
		I 37.1	I 18.1	I		
		I 11.0	I 12.7	I		
		I	I	I		
	Yes	I 22	I 68	I 90		
		I 24.4	I 75.6	I 76.3		
		I 62.9	I 81.9	I		
		I 18.7	I 57.6	I		
	I	I	I			
	COLUMN	35	83	118		
	TOTAL	29.7	70.3	100.0		

CORRECTED CHI SQUARE = 3.94953 WITH 1 DEGREE OF FREEDOM:  
SIGNIFICANCE = 0.0469  
PHI = 0.20476

Table F.3.5

Contingency table between the preparation of an inventory of the resources of liquidity at group level and the preparation of an inventory of the resources of liquidity at parent company level

		IVPC				
		COUNT			ROW	
		I			TOTAL	
		ROW PCT				
		I				
		COL PCT				
		I				
		TOT PCT	No	Yes		
		I	I	I	I	
IV		-----I-----I-----I				
		I	20	1	21	
	No	I	95.2	4.8	21.0	
		I	40.0	2.0		
		I	20.0	1.0		
		-----I-----I-----I				
		I	30	49	79	
	Yes	I	38.0	62.0	79.0	
		I	60.0	98.0		
		I	30.0	49.0		
	-----I-----I-----I					
	COLUMN	50	50	100		
	TOTAL	50.0	50.0	100.0		

CORRECTED CHI SQUARE = 19.52983 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0000  
PHI = 0.46648

Table F.3.6

Contingency table between the preparation of an inventory of the resources of liquidity at group level and the preparation of an inventory of the resources of liquidity at subsidiary company level

		IVSC				
	COUNT					
	ROW PCT					ROW
	COL PCT					TOTAL
	TOT PCT	No	Yes			
IV		21	2			23
	No	91.3	8.7			23.0
		29.6	6.9			
		21.0	2.0			
		50	27			77
	Yes	64.9	35.1			77.0
		70.4	93.1			
		50.0	27.0			
	COLUMN	71	29			100
	TOTAL	71.0	29.0			100.0

CORRECTED CHI SQUARE = 4.76866 WITH 1 DEGREE OF FREEDOM  
SIGNIFICANCE = 0.0290  
PHI = 0.24456



Table F.3.7

Contingency table between the effectiveness of the inventory of resources and the extent to which it is viewed as an indicator of financial mobility

IVDISR	IVREAL						ROW TOTAL
	COUNT	Less than		More than			
	ROW PCT	Moderately		moderately			
	COL PCT						
Null	13	17	14			44	
to	29.6	38.6	31.8			48.9	
moderate	92.9	65.4	28.0				
	14.4	18.9	15.6				
More	1	9	36			46	
than	2.2	19.5	78.3			51.1	
moderate	7.1	34.6	72.0				
	1.1	10.0	40.0				
COLUMN TOTAL	14	26	50			90	
	15.5	28.9	55.6			100.0	

RAW CHI SQUARE = 22.39 WITH 2 DEGREES OF FREEDOM

SIGNIFICANCE = 0.0000

CRAMER'S V = 0.499

UNCERTAINTY COEFFICIENT (ASYMMETRIC) WITH IVDISR DEPENDENT = 0.198