Empirical financial accounting research
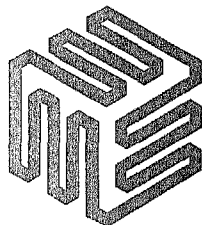
compliance with regulation, distributional
properties of financial ratios and demand
for external auditing

W.F.J. Buijink

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Promotor:
Prof. dr J.H.R. van de Poel

Beoordelingscommissie:
Prof. dr J.G. Backhaus (voorzitter)
Prof. dr J.L. Bouma (Rijksuniversiteit Groningen)
Prof. dr C.C.P. Wolff

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first introduction to financial accounting research and it immediately aroused my interest in the field. I still profit from attending that course. For example, it was during that course that I first heard of Chee Chow's paper on the demand for external auditing on which chapter 4 builds.

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Chapter 1

Empirical financial accounting research:

an introduction

1.1. Introduction

The title of this dissertation raises the question of what is meant by empirical financial accounting research. In what way and why are the three essays in this dissertation examples of empirical financial accounting research?

In this dissertation attention is restricted to research in **financial** accounting. That is research that uses as its basic material the financial statements published, with varying periodicity, by business firms. Since external auditing is inextricably linked with external financial reporting, financial accounting is considered to include auditing in this dissertation. The qualifier financial is used only to exclude management accounting research that uses material intended for use in intra-firm decision making and control. Of course, financial **accounting** information is the product of the application of accounting and disclosure rules.

The three essays in this dissertation are examples of **empirical financial** accounting research in that they look at the real-world phenomena of financial accounting practice.

The first part of this chapter, section 1.2., sketches the research themes of financial accounting research. Attention is restricted however to

economics-based empirical financial accounting research. Financial accounting and disclosure rules, their design and use, are consequences of human action. It is useful therefore to study financial accounting practice as a consequence of human action. Economics, with its assumption that individuals making up the parties concerned with financial accounting, act so as to maximize their welfare, is a powerful tool for modelling human action and devising explanations for empirical phenomena at the aggregated level of markets[1]. Evidently (see also Watts and Zimmerman (1986, p.7)) other 'views' of what directs human action can be used to generate empirical financial accounting research[2]. In this dissertation and in this chapter attention is restricted to economics-based financial accounting research.

A first paragraph in section 1.2. delienates three themes of financial accounting research. A second paragraph gives a brief sketch of the development of financial accounting research noting the comparatively recent introduction of a 'social science' perspective in this area of study next to the already existing 'design' perspective[3]. This paragraph ends by noting the unnecessary tension in the financial accounting literature between those entertaining a 'social science' and those entertaining a 'design' perspective. It concludes that studies done in the former tradition may actually help work done from a design perspective, by critically examining its preconceptions. The penultimate paragraph of section 1.2. explains the author' inclination towards empirical research in this area, while the last paragraph lists a number of empirical financial accounting research survey papers.

The second part of this chapter, section 1.3., introduces chapters 2, 3 and 4.

1.2. A characterization of economics-based empirical financial accounting research

1.2.1. Economics-based financial accounting research

Corporate financial reporting in market-oriented economies ,such as the Netherlands, takes the form of financial statements. These are published by firms with varying periodicity. Financial statements are the products of the application of accounting and disclosure rules. For example, the decision to disclose a management sales forecast for the next fiscal year in the current year financial statements is the result of

the application of a disclosure rule. While the decision to publish inventory data in a firm's financial statement results from a disclosure rule, the choice of the LIFO method to value inventory constitutes the application of a computational algorithm, an accounting rule. Or even more to the point, the examples just given constitute selections of a firm of a particular diclosure or accounting rule from the available set of rules.

Thus, financial reporting activity by firms creates, in the words of Watts (1977, p.49):

" ... the phenomena we losely call [financial] accounting."

Essentially, economics-based empirical financial accounting research studies these phenomena as they exist in two markets: (i) the market for financial information, and (ii) the market for financial accounting and disclosure rules. The demand side of the market for financial accounting information is formed by users of such information. The supply side of this market is formed by firms, that in turn form the demand side of the market for accounting and disclosure rules. The supply side of the market for accounting and disclosure rules or techniques, consists of rule designers, e.g. public accountants, accountancy firms, or accounting academics.

The identification of these two markets presents a convenient way of delienating the following three central themes in financial accounting research:
1. To what uses is financial accounting information put;
2. What guides firms in their demand for accounting and disclosure rules and their supply of financial accounting information (i.e. their choice of specific rules);
3. What determines the supply of accounting and disclosure rules (i.e. their design)?

Theme 1 focuses on the demand for financial accounting information. Theme 2 focuses on the decisions of which rules to demand and to use, and thereby focuses on the demand for rules and the supply of financial accounting information of firms. Theme 3 focuses on the supply of accounting and disclosure rules.

Studies of the demand for financial accounting information (theme 1) look at the two primary uses to which that information is put. Financial statements provide pre-decision use information about the state of a firm and post-decision use information facilitating contracting with respect to the state of the firm (Kinney (1988, p.417)). Foster (1986, p.2) lists the various parties demanding financial statement information for

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pre- and post-decision use: (A) shareholders, investors and security analysts; (B) managers; (C) employees; (D) lenders and other suppliers; (E) customers and (F) government regulatory agencies. An example of pre-decision use by shareholders is that while choosing a portfolio of securities of firms to invest in. An example of post-decision use of financial statements, would be that of debtholders using these statements to monitor the management of lending firms.

Studies of the supply of financial accounting information and the demand for accounting and disclosure rules (theme 2) investigate the choice of specific accounting and disclosure rules as it is influenced by (i) demand forces, (ii) costs, in a broad sense, associated with the production of the information, and in a regulated environment (iii) regulatory forces. Regulatory forces are in fact quite strong in most market-oriented economies, hence Watts' (1977, p.53) remark, that,

"... financial statements are the product of both market and political processes."

What 'regulators' do is limit the choice of firms, both vis-à-vis the accounting rule market supply side and vis-à-vis the accounting information market demand side. And, of course, it is very likely that once financial accounting regulation is introduced, consumers of accounting information, producers of accounting techniques and firms using techniques and supplying information, will try to influence the regulator's decisions. It is also likely that the financial reporting behaviour and decision making of firms will change under regulation. Designers of accounting techniques may be asked to supply arguments for particular accounting and disclosure rules and may also be asked to design accounting techniques around regulations. All this, of course adds complexity to both the accounting information and the accounting technique market.

Theme 3 studies take several forms. There are studies that analyse accounting and disclosure rule invention in a demand and supply framework (see Watts and Zimmerman (1979) and Peasnell and Williams (1986)). There are also studies in which the invention of accounting and diclosure rules is the dependent variable. Yamey (1981) gives an excellent overview of descriptive historical studies of rule invention. The kind of theme 2 studies which are by far the most numerous however, are those that contain proposals of new or amended financial and disclosure rules, or comment upon or criticize existing rules. An excellent example of this kind of work is the invention of the Cash Recovery Rate as an alternative to the Accounting Rate of Return (see, Stark (1990) for a collection of papers on this subject). Another,

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more abstract, example is Beaver and Demski (1979), a commentary on the use of accrual accounting in the context of incomplete markets.

Taken together these three broad themes of economics-based empirical financial accounting research group studies that create, document and try to explain the real-world phenomena that can be observed accross the entire domain of financial reporting activities by firms. These studies contain proposals for, try to document, and to provide explanations for, the appearance of financial reporting activities at one point in time and the evolution in their appearance over time.

1.2.3. The development of economics-based empirical financial accounting research

1.2.3.1. A shift in approach and its consequence
It is only comparatively recently that financial accounting reseachers have started to stress the need for developing,
> "...theory to explain many interesting observed [financial accounting] phenomena." (Watts (1977,p.54)

The key terms here are 'theory' and 'explain'. Indeed it is only comparatively recently that financial accounting researchers have entertained the following description of 'research',
> " ... the development and testing of new theories of 'how the world works' or refutation of widely held existing theories" (Kinney (1986, p.339))[4].

In financial accounting research, evidently, concern is with how the world works with respect to financial accounting practices[5].

Moreover, at the same time, rigour in research was also increasingly demanded, stressing the sequence: theory, hypothesis and the confrontation of hypotheses with facts (Kinney (1986, p.339)). Such confrontation was to be done with quasi-experimental, that is observational, or experimental studies. These studies needed to show an appropriate combination of internal, external, construct and statistical conclusion validity (see, Ball and Foster (1982, p.189). That would serve to ensure that valid inferences are made, given the confrontation of hypotheses with facts, and that these were not an intentional artefact of the observing researcher (see, De Brabander (1983, pp.5-6)).

Demski (1987, p.89) has called this development, "...the injection of a social sciences perspective [in accounting]"[6]. Dyckman and Zeff (1984, p.241) date this change in approach in financial accounting research in the late sixties.

The advent of (economic) theory based empirical accounting research occurred against the background of a strong current among financial accounting researchers that sees financial accounting research as aimed at the design of accounting and disclosure rules, from broad conceptions of the foundations of accounting and disclosure rules (conceptual frameworks for specific rules), to the design of specific rules; that is, the most numerous kind of theme 3 studies.

The discussion within the financial accounting research community between those taking a social science perspective and those using a design perspective has at times been heated[7], see e.g. Watts (1977) and Kinney (1990) versus Christenson (1983) and Sterling (1990). The recency of Sterling's and Kinney's contributions to this debate shows that this discussion is far from over.

But much of the heat can be taken out of the debate once it is recognized that succesful explanation and prediction of financial accounting practice will be of help to designers of accounting and disclosure rules. Watts and Zimmerman (1986, p.9) also make this point.

Using the delienation of themes of financial accounting research, the development of themes 1 and 2 research during the last three decades can be termed a happy development. First it has the potential of creating a better understanding of financial accounting phenomena. The contribution of empirical financial accounting research to themes 1 and 2 will also in part be to do away with need for **preconceived** ideas of how the world works with respect to financial accounting practices, often used in theme 3 financial accounting and disclosure rule design studies.

1.2.3.2. Dispelling preconceived ideas in financial accounting rule design studies: some examples

The need for dispelling preconceived ideas among financial accounting and disclosure rule designers of how the world works with respect to financial accounting practices can be illustrated with three examples from the Netherlands.

The first example describes a situation in which accounting and disclosure rule designers did not use empirical material describing accounting practices. Possibly because such material was not available. Explicit consideration of that fact would have strengthened the designers' case. The second example describes a situation where descriptive empirical results were available, but were not used by disclosure rule designers. A third example describes a situation in which empirical

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results only became available after a long time lag, during which rule designers carried on a debate mainly on non-empirical grounds.

Example 1. In the fifties and sixties a series of reports appeared in the Netherlands with proposals to reform financial reporting. All this activity eventually culminated in the passing of the Law on Annual Financial Statements in 1970 (WJO 1970). The most important of these reports were the employer's federation Rijkens' report, 'The annual report' (1955), the Wiardi Beckman Foundation (Labour party) report of 1959 , called 'The reform of enterprise', the Liberal party's Telders Foundation report, entitled 'Open Enterprise' of 1962, the report of the Hamburger committee of, again, the employer's federation on 'Reporting, stewardship and information disclosure by the managements of limited companies' of 1962, and the report of the Ministery of Justice committee under the chairmanship of Verdam on the 'Revision of Company Law' of 1964. What is striking in these reports is the absence of examinations of actual financial reporting practices of Dutch companies. All of these reports contain policy recommendations on the disclosure and accounting rules to be used by Dutch companies, yet none of them presents quantified evidence on the financial disclosure policies of Dutch firms. All these proposal were therefore apparently made purely on the basis of preconceived ideas. This can not have been for want of empirical research possibilities. The earlier law on annual financial statements, that of 1928/29, had made filing of financial statements with Chambers of Commerce mandatory for a considerable number of Dutch limited liability companies. For instance in 1935, the year in which the 1928/29 law became fully operational, 1057 companies filed their annual financial statements with the Amsterdam Chamber of Commerce alone (Greup (1936, p.59)). At the time around 700 Dutch companies were listed on the Amsterdam Stock Exchange (De Vries (1976, ch.4)). Therefore financial statement material of Dutch companies was widely available and not just for listed companies.

Also, internationally, empirical analyses of the effects of financial accounting regulation, that could have served as an example for relevant research, had already begun in the sixties. Stigler (1964) was the first contribution. Chow (1983) gives an overview of other early contributions.

Example 2. Sternheim (1933) carefully recorded the presence of an independent external auditor with a large number of Dutch companies, mostly listed on the Amsterdam Stock Exchange in 1931/32. All of these companies published financial statements. He found an important demand for external auditing in the lightly regulated (law of 1928/29) financial accounting environment in the Netherlands, since

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55% of the large Dutch companies had external auditors in 1931/2. In the fifties and sixties various other descriptive studies showed an increase in that percentage to over eighty. By the time an external audit was mandated in 1970, a large majority of the larger Dutch companies already had an external auditor. Table 1.1. documents this trend. The percentages are not completely comparable because of difference in sample selection and the presence-of-external auditor definition, but the upward trend is visible.

Table 1.1. Percentage of listed companies in the Netherlands with external auditors: various years.

Year	%	Source
1931/2	55	Sternheim (1933)
1947	72	Lafeber (1948)
1951	50	Kraayenhoff (1955)
1957	85	Vecht (1960)
1958	69	Groeneveld (1965)
1965	84	Groeneveld (1968)

This material could have been used in the debate about a mandated audit in the Netherlands which had started around the turn of the century and lasted until the advent of the mandated external audit in WJO 1970. Similar material could have been used at the time an external audit was mandated for an even larger group of Dutch companies, in 1984, in Title 9 (then title 8). In both cases however an external audit was mandated apparently based on a preconception that without regulation external auditing would not take place.

Also, by 1984 several empirical studies on the determinants of financial disclosure in an unregulated environment, e.g. Chow (1982), that could have served as examples for relevant research, had appeared in the literature.

Example 3. Replacement value theory was designed and advocated by Th. Limperg Jr. in the 1920's for use by Dutch firms in their financial statements. Limperg's ideas led many Dutch financial accounting researchers to attempt to refute or extend Limperg's idea, but almost always with non-empirical means. A great step forward, but only made in 1975, was the first detailed study of the actual use of replacement value accounting for financial reporting in the Netherlands by Klaassen (1975). Klaassen dispelled existing ideas in that he found that few Dutch firms used replacement value accounting. He did not go as far as investigating the reasons for non-adoption however. Further empirical financial accounting research such as Wong (1988), with New

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Zealand data, has since explored the matter further, trying to find out the reason behind accounting rule choice in this area, which will probably further help rule designers.

1.3.3.3. Financial accounting researchers: designers or describers?

While the examples just given suggest possibilities of improvement of financial accounting rule design from empirical knowledge about financial accounting practices there is a fundamental question to be faced by those taking a design perspective of financial accounting research. Can financial accounting researchers really be successful accounting and disclosure rule inventors? Successful in that their inventions are used by firms. Economics-based financial accounting researchers, because of their faith in the optimization premise in economics would hesitate saying yes to that question. Faulhaber and Baumol (1988, p.578) present this problem thus:

> "... if in practice business had to learn these new techniques from economists, then the fundamental optimality premise of economists' attempts to describe business behaviour may need to be reevaluated."

If this were true it would threaten the possibility of, and need for, accounting rule design as an academic research topic. While this raises doubts about the possibility of taking a design perspective in financial accounting research, to be fair, it at the same time raises doubts about the practical importance of the results of financial accounting research taking a social science perspective.

> "If [in the field of accounting] a theory is succesful as a positive theory it cannot produce new insights that might be useful to the actors in the field (essentially the theory has nothing to add to existing behaviour (Van de Poel and Tempelaar (1987, p.4))"

Widely diverging views on this subject can be found in the literature. Simon (1981 p. 128 sqq.) argues for the necessity of a science of design as part of research in schools of business and economics. This is so, in his view, because these schools teach about artificial things, human constructs, such as, for instance, accounting and disclosure rules. On the other hand there is Demski (1987, p.90) who limits the role of a financial accounting researcher to that of social recorder of behaviour, since, "...our immediate task is [not] that of an engineer", and since, "...it is doubtful that the researcher will be in a position to guide or second-guess those [people in firms] specialized in accounting system design".

The position taken in this dissertation, on the force of the optimization premise, is intermediate. It seems unreasonable to assume that the market will force firms to discover undiscovered financial accounting

and disclosure rules, by, possibly as yet unborn, financial accounting researchers. Faulhaber and Baumol (1988, p.579) present several arguments for this position. So there seems to be room for improvement of financial accounting and disclosure rule design from theory based empirical knowledge.

1.2.3.4. Three essays in empirical financial accounting research: this dissertation

The position taken in this dissertation, as can be seen in the essays that follow, is therefore in the empirical wing of financial accounting research. In the words of Stigler (1986, p. 138),

> "The central task of an empirical science such as economics is to provide general understanding of events in the real world, and ultimately all of its theories and techniques must be instrumental to that task".

For economics one should read economics-based financial accounting. The same opinion is slightly more generally phrased by Sutton (1988, p.542),

> "The ultimate aim for any body of theory is that it furnishes new and demonstrably satisfactory (or at least superior) explanations for certain empirical observations."

Such explanations are valuable in that they create a greater understanding of,

> "..[financial] accounting practice as it is, why it is that way and how and why it may change in the future" (Kinney (1990, p....)).

Incidentally, this sort of understanding is something that a pure design approach to financial accounting research in itself would never lead to. At the same time, recognizing the importance of financial accounting and disclosure rule design, such understanding will improve the product of design activity As a minimum therefore a careful investigation of accounting practice is necessary[8].

The three essays that follow are attempts at such empirical research.

As a parting note: during the period from the late sixties, identified by Dyckman and Zeff (1984) as the beginning of theory-based financial accounting research, to the present, financial accounting research in the Netherlands had a design perspective and was predominantly non-empirical (see, Feenstra (1991, p.278)).

The previous paragraphs evidently did not constitute a survey of empirical economics-based financial accounting research. Several surveys are available in the literature. One of the earliest is Hakansson (1973). Other admirable surveys are Ball and Foster (1982), Lev and Ohlson (1982), Peasnell (1983), Foster (1986), Watts and Zimmerman (1986), Dyckman and Morse (1986), Griffin (1987), Beaver (1989) and Bernard (1989). Abdel-khalik and Solomon (1989, especially chapter 6) is a very useful survey of auditing research in relation to financial accounting research.

1.3.   A brief introduction to each of the three essays

1.3.1.   Error-rates in a Belgian financial statements database and the degree of compliance with financial accounting regulation

The last decade has seen a gradual increase in the availability of financial accounting databases for financial analysts and researchers. In the USA there is the ubiquitous COMPUSTAT database (Brown, Huefner and Weintrop (1989) is a useful survey of US financial accounting databases). In England there is the EXSTAT database, and in Belgium and France there are 'Centrales des Bilans', Financial Statements Depositories, that produce datatapes, and recently in Belgium, CD-ROM's with financial statement material. In the Netherlands there are databases such as those of Graydon and Datastream.

A financial analyst or a researcher using a financial accounting database will be interested in a number of features of the database. An important feature is the accuracy of the financial statement material in the database. Two reasons for errors and ommissions in financial accounting databases can be entertained:

* the transcription to the database of the original data, in the financial statements was not done correctly;
* transcription errors are absent, but there are errors and ommissions in the original material that are not, or cannot be, screened away by the database producer.

Lev (1974, p.254) and Foster (1986, appendix 3A, and Foster (1987, p.203)) have stressed the importance of screening the information in

financial statement databases. Foster (1986, appendix 3A) suggests a number of ways to ascertain the quality of financial accounting data in these databases.

1. A comparison of the material in the database with the original financial statements.
2. A comparison of data on the same firms in two independently constructed databases.
3. Checks on known relationships between financial ratios to detect possible errors; e.g. quick ratio ≤ current ratio, etc..
4. Creating dataplots of financial ratios and financial statement items over a cross-section or time-series of company data, and checking outlying observations.
5. To check if necessary equalities and inequalities are satisfied in the financial statement material in the database; e.g. total assets ≥ equity.

Chapter 2 employs the last possibility. It looks at the quality of data in a large Belgian financial accounting database, by subjecting each financial statement in it to a large number of arithmetical and logical tests. The chapter looks at all financial statements in the database from 1977 to 1983. On average 1977 financial statements contained slightly more then 3 errors and in 1983 slightly less than 2 errors. Results such as those in chapter 2 show the importance of quality checking of financial accounting database before use (see chapter 3 for an example).

The study in chapter 2 is an empirical research facilitator; that is, it will help empirical researchers who want to make use of the Balans-centrale database, or help empirical researchers who want to devise a screening technique for the accounting data base they themselves are using. However, there is also another side to these results. Given that the transcription of the original information to a financial accounting database does not itself generate errors, which appears to be the case with the Belgian financial database studied in chapter 2, the question arises what causes the observed error-rate. As Lev (1889, p.185) has put it in a discussion of the quality of financial statements:

"The challenge in this area is to gain insight into the motives and means by which management exercices discretion over [the quality] of financial reporting."

In a regulated environment with respect to financial reporting this is tantamount to raising the question of what explains the degree of compliance of companies with financial accounting regulations. The preconception in the literature seemed to be that compliance was

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unproblematic. The second part of chapter 2 looks at firm characteristics that may explain the observed error-rates in Belgian financial statements. It examines the effects of size, profitability, liquidity, leverage and industry on the error-rate. Several empirical regularities are established. The chapter closes with a discussion of these stylized facts in the light of (agency) theoretic insights. Interestingly, a later paper by Kinney and McDaniel (1989) corroborates some of chapter 2's findings with US data.

1.3.2. Cross-sectional distributional properties of financial ratios

Evidence on the distributional properties of financial ratios is important in a number of diverse decision situations. Foster (1986, p. 110) lists the following:

• a bank loan officer trying to determine were on the industry distribution a financial ratio of interest for a lending decision lies,

• a strategic decision, where the objective is to move a company's profit margin from the lower half of the industry distribution to the top 10 %,

• a decision by an auditor, on the basis of an analytical review of a particular financial statement item in comparison with other companies in the same industry, to continue the audit with substantive tests.

In response to these needs a literature producing evidence on financial ratio distributions has developed.

Barnes (1987) comments on the early empirical literature investigating the cross-sectional distributional properties of financial ratios as follows.

"Most of the early studies noted skewness [of the ratio distributions], but did not inquire into the reasons. Nor was it clear why non-normality mattered. However recent advances have clarified the matter." (Barnes (1987, p. 115))

Barnes gives three reasons for studying the distributional properties of financial ratios. All three have relevance for each of the decision areas just mentioned.

The first reason is that it helps to assess the appropriateness of financial ratio construction itself. The preconception was that a financial ratio is formed to control for the effect of (firm)size on the financial statement item of interest. For instance, the amount of equity in the capital structure of companies of different asset sizes. Inspection of the

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distributional properties of financial ratios can throw light on the precise functional relationship between numerator and denominator items in financial ratios.

The second reason is that in skewed distributions of financial ratios, location measures of the distribution are not unanimous. Problemless unanimity was the preconception here. This makes frequently made intra-industry comparisons of company ratios with industry means problematic.

The third reason is that the use of statistical techniques with financial ratios, e.g. on financial distress prediction models, often leads to the necessity of studying the distributional form of the financial ratios in question, because of preconceived (multi)variate normality assumptions underlying the statistical techniques used.

Chapter 3 has a place in this literature. The assumption tested in chapter 3 is that financial ratios, either in the original or suitably transformed form, are normally or at least symmetrically distributed. More specifically, the analysis centers on the question of whether this assumption is more often true at a lower level of firm aggregation, that is, in more homogeneous industries. And, new to the literature, results are presented on the persistence over time in the form of financial ratio distributions.

A large database, with financial statement material of Belgian companies, from manufacturing industries, the same database studied in chapter 2, is used for the period 1977-1981. The ratio distributions studied are of eleven of the twelve financial ratios extensively studied in Foster (1978).

1.3.3. Evidence on the demand for external auditing in an unregulated environment: the case of the Netherlands

Chapter 4 is the most theory driven empirical study in this dissertation. This chapter tests whether the demand for external independent auditing by Dutch companies is associated with characteristics that proxy for a company's contracting costs. Independent external auditing is posited in the literature as a possible means of reducing the contracting costs that contractually based organizations like a company entail (see Watts (1977) and Watts and Zimmerman (1986, ch. 13)). This may constitute an important reason why managers demand external auditing, even in the absence of regulation. In fact it may obviate the preconceived need for regulation in this area.

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Contracting cost based of a financial accounting research can be termed the microeconomic study of financial reporting practice. The behaviour of the parties to the contracts that make up a firm (e.g. managers, equityholders, debtholders) is positted to be individual utility maximizing. The self-seeking behaviour of these parties potentially generates costs and affects firm value. Financial reporting by managers to equity holders and debtholders may be a cost-effective way of mitigating the costs of contracting between these parties. Contracting cost based financial accounting theory has developed a number of specific testable hypotheses about the choice of accounting and disclosure rules. Christie (1990) is a recent overview of the empirical research in this area. One such rule is the presentation of the results of an external audit. That characteristic of financial reporting is the subject of chapter 4.

In a pioneering article Chow (1982) has investigated the effect of he contracting cost variables firm size, leverage, number of accounting based debt covenants and company ownership structure on the demand for external independent auditing by American (U.S.A.) companies in 1926. That is, before SEC (Securities and Exchange Commission) regulation and stock exchange rules mandated an external audit in the U.S.A..

In chapter 4, Chow (1982) is extended. To avoid all regulatory effects on the demand for external auditing, the data for 141 Dutch companies used in this chapter, are also from 1926, that is before the financial accounting law of 1928/29 (see example 2 earlier). Sixty-five of these companies were externally audited.

1.4.   Final remarks

Chapters 2, 3 and 4 are contributions to diverse areas of financial accounting research. This illustrates the range of possibilities for empirical financial accounting research. Chapters 2, 3, and 4 are all three aimed at dispelling preconceptions with empirical means. The final chapter 5 of this dissertation further explores the links between chapters 2, 3 and 4 and sketches feasible empirical financial accounting research studies linked to the research in chapters 2, 3 and 4.

In this dissertation Belgian data are used in two of the three chapters. The reason is that easily accessible data on the scale of the Belgian 'Centrale des Bilans' or 'Balanscentrale' are not available in the Nether-

lands. In the Netherlands financial statements are filed decentrally with each one of the almost 40 Chambers of Commerce. This make data gathering extremely costly compared to the situation in Belgium. To date initiatives to construct a Dutch financial accounting data base of the voluminously available material have foundered. For a discussion of possibilities in the Netherlands, see Bollen and Buijink (1988).

Notes

1. Or games with a varying number of players. See for a definition of micro-economics in this vein, Kreps (1990, p.3).

2. For instance, for an overview of empirical financial accounting studies carried out starting from a 'behavioral' point of view, see the recent survey article of Birnberg and Shields (1989).

3. As will become clear in what follows, the terminology 'a social science perspective' and 'a design perspective' of financial accounting research, is used in stead of the more frequently used designations 'positive' and 'normative' financial accounting research.

4. Among the first to make this point explicitely was Nelson (1973).

5. As an example: Holthausen (1990) distinguishes three alternative perspectives in the economics-based financial accounting research: the opportunistic behavior, efficient contracting and information perspective. See Holthausen (1990, p.208) for explanation. Demski (1988, p.628), in a review of Watts and Zimmerman (1986), suggests economics based transaction cost theory as a vehicle for financial accounting research. While, of course, in 'behavioral' empirical financial accounting research in general, there exist still other perspectives (for a recent concrete example, see Mezias (1990)).

6. To avoid misunderstanding: Demski uses 'social sciences perspective' in the sense of social science with a (natural) science perspective.

7. This debate among financial accounting researchers is usually called 'the positive vs. normative' debate in the literature. The distinction between an social science and a design perspective is probably more fruitful and less polemic.

8. Note that the results of careful investigations of financial accounting practice would also be beneficial to financial accounting education. As Kinney (1989,p.122) has recently stressed:
    "By understanding the whys of real world [financial] accounting practices, a student will be better prepared to evaluate [accounting] alternatives in

*face of inevitable changes in the social, economic and political environ-
ment."*

In Zeff (1989, p.206) one can find a similar remark:
*"A spirited and critical examination of extant practice -one that goes
beyond the incantation of the usual explanations offered in support of that
practice- is an indispensable part of the education of future [financial
accounting] professionals."*

In doing so, it may also make clear to students that there is intellectual
content in financial accounting information issues beyond accounting
identities (Beaver (1984, p.37)).

Chapter 2

The reliability of financial accounting databases and the degree of compliance with financial accounting regulation:

some Belgian evidence[1]

2.1. Introduction

One of the consequences of the efforts of the Commission of the European Economic Community (EC) to harmonize financial accounting regulations in the EC member states[2] is an increase in the availability of financial statements in Western Europe in the late seventies and eighties. This increased disclosure has led to the creation of financial accounting databases in several EC member states[3]. One of these databases, created by the Belgian National Bank, was used to generate the empirical evidence presented in this chapter. The evidence in this chapter has a bearing on two issues: (1.) the reliability of large financial accounting or financial statement databases, and (2.) the degree of compliance of firms with financial accounting regulations. Issue 1. has already led to a small (largely from the USA) literature. It is an important issue because the reliability of these databases affects the reliability of the research that uses them[4]. About the second issue there exists a surprising lack of evidence in the literature. Both questions are examined in this chapter on the basis of the same set of empirical results.

2.2. Financial accounting legislation in Belgium

Existing financial accounting legislation in Belgium is a consequence of the financial accounting harmonization activities of the EC[5]. In 1975 and 1976 new financial accounting legislation was introduced in Belgium, which became operative in the 1977 fiscal year. This new legislation was modeled on a draft of the EC Commission's Fourth Company Law Directive. The Fourth Directive forms an important part of the framework for harmonization of financial accounting regulations in the EC member states (see Van Hulle (1986)). The new Belgian legislation prescribed rigorously the form and contents of unconsolidated annual financial statements[6] of companies in Belgium. Companies established on the basis of Belgian law in the form of a N.V., P.V.B.A., C.V. or B.V.[7] were mandated to publish a concise set of financial statements if they exceeded one of three size limits: 50 employees or total assets of 25 million BEF or sales of 50 million BEF. If a company exceeded one of three additional size limits, 100 employees or total assets of 50 million BEF or sales of 100 million BEF, a complete, more detailed, set of financial statements had to be published.

Appendix 2.A. shows the structure and contents of the complete balance sheet and profit-and-loss statement under the new legislation. It not only structured the format of the numerical data in the balance sheet, profit-and-loss statement and notes, it also contained a series of de facto accounting standards, leading to the disclosure of narrative material, such as valuation methods. The new legislation also established a commission on accounting standards ,CBN (Commissie voor Boekhoudkundige Normen). The CBN issues bulletins with further accounting standards[8].

To understand the implications of the results in this chapter, note that the new legislation not only applied to companies listed on Belgian Stock Exchanges, but to all companies in the categories mentioned.

Beginning with the 1984 fiscal year the Belgian financial accounting legislation changed again, this time to introduce the final version of the Fourth Directive, issued in 1978, in Belgian law. This changed the prescribed format of the financial statements and affected the procedures used in this chapter (see Jegers and Buijink (1988)). The empirical material presented in this chapter therefore covers the period from 1977 to 1983.

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2.3. Data:
the Balanscentrale financial statement tapes

One of the consequences of the new financial accounting legislation of 1975 and 1976 was the creation of a new department, the Balanscentrale, within the Belgian National Bank. It has the task of transferring to an annual magnetic tape the numerical data in concise and complete financial statements published under the new legislation[9]. This resulted in a set of 7 annual tapes for the period from 1977 to 1983[10].

Financial statements were filed with the Balanscentrale by the companies involved on special forms in which the lay-out of the numerical material was rigourously structured. Appendix 2.A. shows part of this form. The contents of these forms was then transferred to the tapes by the Balanscentrale ensuring that the information submitted was not in any way changed[11]. The Balanscentrale also produced a tape for internal use with corrections, but outsiders could only buy the uncorrected tape. With one exception; the Balanscentrale has corrected the results appropriation statement from 1980 onwards on the tapes sold outside, a point that will be discussed later.

Table 2.1.: Balanscentrale data.

year	Number of financial statements on tape			Number of VAT declarants	Total sales of firms on the tapes* as % of sales of VAT declarants
	complete	concise	total		
1977	8032	1996	10028⁺	428193	49.70%
1978	10827	2631	13498	430680	64.14%
1979	11708	3334	15042	432430	64.19%
1980	12372	3326	15698	434265	65.22%
1981	12942	3405	16347	434753	66.28%
1982	13574	3437	17011	439869	68.82%
1983	14349	3722	18071	447029	69.60%

Source: Belgian National Statistical Institute (NIS), personal communication
* but see note 12.
⁺ In 1977 only companies with an accounting fiscal year ending on 31/12 were required to file their financial statements.

Table 2.1. shows the number of financial statements on each tape and the total annual sales of the companies involved[12] in each year from 1977 to 1983. Total turnover of these companies is also expressed as a

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percentage of the total sales of firms in Belgium. The total number of VAT (Value Added Tax) declarants is used as a proxy for the total number of firms in Belgium.

The data in table 2.1. clearly indicate the importance of the companies on the tapes in the Belgian economy. In 1983, for instance, they generated about 70 percent of total sales in Belgium.

This chapter assesses the accuracy of the data in the financial statements on the seven annual datatapes, 1977-1983. Each financial statement on each of the seven tapes is subjected to a large number of tests.

2.4. Testing the reliability of a financial accounting data file

2.4.1. Previous literature

The reliability of financial accounting or financial statement databases[13] has been the subject of a number of studies, notably those by San Miguel (1977), Stone and Bublitz (1984), Vasarhelyi and Yang (1985) and Thomas and Swanson (1986). Table 2.2. summarizes this earlier research. These four studies either compare financial statements of the same company in different databases, or financial statements with the original documents.

As is evident from table 2.2., three of the four studies reveal a considerable number of errors, which signals the need for careful screening of financial accounting databases.

2.4.2. The testing procedure used in this chapter

The four papers summarized in table 2.2. compare competing information on the same financial statement item(s). Because only one database is available for Belgian companies a comparison of databases is not possible here. Nor is it possible, given the large number of financial statements on the tapes, to compare information on the tapes with the original documents. Consequently errors in the original documents cannot be distinguished from those introduced in the process of transferring the original information to the tapes. However, it can be assumed that very few transcription errors occur given the Balanscen-

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Table 2.2.: Reliability of financial accounting databases: previous studies.

	San Miguel (1977)	Stone, Bublitz (1984)	Vasarhelyi, Yang (1985)	Thomas, Swanson (1986)
Year(s) studied	1972	1979, 1980	1981[a]	1979-1982
Number of items compared	1	7[b]	7	2[c]
Information sources compared	COMPUSTAT vs. SEC 10K forms	SFAS no.33 data tape vs. original annual reports	COMPUSTAT vs. Value Line	SFAS no.33 data tape and COMPUSTAT and Value Line vs. original annual reports[d]
Number of firms in sample	256	176 (max.)	1479	171
Total number of comparisons	256	2178	10353	2736
Total number of errors	78 (30.50%)	76 (3.49%)	1804[e] (15.02%)	551 (20.14%)

[a] Detailed results are given for this year only.
[b] The correctness of a price level code was also checked by the authors, those results are not given in this table.
[c] The items here are the differences between two items valued at current cost and at historical cost.
[d] The SFAS no. 33 data tape was used to obtain current cost data; the COMPUSTAT and VALUE LINE databases were used to obtain historical cost data. The difference was then compared with the diffence as calculated from the original financial statements.
[e] Discrepancies >1%, and omissions in either database.

trale's procedure to avoid such errors. The importance of this is, that therefore the material on the tapes reflects financial reporting practice of Belgian companies with regard to the numerical data required by Belgian financial accounting legislation.

In this chapter the reliability of the information on the tapes is measured by the number of logical errors, arithmetical errors and omissions. With reference to appendix 2.A. an example is given of each kind of error:

- a logical error: an amount is given for both the item profit (4509) and loss (5509) for the financial year;
- an arithmetical error: the sum of the items turnover (5109), inventory variations (5119), internal works (5129), and other operating income (5139) is not equal to the amount given for operating income (5199), **plus or minus 1% of that amount to avoid picking up immaterial, e.g. rounding, errors;**
- an omission: an amount is given for the item reserves (2399), but this amount is not detailed, as required, in items legal reserve

(2309), undistributable reserve (2319), reserves exempted from taxation (2329) and distributable reserves (2339).

The examples of tests given here use items from the balance sheet and profit-and-loss statement in Appendix 2.A.. The same kind of errors can be detected in the results appropriation statement and in the notes, which are not shown in appendix 2.A.. Furthermore, quite a few items in the balance sheet and the profit-and-loss statement have to be detailed in the notes. This necessitates tests for inconsistencies between information items in different parts of the financial statements.

To detect these errors a large number of tests[14] was formulated[15]. Tests can be grouped according to the major sections in a financial statement: balance sheet tests, profit-and-loss statement tests, results appropriation statement tests, notes tests, and a fifth group of consistency tests, i.e. tests that compare information in different parts of a financial statement.

Table 2.3.: Number of tests and their categorization.

Financial Statement	Profit-and-Loss Statement	Type of Test	Year	
			1977-1979	1980-1983
concise	account form	L	12	14
		A/O	41	39
		total	53	53
	columnar form	L	14	14
		A/O	41	41
		total	55	55
complete	account form	L	15	19
		A/O	103	99
		total	118	118
	columnar form	L	11	19
		A/O	100	101
		total	111	120
L = tests for logical errors. A/O = tests for arithmetical errors and omissions.				

The number of tests applied to a particular financial statement depended on whether the financial statement was concise or complete, and whether it had a profit-and-loss statement in columnar or account form. It also depended on the accounting fiscal year since, as men-

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tioned above, the Balanscentrale has made public it corrections of the results appropriation statements in the years since 1980. These corrections affected the number of tests. Table 2.3. shows the number of tests in each of these situations and also shows the number of tests for logical errors, for arithmetical errors and for omissions[16].

Note that the method used here only partially measures the quality of financial statement material in Belgium. Other features of Belgian financial statements are not considered. For instance, how valuation rules in Belgian financial accounting legislation and CBN financial accounting standards are used in Belgian financial statements cannot be discussed in this chapter[17], since that information is not transferred to the tapes.

2.5.   Quality : results

The average number of logical and arithmetical errors and the average number of omissions per financial statement in each of the seven years (1977 to 1983) are given in table 2.4.[18].

Table 2.4.: Overall results: all years, all financial statements.

	1977	1978	1979	1980	1981	1982	1983
average absolute number of logical and arithmetical errors	1.68	1.60	1.48	.82	.79	.82	.78
average absolute number of omissions	1.43	1.25	1.17	1.01	1.05	1.00	.97
total*	3.11	2.85	2.65	1.83	1.84	1.82	1.75
number of financial statements	10028	13498	15042	15698	16347	16347	18071
* Totals may not tally because of rounding.							

The table shows a marked difference between the results for two subperiods, one before and one after 1979. The improvement, a lower average number of errors in the second subperiod, does not necessarily reflect an improvement in the quality of the financial statement material filed by the companies involved however. It is the effect of the corrections by the Balanscentrale in the results appropriation statement since 1980. The effect of this correction can be seen in table 2.5., which gives the average number of logical and arithmetical errors and

omissions for the major sections of the financial statements. The improvement shows up primarily in the average number of errors in the results apropriation statement. Also evident in table 2.5. is the importance of consistency errors.

Table 2.5.: Results (average absolute number of errors*) for major parts of a financial statement: all years, all financial statements.

	1977	1978	1979	1980	1981	1982	1983
Balance sheet	.38	.31	.29	.24	.24	.18	.16
Profit-and-loss statement	.38	.34	.33	.29	.29	.30	.30
Results appropriation statement	.51	.49	.55	.08	.09	.09	.09
Notes	.45	.47	.39	.31	.31	.33	.30
Consistency**	1.40	1.26	1.11	.91	.93	.93	.93
Total***	3.11	2.85	2.65	1.83	1.84	1.82	1.75

* Separate results for errors and omissions are not given here.
** Consistency tests use information from two of the four parts of a financial statement.
*** Totals may not tally because of rounding.

Table 2.6.: Overall results: percentage of error-free and fully detailed financial statements, all years, all financial statements.

Year	Percentage
1977	16.77%
1978	18.83%
1979	19.74%
1980	30.35%
1981	29.36%
1982	30.54%
1983	31.91%

Table 2.6. presents these results in a different way. It gives the percentage of error-free financial statements on the tapes, that is, financial statements that are free of logical and arithmetical errors and omissions. In this table too, the difference between the two subperiods can be seen.

These results can be expressed in a different way. The probability that a randomly selected 1977 financial statement contains errors is approximately 0.83, with an expected number of errors of 3.11. For 1983 this

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probability is 0.70, with an expected number of errors of 1.75. Therefore, as in the case of the US studies in table 2.1., the results here suggest that careful screening of the data is necessary before this financial accounting database can be used.

2.6. Implications of errors in financial accounting databases

2.6.1. The consequences of logical and arithmetical errors and omissions

2.6.1.1 Bias

An important consequence of errors and omissions is bias that results when the error-rate is related to firm characteristics. This may lead to a disproportionate representation of some groups of firms in quality-screened samples used in empirical work.

To measure possible bias the absolute number of errors and omissions in all financial statements was divided by the maximum possible number of errors and omissions (see table 2.3.) given the type (concise or complete, and statement of results in columnar or account form) of the financial statement in question. This gives a weighted number of errors and omissions per financial statement[19]. These numbers were then averaged for sub-groupings of companies along the following characteristics:

*   size (measured by total assets);
*   financial structure (measured by equity/total assets);
*   profitability (measured by return on equity);
*   profitability (measured by return on total assets);
*   liquidity (measured by the current ratio); and
*   industry membership: membership of 1-digit NACE[20] industries.

For these sub-groupings the relative importance of omissions in the total number of errors and omissions was also established and expressed as a percentage. Detailed results for 1977 and 1983 are given in appendix 2.B.. These results indicate that:
1. The error-rate decreases with increasing company size;
2. Increased leverage (increased use of non-equity funds) coincides with a higher error-rate;
3. The error-rate does not covary with profitability;
4. Liquidity does not appear to influence the error-rate;

5. A fairly stable difference in quality of financial statements exists between industries.

The relative importance of omissions, however, only depends on firm size. Financial statements of larger firms not only show less errors, the relative importance of omissions also decreases with increasing firm size. Leverage, liquidity and profitability do not affect omissions. Industry membership affects the relative importance of omissions to a lesser extent than it does the overall error-rate. Apparent in Appendix 2.B. is also the increase in the relative importance of omissions between 1977 and 1983. The results for the other years show similar patterns and are not given here.

These results indicate that a selection bias for size and degree of leverage may result if those variables are of interest to researchers and they screen the tape files to eliminate observations with a higher than acceptable number of errors in the relevant parts of the financial statements.

2.6.1.2. Loss of observations

Of course loss of observations itself, is an important consequence of errors in financial statements. This is illustrated in table 2.7.. The results in appendix 2.B. could only be established for financial statements on the tapes for which it was possible to compute the firm characteristics used there. Table 2.7. shows loss of observations that results when the the five firm characteristics used in Appendix 2.B. are computed.

Table 2.7.: Loss of observations (%) when measuring selected firm characteristics.

	1977	1983
size	0.5	0.1
equity/total assets	13.0	1.5
return on equity	17.1	7.6
return on total assets	5.4	5.5
current ratio	2.3	1.1

As can be seen in Table 2.7., loss of observations because of errors and omissions can be quite substantial. For another example, in the context of a study of properties of financial ratio distributions, in which the Balanscentrale tapes are used, see the next chapter, table 3.4..

2.6.2. A different perspective: degree of compliance with financial accounting regulation[21]

In this section the perspective is changed. The focus is no longer on the problems for empirical work of errors found in financial accounting databases but on the possible reasons for the observed error-rate. Indeed, given the low probability that the Balanscentrale introduces errors in the transcription process, the results in the previous sections indicate the carefulness with which companies in Belgium compiled their financial statements between 1977 and 1983; that is, about their apparent willingness to comply with financial accounting legislation. The financial accounting literature is surprisingly lacking in empirical studies of the degree of compliance of companies with financial accounting regulations[22].

Given the description of the Belgian accounting regulation above, two areas can be singled out on which to focus measurement of the degree of compliance with this regulation: (1) logical errors, material (see above) arithmetical errors and omissions in the numerical material in financial statements, and, (2) errors or vagueness in the narrative material in financial statements, such as the description of the inventory valuation methods used, or in the structure of financial statements, such as the naming and sequencing of items that are required.

Given these possibilities, the results discussed in the previous sections indicate the partial degree of compliance of Belgian companies with Belgian financial accounting legislation between 1977 and 1983. Partial, because only the degree of compliance with regard to numerical material is measured.

The interesting question is what determines the observed degree of compliance. A number of factors are identified in the literature as determining the supply of financial statements, and their quality (in this chapter measured by their error-rate), by companies. Foster (1986, ch.2) gives an overview[23]. Table 2.8. summarizes and augments Foster's discussion and indicates firm characteristics that can be used to test the effect of these factors. Note that the only direct influence of financial accounting regulation in the table is through litigation costs.

Some brief comments explain table 2.8..
• Companies compete with each other in the capital market for equity securities, preferred securities, bonds and so on.
  Exchange listing can therefore be expected to lead to higher quality financial statements, hence lower error-rates.

- Competition for bank loans, financial statements are inputs to the bank lending decision, will lead to the error-rate decreasing with increasing leverage. Liquid and profitable firms face lower competition here, hence higher error-rates can be expected.
- The costs of producing financial statements can be expected to decrease in importance with increasing firm size. As a consequence the error-rate can also be expected to decrease.
- Competitive disadvantage costs lead to fewer financial statements being supplied or financial statements of lower quality. Competitive conditions vary accross industries. Industrial organization literature suggests variables (not in Table 2.8.) that measure the degree of competition, and hence may explain differences in error-rates accross industries.
- Direct regulatory litigation costs, fines, will decrease in relative terms with increasing firm size. However indirect litigation costs, loss of reputation, will probably increase with firm size, because of increasing public 'visibility'.
- Political costs are costs that result from governments monitoring quality of financial statements. Larger firms will be more visible politically. Hence, higher quality financial statements.

Table 2.8. Factors explaining supply and quality (error-rate) of financial statements of for profit business companies.

Factor	Firm Characteristics (assume increasing)	Error-rate (effect)
Capital market forces: • Stock exchange	exchange listing	lower for listed firms
• Bank loans	leverage liquidity profitability	decreasing increasing increasing
Contracting (agency) costs	leverage non-management ownership	decreasing decreasing
Production costs	size	decreasing
Competitive disadvantage costs	industry	differences (between industries)
Litigation costs: • direct • indirect	size size	increasing decreasing
Political costs	size	decreasing

The results in section 2.6.1. suggest a number of empirical regularities supporting some of the effects suggested in table 2.8..
1. Firm-size affects the error-rate; larger firms show less errors in their financial statements.

2. Inter-industry differences in the error-rate suggest competitive disadvantage cost differences (although a further disaggregation by industry is called for here).
3. The hypothesized effects of liquidity and profitability are absent.
4. Error-rates actually increase with leverage; this runs counter to the effect suggested in table 2.8.[24].

2.7. Concluding remarks and additional notes

The problems of using financial accounting databases that contain errors, biased quality screened samples and loss of observations, were discussed in section 2.6.1..

From a degree of compliance perspective the results in this chapter suggest a need for a more thorough investigation of the reception of financial accounting regulations in an economy. This chapter presents a partial registration of the degree of compliance with Belgian financial accounting legislation. At this moment little is known about compliance with other aspects of Belgian financial accounting regulations such as the standards of the CBN. These questions ought to be given more attention in Belgium, as well as in other countries with financial accounting regulations.

Some additional notes conclude chapter 2. Later research by Kinney and McDaniel (1989) has corroborated some of the findings in the previous paragraphs of this chapter. Kinney and McDaniel analysed a group of 73 U.S. firms that reported corrections to their first, second and third quarter financial statements in their subsequent annual report. They analysed characteristics of these correcting firms. The aim was to give an explanation of the presence of errors in the quarterly reports. They compared degree of leverage, profit margin, profitability, as well as firm size, measured by sales and total assets of these 73 firms with the relevant 2-digit industry median scores on each of these ratios and items. Table 2.9. shows their results.

Correcting firms are typically smaller, show higher leverage and lower profit margins and profitability. Chapter 2 reports similar effects of size and degree of leverage, but does not document an effect of profit measures. Kinney and McDaniel did not consider the effect of liquidity and industry.

Table 2.9. Characteristics of 73 error-correcting U.S. firms, compared with relevant 2-digit industry medians.

Item/ratio	below industry median (maximum n = 73)	
	n	%
Net Income	66	90.4
Sales	69	94.5
Total assets	69	94.5
Liabilities/Equity	34	46.0
Profit margin	44	60.3
Net income/Equity	47	64.4
Source: Kinney and McDaniel (1989,p.81)		

A final remark: current users of the Balanscentrale database still report problems with errors of the type discussed in this chapter in Belgian financial statements, see e.g. Weekberichten (1991).

Appendix 2.A.: A complete Belgian Balance Sheet and Profit-and-Loss Statement: 1977-1983. (source: Lefebvre (1981)).

ASSETS

	Code Numbers		
I. Formation expenses	0199		XXX
II. Intangible fixed assets	0299		XXX
III. Tangible fixed assets	0399		XXX
A. Land and buildings	0309	XXX	
B. Installations, machines and equipment	0319	XXX	
	0329	XXX	
C. Furniture and rolling stock			
D. Construction in progress and advance payments	0339	XXX	
E. Fixed assets held on long lease, lease financing or with similar rights	0349	XXX	
	0359	XXX	
F. Other tangible fixed assets			
IV. Financial fixed assets (investments)	0499		XXX
A. Affiliated companies			
1. Participations (Majority interests)	0401	XXX	
2. Accounts receivable	0402	XXX	
B. Associated companies			
1. Participations (Minority interests)	0411	XXX	
2. Accounts receivable	0412	XXX	
C. Other financial fixed assets			
1. Shares and stock	0421	XXX	
2. Fixed income securities	0422	XXX	
3. Other receivables and guaranty cash deposits	0423	XXX	
V. Accounts receivable at more than one year	0599		XXX
A. Trade debtors	0509	XXX	
B. Other accounts receivable	0519	XXX	
VI. Inventories	0699		XXX
A. Raw materials, consumables and supplies	0609	XXX	
B. Goods in process, work in progress, scrap	0619	XXX	
C. Finished goods	0629	XXX	
D. Trade stock	0639	XXX	
E. Advance payments on purchases of inventories	0649	XXX	
VII. Accounts receivable within the year	0799		XXX
A. Trade debtors	0709		
B. Other accounts receivable		XXX	
1. Unpaid called-up capital	0711		
2. Other debtors	0712	XXX	
		XXX	
VIII. Short-term investments	0899		XXX
IX. Liquid assets	0999		XXX
X. Transitory accounts	1099		XXX
Total	1999		XXX

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	Code Numbers		
I. Capital	2199		XXX
A. Subscribed capital (issued and paid up)	2109	XXX	
B. Uncalled capital (−)	2119	XXX	
II. Share premium account	2299		XXX
III. Reserves	2399		XXX
A. Legal reserve	2309	XXX	
B. Undistributable reserves	2319	XXX	
C. Reserves exempted from taxation	2329	XXX	
D. Distributable reserves	2339	XXX	
IV. Profit carried over or Loss carried over (−)	2499		XXX
V. Revaluation surpluses	2599		XXX
VI. Capital subsidies (subventions) received	2699		XXX
VII. Provisions for risks and charges	2799		XXX
VIII. Accounts payable at more than one year	2899		XXX
A. Subordinated loans			
1. Convertible	2801	XXX	
2. Non-convertible	2802	XXX	
B. Non-Subordinated debenture loans			
1. Convertible	2811	XXX	
2. Non-convertible	2812	XXX	
C. Pension fund	2829	XXX	
D. Debts resulting from long lease, lease financing and similar debts	2839	XXX	
E. Credit institutions	2849	XXX	
F. Trade creditors	2859	XXX	
G. Advanced payments received	2869	XXX	
H. Other debts	2879	XXX	
IX. Accounts payable within the year	2999		XXX
A. Debts at more than one year falling due within the financial year	2909	XXX	
B. Credit institutions	2919	XXX	
C. Trade creditors	2929	XXX	
D. Debts and liabilities for taxes, social security charges and remunerations	2939	XXX	
E. Advance payments received	2949	XXX	
F. Other loans and guaranty cash deposits received	2959	XXX	
G. Other debts	2969	XXX	
X. Transitory accounts	3099		XXX
Total			XXX

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Profit-and-Loss Statement
(Alternative presentation in columnar or vertical form)

	Code Numbers		
I. Operating income (sales and services)	5199		XXX
A. Turnover	5109	XXX	
B. Inventory variations of goods in process, finished goods, scrap and work in progress (increase +, decrease −)	5119	XXX	
C. Internal works on fixed assets (own construction) capitalized	5129	XXX	
D. Other operating income	5139	XXX	
I. Operating expenses (cost of sales and services)	4199		(−)XXX
A. Trade stock, raw materials, consumables and supplies			
1. Purchases	4101	XXX	
2. Inventory variations (increase +, decrease −)	4102	XXX	
B. Miscellaneous goods and services			
1. Purchases and supplies	4111	XXX	
2. Costs carried over (+), costs to be carried over (−)	4112	XXX	
C. Personnel			
1. Remunerations, pensions and other personnel costs	4121	XXX	
2. Pension fund (appropriation +, utilization −)	4122	XXX	
D. Depreciation, reductions in value (amounts written off) and provisions for risks and charges			
1. Depreciation (other than those referred to sub II.A.2)	4131	XXX	
2. Reductions in value on inventories and on accounts receivable within the year	4132	XXX	
3. Provisions for risks and charges (appropriation +, utilization −)	4133	XXX	
E. Other operating expenses	4149	XXX	
I. Operating results	5100		XXX
II. Financial income	5299		XXX
A. Income from financial fixed assets (investments)	5209	XXX	
B. Income from other accounts receivable, short-term investments and liquid assets	5219	XXX	
C. Other financial income	5229	XXX	
II. Financial expenses (charges)	4299		(−)XXX
A. Charges on accounts payable at more than one year			
1. Interest	4201	XXX	

	Code Numbers		
2. Amortization of premiums and issuing expenses	4202	XXX	
3. Interest subsidies received (–)	4203	XXX	
B. Charges from debts at maximum one year	4219	XXX	
C. Other financial charges			
1. Reductions in value on financial fixed assets (investments), on accounts receivable at more than one year, on short-term investments and on liquid assets	4221	XXX	
2. Miscellaneous financial charges	4222	XXX	
II. Financial results	5200		XXX
III. Exceptional income	5399		XXX
A. Reversal of depreciation, reductions in value, provisions for risks and charges and for pensions			
1. Reversal of depreciation	5301	XXX	
2. Reversal of reductions in value	5302	XXX	
3. Reversal of provisions for risks and charges	5303	XXX	
4. Reversal of pension fund	5304	XXX	
B. Surpluses on realization of fixed assets out-of-use	5319	XXX	
C. Other exceptional income	5329	XXX	
III. Exceptional charges	4399		(–)XXX
A. Depreciation, reductions in value, provisions for risks and charges and for pensions			
1. Depreciation	4301	XXX	
2. Reductions in value	4302	XXX	
3. Provisions for risks and charges	4303	XXX	
4. Pension fund	4304	XXX	
B. Losses on realization of fixed assets	4319	XXX	
C. Other exceptional charges	4329	XXX	
D. Transfer to reserves exempted from taxation	4339	XXX	
III. Exceptional results	5300		XXX
IV. A. Reversal of tax provisions and adjustments	5409		XXX
B. Income Tax (tax on profits)	4409		(–)XXX
1. For the financial year	4401	XXX	
2. For previous financial years	4402	XXX	
IV. Taxes	5400		XXX
V. Profit / Loss for the financial year	4509		XXX
	5509		XXX

Appendix 2.B.: The relation between firm characteristics and the quality of Belgian financial statements in 1977 and 1983.

In this appendix: errors = total number of errors and omissions (weighted average), omissions= omissions as a percentage of the total number of errors and omissions, and n = number of financial statements involved.

Table 2.B.1.: Number of errors per size class of total assets (10^6 BEF) and the relative importance of omissions.

		0-25	25-50	50-100	100-500	500-1000	>1000
errors	1977	3.6	4.0	2.9	2.6	2.3	2.2
	1983	1.8	2.0	1.7	1.5	1.3	1.4
omissions	1977	48%	49%	48%	44%	42%	33%
	1983	60%	59%	56%	51%	44%	33%
n.	1977	846	3622	2447	2335	372	359
	1983	2434	5959	4142	4053	701	776

Table 2.B.2.: Number of errors per class of equity/total assets ratio (%) and the relative importance of omissions.

		<0	0-25	25-50	50-75	75-100
errors	1977	2.9	2.8	2.7	2.5	2.1
	1983	1.5	1.7	1.7	1.6	1.3
omissions	1977	43%	43%	42%	42%	41%
	1983	57%	55%	53%	55%	57%
n.	1977	385	4167	2469	1121	581
	1983	917	7557	5114	2532	1680

Table 2.B.3.: Number of errors per class of net income/equity ratio (%) and the relative importance of omissions.

		<0	0-10	10-20	20-30	>30
errors	1977	2.7	2.6	2.5	2.6	2.7
	1983	1.7	1.7	1.6	1.6	1.7
omissions	1977	42%	42%	42%	42%	43%
	1983	54%	55%	53%	56%	57%
n.	1977	2215	3429	1224	528	917
	1983	3505	6604	3108	1447	2221

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Table 2.B.4.: Number of errors per class of net income/total assets ratio (%) and the relative importance of omissions.

		<0	0-5	5-10	10-15	>15
errors	1977	3.2	3.2	3.1	2.7	3.4
	1983	1.8	1.7	1.6	1.6	1.6
omissions	1977	47%	47%	45%	47%	48%
	1983	54%	55%	54%	58%	56%
n.	1977	2519	5261	1067	332	304
	1983	3541	9220	2682	921	721

Table 2.B.5.: Number of errors per class of current ratio and the relative importance of omissions.

		0-1	1-2	>2
errors	1977	3.2	3.1	3.2
	1983	1.7	1.7	1.6
omissions	1977	46%	47%	47%
	1983	55%	55%	56%
n.	1977	2366	5547	1882
	1983 ·	4039	10072	3761

Table 2.B.6.: Number of errors per 1-digit NACE industry and the relative importance of omissions.

Industry	Errors		Omissions		n.	
	1977	1983	1977	1983	1977	1983
0	4.33	1.77	56%	59%	52	175
1	2.13	1.71	28%	22%	68	68
2	2.84	1.60	45%	49%	566	765
3	3.20	1.69	46%	51%	865	1276
4	3.35	1.81	48%	54%	1819	2700
5	3.66	1.90	45%	52%	963	1267
6	3.37	1.79	47%	56%	3554	7331
7	2.77	1.56	45%	57%	542	1098
8	3.30	1.40	46%	59%	1452	2910
9	3.55	1.63	40%	53%	147	481

1 digit NACE industries: 0 = agriculture, 1 = energy and water, 2 = extraction and processing of non-energy producing minerals; chemical industry, 3 = metal manufacture; engineering, 4 = other manufacturing industries, 5 = building, 6 = distributive trades, 7 = transport and communication, 8 = banking and finance, insurance, 9 = other services.

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Notes

1. This chapter is based on the previously published article: M.Jegers, W.Buijink, The reliability of financial accounting databases: some Belgian evidence, in: International Journal of Accounting Education and Research ,1987, 23, 1, pp.1-21, and on Jegers and Buijink (1987). An earlier version of this chapter was presented at an EIASM (European Institute for Advanced Studies in Management) workshop on Financial Statement Analysis and Management Accounting in Ghent, Belgium, in March 1987. Constructive comments of George Foster, Hubert Ooghe, Diana Philips and Charles van Wymeersch are gratefully acknowledged.

2. For a survey of these efforts, see Van Hulle (1986).

3. Choi and Foote (1985) survey Western European financial accounting databases. They do not mention the database used here, nor do they mention the influence of the E.C. Commission's harmonization efforts on the construction of databases.

4. This is shown rather dramatically by Vasarhelyi and Yang (1985) who test the hypothesis of normality of financial ratio distributions on the basis of financial statement information for the same firms from two different databases. They observe that rejection of the normality hypothesis for a number of ratios depends to a certain extent on the choice of the database. For a survey of empirical work with the Balans-centrale material, see Ooghe and Van Wymeersch (1985, ch.17). In English have appeared e.g. Ooghe and Verbaere (1985).

5. See Lefebvre (1981,1984) and Theunisse (1987) for a more complete treatment of the emergence of the new Belgian financial accounting legislation within the EC framework.

6. The EC commission has already issued a 7th directive on Company Law that harmonizes the regulation of consolidated financial statements in EC member states. But this 7th directive was not relevant for the period under study. Also, no regulations existed in the period under study in Belgium, that require the publication of semi-annual or quarterly financial statements. As a result, only annual unconsolidated financial statements were publicly available.

7. N.V. (naamloze vennootschap) = joint stock company, P.V.B.A. (personenvennootschap met beperkte aansprakelijkheid) = association of persons enjoying limited liability, C.V. (commanditaire vennootschap) = limited partnership and B.V. (burgelijke vennootschap die de vorm van een handelsvennootschap heeft aangenomen) = professional association taking the form of a business company.

8. See Theunisse (1987) for a discussion on the status of the CBN.

9. Except for the financial statements of some but not all companies in the banking, financial services and insurance industries and pure holding companies (see, Theunisse (1987)).

10. The Balanscentrale also records all financial statements on microfilm, so that the narrative material that is not transferred to the magnetic tape can be fairly easily obtained.

11. In fact, each financial statement is entered twice by different persons, after which the two inputs are compared and errors discovered are corrected.

12. Concise financial statements do not contain the item turnover, therefore total sales is calculated from complete financial statements only.

13. For a dicussion about of this subject, see Foster (1986, appendix to chapter 3).

14. As a preliminary step the material in each financial statement was checked for conformity with the sign conventions specified for each item in the special financial statement forms of the Balanscentrale. This means that errors in the use of these sign conventions are 'foregiven'. This is necessary, although of course it alters the material submitted, errors of the type this paper tries to discover may be concealed by failures to respect the sign conventions.

15. A complete list of the tests is given in an appendix to Jegers, Buijink (1983) and is available from the author upon request.

16. Tests for arithmetical errors and for omissions are obviously identical. The test is first used to test for an omission and then, when relevant, to test for an arithmetical error.

17. For some empirical work on how companies in Belgium actually implement financial accounting regulation with regard to inventory valuation, see, Van Den Broeck (1984).

18. This section and the next summarize and update Jegers, Buijink (1983) and Jegers, Buijink (1984).

19. This step was to control for variations in the error rates in the different groups formed simply because the relative number of complete vs. concise statements was different; complete statements being subjected to more tests are likely to produce more errors.

20. NACE ('Nomenclature des Activités Economiques dans la Communauté Européenne') is the General Industrial Classification of Economic Activities of the EC. This classification distinguishes ten main industries each designated with a single digit, 0-9, and more detailed industries at a two-, three- and four-digit level. See: Statistical Office of the EC (1970).

21. This section is a rewritten and augmented version of a section in the article on which this chapter is based.

22. The only reference to compliance problems in the U.S. literature apparently is Olsen (1985, section 2).

23. See also Kelly (1983) and Benston (1986) for a very clear conceptual discussion, as well as Watts and Zimmerman (1986).

24. Jegers and Buijink (1987) report that corporations listed on the Brussels and Antwerp stock exchanges with financial statements on the Balanscentrale tapes in 1977 and 1983 do not show lower error rates. The average number of errors and omissions in the financial statements of listed companies was 2.40 in 1977 (n=127) and 1.85 in 1983 (n=123). These averages can be compared with the results in table 2.4..

Chapter 3

Cross-sectional distributional properties of financial ratios in Belgian manufacturing industries:

aggregation effects and persistence over time[1]

3.1. Introduction

The purpose of this chapter is to add evidence on cross-sectional univariate distributional properties of financial ratios to the previous results of Deakin (1976) and Frecka and Hopwood (1983) amongst others. The ratios studied are eleven of the twelve extensively used in Foster (1978, table 3.2.)

The assumption tested in this chapter is that ratios, either in the original or in a suitably transformed form, are normally or at least symmetrically distributed. More specifically, the analysis centers on the question whether this assumption is more often true at a lower level of firm aggregation, that is in more homogeneous industries. Additionally, some results are presented on the persistence over time of the form of the ratio distributions.

A large data base with the financial statements of Belgian companies for each of the years from 1977 to 1981 is used. However, as in the relevant previous literature, attention is restricted to companies in the manufacturing industries.

3.2. Background

Evidence on the character of financial ratio distributions is important because, amongst other things, it guides the choice of statistical tools (Foster (1986)), see also chapter 1 for further discussion). In many studies using ratios, statistical methods are employed that rely on univariate or multivariate normality assumptions. An example are the financial distress prediction studies in which discriminant analysis is used. If it can be shown that ratios are not distributed normally or symmetrically in raw, transformed and/or truncated form, users of financial ratios will have to turn to other, most probably non-parametric, statistical techniques.

There are a number of reasons why distributions of the raw scores of financial ratios cannot be expected to be normal or even symmetrical. The first is that it is in fact a distribution of the quotient of two variables, which each have their own distribution, that one is looking at. Even if these component distributions are normal[2] this does not lead to a normal ratio distribution (see Barnes (1982) and Marsaglia (1965)). The second reason is that there will, most of the time, be outside pressure on firm management to keep at least some of the ratios within certain 'acceptable' limits. The third reason is that a number of ratios do not have a range of possible scores of $(-\infty, +\infty)$ but possess a lower bound of zero, which may lead to skewness. Lack of homogeneity among firms may constitute a fourth reason. If this is the case, one looks at mixtures of distributions of ratios of firms from different economic environments, and there is indeed evidence that there exist sizable inter-industry differences in financial ratios.[3] These differences seem to be due in the first place to differences in the underlying economic conditions affecting the industries. Clear examples of such differences and their effects on ratios are given by Gupta and Huefner (1972).

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It is not clear what form of ratio distributions the first reason for non-normality points to. In effect it seems to suggest that it is more appropriate to study the component distributions, because given their distributional form and correlation, the form of the ratio distribution can in principle be deduced[4]. The second reason leads to the expectation of shorter and less populated distributional tails in one or both directions. The third reason points to the use of skewness reducing transformations to achieve normality or symmetry, while the fourth reason suggests that the analysis of the form of ratio distributions should take into account the degree of homogeneity of the population of the firms studied.

Table 3.1 provides a summary of previous research[5] on the distributional properties of financial ratios and although it indicates that evidence in this area is not abundant, some guidance may be gained from it.

First, the work of Bird and McHugh (1977), Frecka and Hopwood (1983) and Beecher, Ezzamel and Mar-Molinero (1984) suggests that the level of aggregation on which the data are analysed matters[6]. This seems to be true even before transformation. Second, transformation improves goodness-of-fit to the normal distribution. Also apparent is the beneficial effect of truncation (Frecka and Hopwood, 1983).

Persistence of the form of the ratio distribution over time is not discussed in any of the papers listed in table 3.1., yet it seems obvious that results are strengthened if stability over time of distributional form can be detected.

Table 3.1. Previous research on financial ratio distributions.

Author(s)	Country	Type of Firm	Period	Level(s) of Aggregation	Number of firms at each level of Aggregation	Number of Ratios	Transformation (NT = no transformation)	Truncation	Normality Test	Level of Significance	% Normal Distributions Raw Data	% Normal Distributions after most successful transformation or truncation (if any)
Deakin (1976)	USA	Manufacturing companies on COMPUSTAT tape	1955-1973	Overall, and 6 S.I.C. industry subgroups (1)	Overall, 454(1955)-1114(1973); industry, minimum 30	11	NT, SQR, log (2)	none	Chi2	5% (3)	15% (overall)	28% (overall)
Bird & McHugh (1977)	Australia	Listed public companies in food, electrical and accommodation industries	1967, 1969, 1971	3 industries, food, electrical, accommodation	Food, 26, electrical, 19 accommodation, 23	5	NT	none	Shapiro, Wilk (4)	5%	67%	not applicable
Bougen & Drury (1980)	UK	Not specified	1975	Overall, several industries subgroups	Overall, 700 + industry, minimum 30	7	NT, SQR, log (5)	yes (6)	Chi2	5%	not given (overall)	0% (overall) (7)
Donnithorne (1981)	Canada	Manufacturing companies on COMPUSTAT tape	1960-1978	Overall	62(1960)-152(1978)	11	NT	yes (6)	K.S. (8)	5%	not given (overall)	0% (overall) (9)

Ooghe & Verbaere (1982)	Belgium	Limited companies from various industries on BALANSCENTRALE tape	1977–1978	Overall	753	146	NT	none	Lilliefors K.S. (10)	1%	0%	not applicable
Frecka & Hopwood (1983)	USA	Manufacturing companies on COMPUSTAT tape	1950–1979	Overall, 3 S.I.C. industries subgroups in 1978–1979	Overall, 346 (1950) – 1243 (1978); industry, minimum 100	11	NT, SQR	yes (6)	Chi2	1%	13% (overall) 38% (industry)	47% (overall) 92% (industry)
Beecher, Ezzamel & Mar-Molinero (1984)	UK	Quoted and unquoted companies on EXSTAT tape	1980–1981	3 industries, textiles, retail food, metals	Textiles, 40 retail food, 26, metals, 25	5	NT, SQR, log	none	Chi2, K.S., Shapiro Wilk	5%	73% (11)	92% (11)

(1) Relevant period for industry subgroups not given.
(2) SQR and log transformation for five ratios only.
(3) If possible the results at five percent are reproduced here for all seven papers.
(4) Shapiro, Wilk (1965).
(5) SQR and log for selected industry subgroups only.
(6) Truncation procedure described in text below.
(7) Results for industries not presented in detail.
(8) K.S. – Kolmogorov-Smirnov test; also uses a t-test without explanation.
(9) Also gives results for all years pooled together.
(10) Lilliefors's version of Kolmogorov-Smirnov test, Lilliefors (1967).
(11) Results for K.S.-test.

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3.3.   Data, ratios and method

3.3.1.   Data

Data were taken from the annual magnetic tapes of the 'Balanscentra-le', a department of the National Bank of Belgium, on which the annual accounts of all companies established on the basis of Belgian law in the form of a N.V., P.V.B.A., C.V. or B.V.[7] and exceeding certain size limits can be found (see also chapter 2). The size limits are: 50 employees, or sales exceeding 50 million BEF, or total assets minimally worth 25 million BEF. If a company exceeds one of three further size limits, viz. 100 employees, sales of 100 million BEF, or total assets worth 50 million BEF it has to file more detailed annual accounts.[8] Thus there are concise and complete annual accounts depending on a company's size. This has an effect on the computation of the ratios. To enhance comparability, only annual accounts with an accounting fiscal year ending on December 31 are used[9]. A large majority of the companies on the 'Balanscentrale' tape have such a fiscal year, see table 3.2..

Table 3.2.: Percentage of companies on 'Balanscentrale' tape with an accounting fiscal year ending in December.

1977	1978	1979	1980	1981
100.0%	86.0%	86.1%	85.6%	85.7%

3.3.2.   Ratios

Table 3.3. shows the eleven financial ratios (Foster, 1978, pp. 28-36) which are examined in this chapter[10]. Ratios five to eleven were not calculated for concise annual accounts.

3.3.3.   Method

3.3.3.1.   Aggregation level and ratio distributions
To investigate the effect of aggregation level on the acceptance of the normality or symmetry hypothesis, ratio distributions are analysed at two levels of aggregation: the two- and three-digit NACE manufacturing industries.[11] On both of these levels the eleven ratio distributions are looked at in each manufacturing industry with ten observations or more. Appendix 3.B. gives an idea, for 1977, of the number of industries involved in the analysis at both levels of aggregation. It shows

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Table 3.3.: Financial ratios used.
Liquidity 1. Current ratio (CR) 2. Quick ratio (QR)
Leverage 3. Debt to equity (DE) 4. Longterm debt to equity (LTDE) 5. Times interest earned (TIE)
Profitability 6. Earnings to sales (ES) 7. Return on assets (ROA) 8. Return on equity (ROE)
Turnover 9. Total assets turnover (TAT) 10. Inventory turnover (IT) 11. Accounts receivable turnover (ART)

that in 1977 observations from some 70 three-digit industries and 18 two-digit industries were used. Appendix 3.B. also gives an indication of the number of observations used per industry at both levels of aggregation.

Results are presented in this chapter for each of the years from 1977 to 1981.

3.3.3.2. Normality and symmetry tests

The chi-square test of goodness-of-fit to normality is not appropriate since the samples in this chapter are frequently too small. Several alternatives are suggested in the literature. The most powerful seems to be the Shapiro-Wilk test (Shapiro and Wilk (1965)) but tables are not available for n > 50 (Royston (1982)). An alternative, the Kolmogorov-Smirnov test, is not appropriate when the mean and the variance of the population distribution are unknown (Gibbons (1971, p. 86)). Lilliefors (1967), using Monte Carlo techniques, has constructed a Kolmogorov-Smirnov like test that copes with this problem. To perform this test the mean and the variance of the theoretical normal distribution are estimated from the sample and the maximum difference between the sample cumulative distribution and the hypothesized cumulative normal distribution is determined and compared with the critical value given by Lilliefors.[12]

The sign test is a simple exact test based on the binomial distribution that can be used to test for symmetry. The null hypothesis states that the mean of the empirical distribution equals its median. The number of positive and negative differences of the individual observations from the mean is counted and the probability of the outcome is

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assessed under the null hypothesis. Since positive as well as negative skewness can be expected, a two-sided test is appropriate (Dixon and Massey (1957, p. 417)).

It should be noted that there is a problem with the procedure suggested here.[13] The correct procedure would be to postulate a null-hypothesis of non-normality (or non-symmetry) in order to detect normality or symmetry. But an operational formulation of such a null-hypothesis is difficult, as the number of alternative hypothetical distributions is large. So the null-hypothesis of normality (or symmetry) is used. Consequently, the probability of rejecting this hypothesis, when it is correct in reality, is minimized. Thus it will be rejected only in cases of very evident non-normality (or non-symmetry). Therefore the number of instances of normality (or symmetry) may be overstated.

3.3.3.3. Transformation

Transformation is an obvious way to improve the normality of a ratio distribution. However transformations are not always possible. It is not possible to use logarithmic or square root transformations for ratios that can be negative. Frecka and Hopwood (1983) and apparently Deakin (1976) as well, circumvent this difficulty by adding the greatest negative score plus a small positive real number to all observations. There is, however, some arbitrariness in this procedure since the magnitude of the small positive real number, which in effect becomes the smallest observation, may influence greatly the resulting distribution. If it is sufficiently small it will produce an outlier. Other transformations change the order of the observations, which in itself is not an objection, but some of these change the order in different directions for positive and negative values. They turn the original distribution inside-out as it were. An example is the 'inverse' transformation.

In this chapter four transformations are performed: Natural log(ln X), inverse (1/X), square root (SQR(X)) and cube root (CBR(X)). Only the last transformation is used for all eleven ratios. Ratios three to eight can be negative and so the logarithmic, inverse, and square root transformations were only performed for ratios 1, 2, 9, 10 and 11. Therefore in all 37 ratio/transformation combinations were analysed for each year.

3.3.3.4. Truncation: removal of outliers

Bougen and Drury (1980) remove observations further than three standard deviations away from the mean to improve normality, provided, they say, that the loss of observations is reasonable. They do not state their criterion of reasonableness, but hint that a loss of 25 per cent is not acceptable. Since they only present results after truncation it

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is difficult to judge the success of this operation. Donnithorne (1981) sets, rather arbitrarily, minimum and maximum values for each ratio beyond which observations are removed. Without success however since normality is still rejected in all cases. Frecka and Hopwood (1983) remove observations from the transformed distributions (SQR(X)) until skewness or kurtosis, which ever happens first, is no longer different from the skewness or the kurtosis of the normal distribution at the one per cent significance level. In 1978 and 1979 the loss of observations for their overall sample ranged from nought per cent to ten per cent. They show that truncation dramatically improves the goodness-of-fit to the normal distribution (see table 3.1., supra).

While it is clear that outliers resulting from data errors should be removed, as should all ratio scores calculated from deficient annual accounts, any further truncation is debatable. A general argument against the procedure is of course that it seems strange to test for normality only after the observations that presumably would belie normality have been removed. Two further arguments can be made against truncation specifically in the context of financial statement analysis. The first is that ratios are often interdependent and that to discard observations on one ratio should logically lead to elimination of seemingly normal observations calculated from the same financial statement on the interdependent ratios. For example, given a Debt to Equity ratio of, say, one and a certain level of current assets, even an extreme Current Ratio due to a very low level of current liablilities will coincide with a perfectly innocent looking Long Term Debt to Equity Ratio. However, if the outlying CR is suspect why not then the LTDE ratio? The second argument is that it is difficult to see how 'suspicious observations' can exist when the financial statements from which the observations are calculated are carefully drawn up.

In this chapter therefore no outliers are removed after a procedure to control the quality of the data. This procedure is outlined in the next section.

3.3.3.5. Outline of the procedure to control data quality

Although the data base, the magnetic tapes of the 'Balanscentrale', is potentially very valuable it cannot be used until after each annual account in it has been carefully checked[14]. It is advisable to perform quality tests[15]. Each of the ratios in this chapter was calculated only after an appropriate set of quality tests had been passed. In chapter 2 the procedure to test data quality of the Balanscentrale tapes is described in more detail. Because of quality problems, financial statements of very small firms, firms with personnel costs of less than one million BEF or with total assets or total sales of less than five million

BEF, were not used. For ratios one to four only the total assets size limit was retained. The overall consequences of this procedure are shown in table 3.4..

Table 3.4.: Overall effect of data quality control.

			1977	1978	1979	1980	1981
I			3250	4268	4490	4532	4505
U	2-digit	min.	1962	2178	2333	2432	2468
	industries	max.	3134	3519	3757	3849	3839
	3-digit	min.	1786	1979	2137	2263	2307
	industries	max.	2957	3379	3630	3707	3698

I = initial number of observations on tape in manufacturing industries.
U= number of observations used.

In table 3.4. the initial number of observations on tape each year in the manufacturing industies is compared with the minimum and maximum number used. The number of observations used depended on the particular ratio analysed, given the quality contol procedure outlined above[16]. As explained earlier, only observations with a fiscal year ending on 31/12 and from three- or two-digit industries with a minimum number of 10 usable observations were retained. Of course, division by zero also eliminated some observations.

3.4.   Results

3.4.1.   Introduction

Table 3.5. cross-classifies ratios and transformations for each of the five years. In section 3.3.3.3. it was explained that the logarithmic, inverse, and square root transformations, were not used for ratios three to eight, hence the blank cells in the middle of each panel of table 3.5.. The first row (X) in each panel of that table gives the results for the distributions of the untransformed ratios. The next four rows show results for the transformations. The results shown are percentages: the percentage of manufacturing industries at the three-digit NACE level in which the normality of the ratio distribution in question could not be rejected. For instance, in 1978, the hypothesis of normality of the distribution of the logarithmically transformed (ln X) Quick Ratio (QR) could not be rejected in 62 per cent of the three-digit manufacturing

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industries studied. The confidence level is 95 per cent. To facilitate the interpretations of table 3.5. a # indicates percentages of 50 or more and a ** indicates percentages of over 90. Table 3.6. presents similar results for two-digit industries. In tables 3.7. and 3.8. results at both levels of aggregation for the symmetry hypothesis are presented. Normality includes symmetry. Appendix 3.B. shows for one year, 1977, for each case the number of industries involved, the average number of observations per industry and the highest number of observations in any one industry.[17]

3.4.2. Effects of Aggregation

The cells in the panels of table 3.5. can be compared with the corresponding cells of table 3.6.. This comparison reveals that in almost all cases, 182 out of the possible 185, the three-digit industry level results show a higher proportion of industries for which the normality hypothesis cannot be rejected before or after transformation. A similar comparison of tables 3.7. and 3.8. leads to the same general conclusion regarding the hypothesis of symmetry (184 out of the possible 185). The level of aggregation thus has an unmistakable effect on the rejection of the normality and symmetry hypothesis.

3.4.3. Other results

Tables 3.5. and 3.6. show that the ratios with a range of $(0,+\infty)$, viz. CR, QR, DE, LTDE, TAT, IT and ART, have in general positively skewed distributions of raw scores, because the transformations that reduce this type of skewness appear to work well. For the other four ratios TIE, ES, ROA and ROE with a range of $(-\infty,+\infty)$ a skewness reducing transformation does not seem to work well. All this is in agreement with earlier findings.

Apart from the results for the individual ratios there is a more general conclusion that may be drawn from tables 3.5. and 3.7. with more direct consequences with regard to the choice of statistical tools. Table 3.5. shows that for the CR, QR, ES, ROA, TAT, IT and ART ratios, there exists for each year, with three slight exceptions, at least one transformation that achieves normality in a majority of the 3-digit industries. Table 3.7. shows that for all ratios, except the ROE ratio, there exists at least one transformation that achieves symmetry in 80 per cent of the 3 -digit industries or more. In section 3.6. the results presented so far are discussed in more detail.

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Table 3.5.: Percentage of three-digit manufacturing industries for which the hypothesis of normality of the ratio distribution in question could not be rejected. (Significance level: five per cent)

year : 1977

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	18%	22%	10%	4%	13%	49%	63% #	25%	66% #	13%	29%
lnX	: N	47%	65%							79% #	66% #	59% #
1/X	: N	49%	32%							28%	43%	60% #
SQR(X)	: N	36%	43%							85% #	38%	40%
CBR(X)	: N	43%	54% #	29%	29%	23%	12%	16%	12%	85% #	47%	46%

year : 1978

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	23%	23%	10%	4%	8%	52% #	58% #	19%	70% #	18%	27%
lnX	: N	47%	62% #							67% #	73% #	61% #
1/X	: N	52% #	37%							25%	48%	65% #
SQR(X)	: N	34% ·	38%							82% #	37%	41%
CBR(X)	: N	37%	46%	27%	41%	24%	11%	17%	11%	90% **	46%	44%

year : 1979

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	20%	20%	9%	6%	6%	49%	54% #	23%	70% #	15%	32%
lnX	: N	46%	63% #							68% #	58% #	60% #
1/X	: N	56% #	33%							30%	55% #	51% #
SQR(X)	: N	26%	34%							79% #	26%	50% #
CBR(X)	: N	30%	48%	28%	39%	11%	10%	9%	6%	81% #	30%	53% #

year : 1980

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	16%	24%	5%	6%	10%	51% #	63% #	20%	72% #	15%	29%
lnX	: N	46%	54% #							72% #	65% #	61% #
1/X	: N	54% #	30%							36%	44%	60% #
SQR(X)	: N	27%	35%							83% #	32%	44%
CBR(X)	: N	29%	46%	27%	43%	16%	17%	13%	17%	83% #	40%	47%

year : 1981

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	19%	36%	13%	5%	12%	53% #	49%	25%	73% #	7%	27%
lnX	:N	44%	71% #							73% #	56% #	62% #
1/X	: N	50% #	29%							29%	41%	56% #
SQR(X)	: N	29%	46%							88% #	29%	38%
CBR(X)	: N	27%	58% #	33%	46%	10%	11%	9%	13%	88% #	34%	45%

Table 3.6.: Percentage of two-digit manufacturing industries for which the hypothesis of normality of the ratio distribution in question could not be rejected. (Significance level: five per cent)

year : 1977

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	0%	0%	0%	6%	17%	28%	12%	22%	0%	0%
lnX	: N	22%	33%							44%	41%	6%
1/X	: N	11%	6%							6%	6%	18%
SQR(X)	: N	6%	22%							44%	12%	6%
CBR(X)	: N	6%	22%	0%	11%	0%	17%	6%	0%	50% #	12%	6%

year : 1978

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	0%	0%	0%	6%	17%	22%	6%	28%	6%	6%
lnX	: N	6%	11%							44%	39%	28%
1/X	: N	6%	6%							0%	11%	22%
SQR(X)	: N	0%	0%							61% #	11%	17%
CBR(X)	: N	6%	17%	0%	6%	6%	0%	6%	6%	61% #	11%	17%

year : 1979

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	0%	0%	0%	0%	17%	28%	6%	39%	0%	11%
lnX	: N	6%	17%							33%	28%	17%
1/X	: N	11%	0%							11%	11%	17%
SQR(X)	: N	0%	0%							44%	17%	17%
CBR(X)	: N	0%	0%	6%	17%	6%	11%	6%	0%	56% #	17%	22%

year : 1980

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	6%	0%	0%	0%	17%	33%	0%	28%	11%	6%
lnX	: N	0%	22%							44%	22%	28%
1/X	: N	22%	6%							11%	11%	11%
SQR(X)	: N	0%	11%							50% #	11%	22%
CBR(X)	: N	0%	17%	11%	11%	0%	0%	6%	0%	56% #	11%	22%

year : 1981

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	0%	0%	0%	0%	28%	22%	0%	17%	0%	0%
lnX	: N	6%	28%							39%	22%	28%
1/X	: N	28%	11%							6%	6%	17%
SQR(X)	: N	6%	17%							67% #	6%	0%
CBR(X)	: N	6%	28%	0%	11%	11%	6%	0%	0%	72% #	6%	6%

Table 3.7.: Percentage of three-digit manufacturing industries for which the hypothesis of symmetry of the ratio distribution in question could not be rejected. (Significance level: five per cent) (symmetry includes normality)

year : 1977

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	46%	43%	42%	33%	33%	93%**	94%**	57%#	93%**	50%#	54%#
lnX	:S	88%#	94%**							99%**	94%**	91%**
1/X	:S	81%#	65%#							68%#	82%#	87%#
SQR(X)	:S	65%#	71%#							100%**	74%#	66%#
CBR(X)	:S	75%#	82%#	83%#	96%**	82%#	59%#	54%#	69%#	100%**	82%#	75%#

year : 1978

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	49%	47%	42%	35%	29%	95%**	94%**	65%#	96%**	43%	52%#
lnX	:S	89%#	97%**							97%**	96%**	91%**
1/X	:S	80%#	61%#							58%#	75%#	92%**
SQR(X)	:S	57%#	68%#							100%**	70%#	64%#
CBR(X)	:S	67%#	75%#	89%#	95%**	71%#	50%#	54%#	62%#	100%**	76%#	73%#

year : 1979

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	48%	51%#	45%	37%	23%	90%**	96%**	56%#	95%**	44%	57%#
lnX	:S	88%#	96%**							97%**	96%**	94%**
1/X	:S	78%#	61%#							63%#	75%#	89%#
SQR(X)	:S	67%#	73%#							99%**	63%#	75%#
CBR(X)	:S	70%#	85%#	90%**	96%**	69%#	50%#	45%	65%#	99%**	71%#	85%**

year : 1980

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	44%	46%	38%	39%	37%	94%**	97%**	58%#	89%#	44%	54%#
lnX	:S	85%#	95%**							99%**	94%**	93%**
1/X	:S	80%#	61%#							65%#	76%#	89%#
SQR(X)	:S	63%#	73%#							97%**	67%#	68%#
CBR(X)	:S	68%#	78%#	91%**	98%**	74%#	61%#	49%	61%#	100%**	76%#	78%#

year : 1981

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	49%	50%#	45%	38%	29%	94%**	93%**	54%#	95%**	36%	54%#
lnX	:S	93%**	100%**							97%**	92%**	94%**
1/X	:S	83%#	70%#							67%#	79%#	87%#
SQR(X)	:S	64%#	81%#							99%**	58%#	70%#
CBR(X)	:S	74%#	94%**	89%#	96%**	71%#	49%	43%	72%#	99%**	67%#	83%#

Table 3.8.: Percentage of two-digit manufacturing industries for which the hypothesis of symmetry of the ratio distribution in question could not be rejected. (Significance level: five per cent) (symmetry includes normality)

year : 1977

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	17%	6%	6%	0%	6%	78%#	83%#	29%	50%#	6%	12%
lnX	:S	56%#	89%#							94%**	71%#	59%#
1/X	:S	61%#	17%							17%	24%	53%#
SQR(X)	:S	22%	28%							100%**	29%	12%
CBR(X)	:S	22%	28%	72%#	78%#	76%#	33%	22%	35%	100%**	35%	12%

year : 1978

		CR	QR	DE	LTDE/	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	6%	6%	11%	11%	6%	78%#	89%#	22%	61%#	11%	17%
lnX	:S	50%#	89%#							89%#	72%#	61%#
1/X	:S	33%	11%							17%	39%	56%#
SQR(X)	:S	6%	22%							94%**	22%	22%
CBR(X)	:S	6%	22%	72%#	78%#	50%#	22%	28%	33%	100%**	39%	28%

year : 1979

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	6%	6%	6%	22%	6%	89%#	83%#	50%#	61%#	17%	28%
lnX	:S	33%	94%**							72%#	67%#	67%#
1/X	:S	39%	11%							17%	33%	56%#
SQR(X)	:S	11%	28%							89%#	22%	33%
CBR(X)	:S	17%	39%	72%#	89%#	61%#	17%	17%	28%	89%#	28%	39%

year : 1980

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	6%	11%	11%	11%	11%	89%#	94%#	28%	61%#	11%	22%
lnX	:S	33%	89%#							83%#	67%#	61%#
1/X	:S	50%#	6%							22%	28%	44%
SQR(X)	:S	11%	28%							94%**	11%	28%
CBR(X)	:S	17%	39%	83%#	78%#	39%	17%	11%	22%	100%**	17%	39%

year : 1981

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	6%	11%	6%	11%	11%	78%#	83%#	22%	50%#	6%	6%
lnX	:S	28%	94%**							89%#	61%#	56%#
1/X	:S	50%#	28%							11%	17%	50%#
SQR(X)	:S	6%	44%							94%**	11%	17%
CBR(X)	:S	17%	50%#	94%**	94%**	44%	22%	17%	22%	94%**	28%	28%

3.5. Persistence of distributional characteristics over time

The persistence of distributional characteristics over time may be studied in the following manner: given a no-persistence hypothesis, symmetry (including normality), left-asymmetry and right-asymmetry are distributed independently over the five years. The expected number of industries, as a fraction of the total number, which will, given this hypothesis, be in each year in the same distributional class is, for a given ratio and transformation:

$$\sum_{i=1}^{5} p_{Si} + \sum_{i=1}^{5} p_{LAi} + \sum_{i=1}^{5} p_{RAi}$$

where p_{Si} is the fraction of industries in which the given ratio/transformation was symmetrically distributed in year i + 1976, and p_{LAi} and p_{RAi} were similarly calculated for the asymmetrical cases.

The binomial distribution is used to test whether the observed fraction of industries[18] in which the given ratio/transformation is persistently, that is to say in all five years, identically distributed, is more than 1.65 standard deviations away from the expected fraction with the null hypothesis of independence. It turns out that at this one sided 95 per cent confidence level independence must be rejected, for 29 of the 37 possible ratio/transformation combinations. This means that there is persistence in ratio distribution form in consecutive years.

An example may make the rationale of this test clear. In figure 3.1. a fictitious group of 100 industries is divided in three distribution type classes for two years.

In the case of independence one should expect 62 per cent of the 60 industries symmetrically distributed in the first year, to be distributed symmetrically in the second year. The same argument applies to the LA and RA cases. One should therefore expect:

$$100 * [(0.60)(0.62) + (0.25)(0.25) + (0.15)(0.13)] = 45\%$$

of the industries to remain in the same distributional class. This percentage is to be compared, with a binomial test, with the 83 percent (54 + 19 + 10) of the industries that, in this example, actually remained in the same distributional class.

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Figure 3.1.: Logic of the persistence test.

Year 1   Year 2
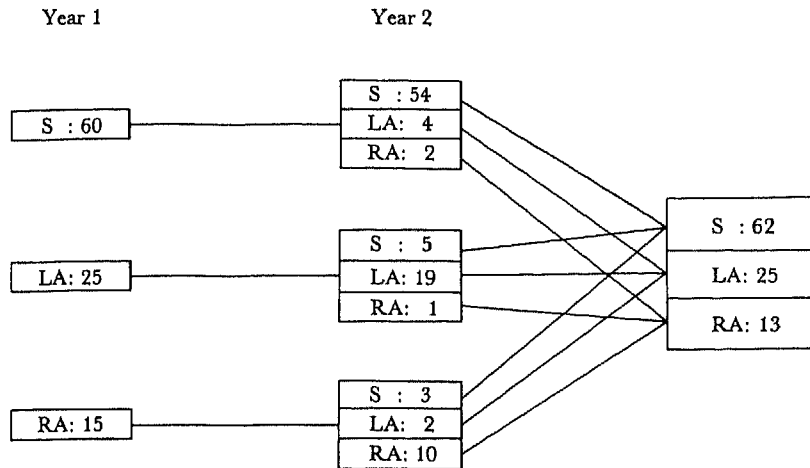
3.6.   Further remarks

3.6.1.   The case of several 'successful' transformations

It is clear from table 3.5.[19] that at the three-digit industry level there are quite a few instances in which several transformations, or the raw scores, and simultaneously one or more transformations, lead to normality. It may be thought that the identity of the industries in which normality was achieved is different for different transformations. However, one glance at table 3.5. suffices to show that there must be considerable overlap between successful transformations. This is most clearly the case for the TAT ratio. To quantify the extent of overlap Table 3.9. shows for each ratio the percentage of industries in 1981 for which there existed more than one 'successful' transformation to normality, where transformation must be understood to include the raw score case.

Table 3.9. also gives for each ratio the percentage of industries for which there existed at most one successful transformation. Also given is the average number of observations (firms) per industry in both cases, as well as the total number of industries involved in each case. The overlap percentages are not very high for the DE,LTDE, TIE, ES, ROA, and ROE ratios but of course for these only the raw scores and the cube root transformation were used. The percentage is especially high for the TAT ratio, as could be expected from table 3.5.. But the

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Table 3.9.: Extent of overlap between transformations.

Year: 1981 Observations: 3-digit manufacturing industries					
ratio	overlap	average number of firms	no overlap	average number of firms	number of industries
CR	41%	22.7	59%	62.8	80
QR	64%	28.3	36%	77.8	80
DE	11%	13.9	89%	50.4	80
LTDE	5%	13.0	95%	48.0	80
TIE	4%	12.7	96%	34.4	69
ES	11%	15.8	89%	41.5	70
ROA	9%	14.0	91%	39.8	69
ROE	9%	14.5	91%	37.3	69
TAT	90%	35.4	10%	66.9	73
IT	42%	21.5	58%	49.3	73
ART	58%	23.5	42%	59.5	71

overlap percentage is also disturbingly high for the CR, QR, IT,and ART ratios. One possible explanation for this result is that the average number of observations in industries in which overlap occurs is always much lower than the corresponding average number in industries where no overlap occurs. This points to a sample size effect which affects the normality test and which is independent of the type of transformation. This is taken up in the next paragraph. However, part of the explanation may also lie in the numbers and transformations involved. Take the TAT ratio for instance, for the industry 'Drawing, cold rolling and cold folding of steel' in 1981. In that year there were 22 acceptable observations in this industry. Table 3.10. gives the TAT ratios of these 22 firms in raw and transformed form, leaving out the inverse transformation.[20]The table shows that in this particular case the ratio scores themselves explain the overlap. The raw scores of the TAT ratio lie around one, and themselves already allow the normality hypothesis to be accepted. The square root and cube root transformations merely pull the sample distribution inward towards one. How general the validity of this type of explanation is, is not explored further in this chapter. Of course, the concern in this section with the occurence of overlap vanishes if data are analysed with clear theoretical expectations regarding the form of the ratio distributions. On the basis of these, one could presumably establish the order in which the transformations, including the raw scores case, should be looked at.

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Table 3.10.: Raw and transformed scores of the TAT ratio in NACE Industry 223, in 1981.

	X	ln X	SQR(X)	CBR(X)
	0.164	-1.807	0.405	0.548
	0.197	-1.626	0.443	0.582
	0.430	-0.843	0.656	0.755
	0.628	-0.466	0.792	0.856
	0.958	-0.043	0.979	0.986
	1.047	0.046	1.023	1.016
	1.148	0.138	1.071	1.047
	1.275	0.243	1.129	1.084
	1.351	0.301	1.163	1.106
	1.372	0.316	1.171	1.111
	1.395	0.333	1.181	1.117
	1.462	0.380	1.209	1.135
	1.524	0.421	1.235	1.151
	1.790	0.582	1.338	1.214
	1.792	0.583	1.339	1.215
	1.824	0.601	1.351	1.222
	1.935	0.660	1.391	1.246
	2.065	0.725	1.437	1.273
	2.139	0.760	1.463	1.288
	2.426	0.886	1.558	1.344
	2.576	0.946	1.605	1.371
	2.851	1.408	1.688	1.418
n	22	22	22	22
mean	1.470	0.190	1.165	1.095
s.d.	0.728	0.759	0.345	0.233
c.v.D	0.190	0.190	0.190	0.190
D	0.079*	0.210 sym	0.141*	0.164*

s.d. = standard deviation; c.v.D = critical value Lilliefors K-S test statistic D; D = actual D
(*: normality not rejected at 5% level); sym = symmetry not rejected at 5% level

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3.6.2. Effect of sample size on the rejection of the normality hypothesis

As Deakin (1976, p.95) points out, the outcome of the normality test might be influenced by the number of observations in an industry. In order to investigate this proposition, the following procedure was devised. For each case (a given year, variable and transformation) a contingency-table was computed. An example, the untransformed Current Ratio in 1977 at the three-digit industry level, is given in table 3.11..The chi-square for this contingency table is 8.73 which is significant at the five per cent level. The effect is 'positive', which means that in larger industries normality is significantly more often rejected than in smaller industries. When in one of the cells the expected number of observations fell below five, the corresponding chi-square was not considered.

Table 3.11.: Contingency table: the relation between sample size and rejection of the normality hypothesis. (the untransformed CR in 1977, three-digit level)

	Industries with less than 30 observations	Industries with 30 observations or more	
normality rejected	25	34	59
normality accepted	12	1	13
	37	35	72

Table 3.12.: Relation between sample size and rejection of the normality hypothesis.

	1977	1978	1979	1980	1981
Cases considered	27	29	29	30	28
independence rejected at 5% level	13	22	16	22	24

In table 3.12. the number of cases, per year, is given in which the independence of industry size and the rejection of the normality hypothesis could not be accepted.

The conclusion from this table is clear: in most of the cases a positive relation exists between sample size and the rejection of normality. Table 3.13. gives similar results for the symmetry hypothesis. Here again in most cases a positive relation exists between sample size and the rejection of symmetry.

Table 3.13.: Relation between sample size and rejection of the symmetry hypothesis.

	1977	1978	1979	1980	1981
cases considered	22	24	23	24	22
independence rejected at 5% level	14	16	17	20	16

To check how all this affects the results in Tables 3.5.-3.8., the analysis was performed once again for one year (1981) using only industries with 30 observations or more. The results are given in Tables 3.14. and 3.15..

Although normality and symmetry are more frequently rejected, the results outlined in the discussion in sections 3.4.3 and 3.4.4. reemerge.

3.7. Conclusion

The previous paragraphs show that there is persistence in the form of ratio distributions, if necessary suitably transformed, from year to year. They also show that the eleven raw or transformed ratios studied were invariably more often normally or symmetrically distributed at a three-digit level of manufacturing industries than at the more broadly defined two-digit level.

This finding corroborates the evidence of the importance of industry homogeneity for the form of ratio distributions presented in table 3.1.. That is, researchers who use financial ratio data and apply parametric statistical techniques should do so only in settings in which they have data on firms from industries at a low level of aggregation. This is certainly so if the techniques are robust in the sense that the symmetry of the underlying ratio distributions is already sufficient to allow a correct probabilistic interpretation. If data are only available for broad industries, it is advisable to test for the normality or symmetry of the underlying distribution, possibly after a suitable transformation. The results in this chapter suggest that in such cases non-parametric statistical techniques will be appropriate more often than not.

Table 3.14.: Percentage of three- and two-digit manufacturing industries for which the hypothesis of normality of the ratio distribution in question could not be rejected. (Significance level: five per cent, minimum number of observations per industry: 30)

year : 1981
observations : Three-digit industries in Belgian manufacturing (= N.A.C.E. one-digit industries 2,3, and 4)

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	N	3%	8%	0%	0%	0%	42%	24%	0%	56%#	0%	6%
	n	40	40	40	40	28	33	29	28	34	32	33
	m	74	74	74	74	58	62	64	61	63	63	63
lnX	N	20%	63%#							71%#	44%	42%
	n	40	40							34	32	33
	m	74	74							63	63	63
1/X	N	27%	8%							12%	19%	30%
	n	40	40							34	32	33
	m	74	74							63	63	63
SQR(X)	N	10%	20%							82%#	9%	12%
	n	40	40							34	32	33
	m	74	74							63	63	63
CBR(X)	N	8%	33%	8%	18%	0%	3%	0%	4%	79%#	16%	24%
	n	40	40	40	40	28	33	29	28	34	32	33
	m	74	74	74	74	58	62	64	61	63	63	63

Table 3.14.: Continued.

year : 1981
observations : Two-digit industries in Belgian manufacturing (= N.A.C.E. one-digit industries 2,3 and 4)

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	: N	0%	0%	0%	0%	0%	19%	19%	0%	13%	0%	0%
	n.	16	16	16	16	15	16	16	15	16	15	16
	m	238	238	238	238	161	178	172	171	183	189	181
lnX	: N	0%	19%							38%	7%	19%
	n.	16	16							16	15	16
	m	238	238							183	189	181
1/X	: N	19%	0%							0%	7%	6%
	n.	16	16							16	15	16
	m	238	238							183	189	181
SQR(X)	: N	0%	13%							63% #	0%	0%
	n.	16	16							16	15	16
	m	238	238							183	189	181
CBR(X)	: N	0%	19%	0%	6%	0%	0%	0%	0%	69% #	0%	0%
	n.	16	16	16	16	15	16	16	15	16	15	16
	m	238	238	238	238	161	178	172	171	183	189	181

N = normal
n. = number of three- or two-digit industries analysed
m = average number of observations per industry

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Table 3.15.: Percentage of three- and two-digit manufacturing industries for which the hypothesis of symmetry of the ratio distribution in question could not be rejected. (Significance level: five per cent, minimum number of observations per industry: 30, symmetry includes normality)

year : 1981
observations : Three-digit industries in Belgian manufacturing (= N.A.C.E. one-digit industries 2,3, and 4)

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:S	13% #	18%	20%	10%	7%	97% #	90% #	18%	88% #	9%	24%
	n.	40	40	40	40	28	33	29	28	34	32	33
	m.	74	74	74	74	58	62	64	61	63	63	63
lnX	:S	88% #	100% **							94% **	88% #	88% #
	n.	40	40							34	32	33
	m.	74	74							63	63	63
1/X	:S	73% #	50% #							53% #	63% #	79% #
	n.	40	40							34	32	33
	m.	74	74							63	63	63
SQR(X)	:S	35%	68% #							97% **	28%	55% #
	n.	40	40							34	32	33
	m.	74	74							63	63	63
CBR(X)	:S	55% #	90% **	85% #	95% **	54% #	24%	10%	57% #	97% **	41%	73% #
	n.	40	40	40	40	28	33	29	28	34	32	33
	m.	74	74	74	74	58	62	64	61	63	63	63

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Table 3.15.: Continued.

year   : 1981
observations : Two-digit industries in Belgian manufacturing (= N.A.C.E. one-digit industries 2,3 and 4)

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:N	0%	0%	6%	13%	0%	75%#	81%#	7%	44%	0%	0%
	n.	16	16	16	16	15	16	16	15	16	15	16
	m.	238	238	238	238	161	178	172	171	183	189	181
lnX	:S	19%	94%**							88%#	53%#	50%#
	n.	16	16							16	15	16
	m.	238	238							183	189	181
1/X	:S	44%	19%							6%	7%	44%
	n.	16	16							16	15	16
	m.	238	238							183	189	181
SQR(X)	:S	0%	38%							94%**	0%	6%
	n.	16	16							16	15	16
	m.	238	238							183	189	181
CBR(X)	:S	13%	44%	94%**	94%**	33%	13%	6%	7%	94%**	13%	19%
	n.	16	16	16	16	15	16	16	15	16	15	16
	m.	238	238	238	238	161	178	172	171	183	189	181

S = symmetry
n. = number of three- or two-digit industries analysed
m. = average number of observations per industry

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3.8.   Additional notes

3.8.1.   Univariate normality

Several papers have appeared in the literature since a version of this chapter was published or contemporaneously. A recent paper by Ezzamel and Mar-Molinero (1990) tabulates these. Table 3.16 is taken from table 1 of Ezzamel and Mar-Molinero (1990,p.2).

Table 3.16.: Additional studies on the distributional properties of financial ratios not tabulated in table 3.1.

Study	No. of ratios used	Period covered	Sample size	Null hypothesis (distribution is normal)
Lee(1985),USA	4	1961,65,70, 75,80	348-606	mixed
McLeay(1986),UK,Ireland	3	1981,82	1634	reject
So(1987),USA	11	1971-79	490	mixed
Karels,Prakash(1987), USA	50	1972-76	50	reject
Source: Ezzamel,Mar-Molinero(1990,table 1)				

Of these papers Lee (1985) also identified an industry effect, similar to that described in this chapter, on the form of ratio distributions. None of these papers looked at the inter-temporal persistence of the form of ratio distributions.

Ezzamel and Mar-Molinero (1990) do look at both questions: the effect of disaggregation of firms into more homogeneous industries and the inter-temporal persistence of the form of ratio distributions. They look at the distributional properties of 9 financial ratios for the period 1973 - 1981 of between 1115 (min. in 1973) and 1665 (max. in 1978) companies, with data taken from the EXSTAT database (UK).

They find a disaggregation effect; the normality hypothesis for seven of the nine ratios was less often rejected at the more disaggregated industry level. This was true for raw data distributions, as well as transformed data distributions.

Ezzamel and Mar-Molinero also examine inter-temporal properties of ratio distributions. They conclude that their results are consistent with the findings in this chapter.

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3.8.2. Multivariate normality

Karels and Prakash (1987) and Watson (1990) are interesting contributions to the literature on the distributional properties of financial ratios. They point out that, strictly, in order to be useful as in an appreciation of the appropriateness of using parametric statistical techniques using financial ratios, one needs to look at multivariate normality of financial ratios. Univariate normality of a given number of financial ratio distributions, does not imply multivariate normality.

Both papers fail to find much multivariate normality. Karels and Prakash look at multivariate properties of univariate normal ratios selected from 50 ratios in seven distinctive groupings (e.g. a group of profitability ratios). Thus, they first test for univariate normality and then combine sets of univariate normally distributed ratios, as much as possible one from each ratio grouping, and test those for multivariate normalcy. They use raw as well as log transformed ratio scores. They do not delete outliers. Departures from multivariate normality were always substantial.

Watson looks at the multivariate distributional properties of 4 of the ratios out of the 11 analysed by Deakin(1976) and Frecka and Hopwood (1983). Watson restricts his samples, of varying size, to firms with data on the COMPUSTAT tape from US manufacturing industries in 1982-1983. He finds, rejections of univariate and multivariate normality for all four ratio distributions in all three years using the raw ratio scores. He finds less reason to reject univariate and multivariate normality after deleting multivariate outliers and after applying Box-Cox transformations to the raw data.

Appendix 3.A.: Definition of financial ratios used.

The numbers used in the definitions are item numbers in the standard Belgian balance sheet and results statement (see appendix 2.A. above). Itemnumbers in between square brackets are negative by definition.

1. Current ratio (CR):
    (0699+0799+0899+0999+1099)/(2999+3099)
2. Quick ratio (QR):
    (0799+0899+0999+1099)/(2999+3099)
3. Debt to equity (DE):
    (2799+2899+2999+3099)/(2199+2299+2399+2499+2599+2699)
4. Longterm debt to equity (LTDE):
    (2799+2899)/(2199+2299+2399+2499+2599+2699)
5. Times interest earned (TIE):
    (4509-5509+4131+4209+4219+4301-5301+[4134])/(4209+4219)
6. Earnings on sales (ES):
    (5199-4199+4139+4122)/(5109+5139)
7. Return on assets (ROA):
    (4509-5509+4131+4209+4219+4301-5301+[4134])/1999
8. Return on equity (ROE):
    (4509-5509+4131+4202+4301-5301+[4134]+[4204])/(2199+2299+
    2399+2499+2599+2699)
9. Total assets turnover (TAT):
    (5109+5139)/1999
10. Inventory turnover (IT):
    (4199-5119-5129)/699
11. Accounts receivable turnover (ART):
    (5109+5139)/(0509+0709)

Appendix 3.B.: Detailed Results

N = percentage of industries in which the normality of the ratio distribution in question could not be rejected.

-N = complement of N.

S = percentage of industries in which the ratio distribution in question could not be termed normal, but in which the symmetry hypothesis could not be rejected.

Year : 1977
Observations : Three-Digit Industries in Belgian Manufacturing (= N.A.C.E. one-digit industries 2,3, and 4)

X

	CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
:N	18%	22%	10%	4%	13%	49%	63%	25%	66%	13%	29%
-N	82%	78%	90%	96%	87%	51%	37%	75%	34%	87%	71%
S	34%/66%	27%/73%	35%/65%	30%/70%	23%/77%	86%/14%	84%/16%	42%/58%	78%/22%	42%/58%	35%/65%
n.	72	72	72	72	61	68	68	67	68	68	68
m.	41	41	41	41	29	32	31	30	33	32	33
H.	170	170	170	170	92	112	107	100	113	112	112

lnX

	CR	QR	TAT	IT	ART
:N	47%	65%	79%	66%	59%
-N	53%	35%	21%	34%	41%
S	76%/24%	84%/16%	93%/7%	83%/17%	79%/21%
n.	72	72	68	68	68
m.	41	41	33	32	33
H.	170	170	113	112	112

1/X

	CR	QR	TAT	IT	ART
:N	49%	32%	28%	43%	60%
-N	51%	68%	72%	57%	40%
S	62%/38%	49%/51%	55%/45%	69%/31%	67%/33%
n.	72	72	68	68	68
m.	41	41	33	32	33
H.	170	170	113	112	112

SQR(X)

	CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
:N	36%	43%	29%	29%	23%	12%	16%	12%	85%	38%	40%
-N	64%	57%	71%	71%	77%	88%	84%	88%	15%	62%	60%
S	46%/54%	49%/51%	76%/24%	94%/6%	77%/23%	53%/47%	46%/54%	64%/36%	100%/0%	57%/43%	44%/56%
n.	72	72	72	72	61	68	68	67	68	68	68
m.	41	41	41	41	29	32	31	30	33	32	33
H.	170	170	170	170	92	112	107	100	113	112	112

CBR(X)

	CR	QR	TAT	IT	ART
:N	43%	54%	85%	47%	46%
-N	57%	46%	15%	53%	54%
S	56%/44%	61%/39%	100%/0%	67%/33%	54%/46%
n.	72	72	68	68	68
m.	41	41	33	32	33
H.	170	170	113	112	112

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Year : 1977
Observations : Two-Digit Industries in Belgian Manufacturing (= N.A.C.E. one-digit industries 2,3, and 4)

		CR	QR	DE	LTDE	TIE	ES	ROA	ROE	TAT	IT	ART
X	:N / -N	0% / 100%	0% / 100%	0% / 100%	0% / 100%	6% / 94%	17% / 83%	28% / 72%	12% / 88%	22% / 78%	0% / 100%	0% / 100%
	:S / -S	17% / 83%	6% / 94%	6% / 94%	0% / 100%	0% / 100%	73% / 27%	77% / 23%	20% / 80%	36% / 64%	6% / 94%	6% / 94%
	n.	18	18	18	18	17	18	18	17	18	17	17
	m	174	174	174	174	115	131	126	126	134	138	139
	H	453	453	453	453	313	371	350	334	382	372	374
lnX	:N / -N	22% / 78%	33% / 67%							44% / 56%	41% / 59%	6% / 94%
	:S / -S	43% / 57%	83% / 17%							90% / 10%	50% / 50%	56% / 44%
	n.	18	18							18	17	17
	m	174	174							134	138	139
	H	453	453							382	372	374
1/X	:N / -N	11% / 89%	6% / 94%							6% / 94%	6% / 94%	18% / 82%
	:S / -S	56% / 44%	12% / 88%							12% / 88%	19% / 81%	43% / 57%
	n.	18	18							18	17	17
	m	174	174							134	138	139
	H	453	453							382	372	374
SQR(X)	:N / -N	6% / 94%	22% / 78%	0% / 100%	11% / 89%	0% / 100%	17% / 83%	6% / 94%	0% / 100%	44% / 56%	12% / 88%	6% / 94%
	:S / -S	18% / 82%	7% / 93%	7% / 93%	75% / 25%	76% / 24%	20% / 80%	18% / 82%	35% / 65%	100% / 0%	20% / 80%	6% / 94%
	n.	18	18	18	18	17	18	18	17	18	17	17
	m	174	174	174	174	115	131	126	126	134	138	139
	H	453	453	453	453	313	371	350	334	382	372	374
CBR(X)	:N / -N	6% / 94%	22% / 78%							50% / 50%	12% / 88%	6% / 94%
	:S / -S	18% / 82%	18% / 82%							100% / 0%	27% / 73%	6% / 94%
	n.	18	18							18	17	17
	m	174	174							134	138	139
	H	453	453							382	372	374

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Notes

1. This chapter is based on the previously published article: W.Buijink, M.Jegers, Cross-sectional distributional properties of financial ratios in Belgian manufacturing industries: aggregation effects and persistence over time, in: Journal of Business Finance and Accounting, 1986, 13, 3, pp. 337-363. An earlier version of this chapter was presented at a workshop at the EIASM in Brussels. Constructive comments of the participants, especially George Foster, are gratefully acknowledged. Constructive comments were also received from Francis Thomson and Bert De Brabander.

2. It should be noted that firm size, a frequent ratio component, invariably is found to have very skew distributions, see for instance Clarke (1987).

3. See Foster (1986,pp. 58-62) for a more detailed discussion of this point.

4. For the distribution of the ratio of two normally distributed varables, see Marsaglia (1965).

5. Previous work, without quantitative detail, in this area are Horrigan (1965) and O'Connor (1973). Another approach based on maximum likelihood estimations of transformation and distribution parameters can be found in McLeay (1984).

6. This result is also hinted at by Bougen and Drury (1980),p.44, and Deakin (1976), p.95, but they do not present detailed evidence.

7. Roughly: N.V. = joint stock company, P.V.B.A. = association of persons enjoying limited liability, C.V. = limited partnership and B.V. = professional association taking the form of a business company (see also note 7, chapter 2).

8. For a more thorough discussion of the criteria that lead to the annual accounts of a Belgian company being recorded on the tapes and a discussion of the recent reforms of Belgian accounting legislation as a result of the EEC's fourth directive, see Lefebvre (1984) and also Theunisse (1987).

9. In 1977, only annual accounts of firms with an accounting fiscal year ending on December 31 were filed.

10. Precise definitions with references to standard Belgian annual accounts are given in appendix 3.A..

11. NACE (see also note 21, chapter 2) stands for General Industrial Classification of Economic Activities of the EC. This classification distinguishes ten main industries each designated with a single digit, 0-9, and more detailed industries at a two-, three- and four-digit level. The two- and three-digit level industries studied in this chapter, are the classes and groups in the one-digit NACE-industries two, three and four, the manufacturing industries. See: Statistical Office of the EC (1970).

12. A table corrected by Conover (1971) p. 398, was used in fact.

13. As well as in all previous work on this subject.

14. The Compustat tape used by Deakin (1976) and Frecka and Hopwood (1983) is apparently not error free either. See chapter 2.

15. There is no 'competing' data base in Belgium, therefore no cross-checking is possible.

16. It should be remembered that concise annual accounts were not used in the analysis of ratios 5-11. This obviously also entails loss of observations.

17. Appendix A gives in more detail the results for 1977 also shown at the top of Tables 5 and 6. Similar more detailed results for each year in Tables 5-8 can be obtained from the authors.

18. Only those industries for which ≥ 10 observations were available in all five years were used.

19. As well as from Table 3.7.. However, the focus of this section is on the normality hypothesis.

20. Because the percentage of industries in which that transformation worked well is comparatively small.

Chapter 4

Some evidence on the demand for external auditing in an unregulated environment:

the case of the Netherlands[1]

4.1.   Introduction

This chapter tests whether the demand for external independent auditing of Dutch companies is associated with firm characteristics that proxy for a company's contracting costs. Independent external auditing is a possible means of reducing contracting costs (see Watts and Zimmerman (1986, ch. 13), and Wallace (1987) for reviews), and this may form an important reason why managers demand external auditing, even in the absence of regulation. Results such as those presented in this chapter are therefore a potential contribution to the policy debate surrounding the extent to which auditing should be mandated.

In a pioneering article Chow (1982) investigated the effect of the contracting cost variables firm size, leverage, number of accounting based debt covenants and firm ownership structure on the demand for external independent auditing by U.S. companies in 1926. That is, before Securities and Exchange Commission (SEC) regulation and stock exchange rules mandated an external audit. There are related studies in this area (see Wallace (1987) and Chow, Kramer and Wallace (1988) for reviews) but they are few in number.

In this chapter, Chow (1982) is extended: (i) data from a non-Anglo Saxon country are used; (ii) a different, firm specific, management's ownership share variable is used; (iii) a distinction is made between

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total, and public and private debt; (iv) the effect of an alternative means of reducing contracting costs on the demand for external auditing is considered; (v) the sample is not restricted to industrial firms with common shares listed; it includes trading companies, and companies with, for example, only bonds listed; (vi) other, not predominantly contracting related, factors affecting the demand for an external audit are briefly considered.

An annual external audit was not mandated for Dutch companies until the major revision of Dutch company and disclosure legislation in 1970 (WJO 1970, see chapter 1). A decade earlier, in the 1958 version of the listing requirements, the Amsterdam Stock Exchange mandated an external independent audit of financial statement material in security issue prospectuses. However, an earlier revision of Dutch company law in 1929, did mention the possibility of an external audit. It made it optional. Moreover, this revision tightened disclosure requirements for larger Dutch companies, which may have triggered demand for accounting expertise of external auditors. To avoid all regulatory effects on the demand for external auditing, the data for 141 Dutch companies used in this chapter, are from 1926.

4.2. Contracting between managers, shareholders and creditors and a firm's demand for external auditing

Contracting cost based hypotheses about the extent of firms' demand for external auditing derive from Jensen and Meckling (1976) and especially Watts (1977) (see Watts and Zimmerman (1986, Ch.8 and Ch.13) for a review). Chow (1982) tested versions of the Watts (1977) hypotheses empirically in the context of the demand for external auditing. Contracting costs affecting companies are considered to be caused by the moral hazard problem in the principal-agent contracting setting between (i) managers and shareholders, and (ii) between managers and shareholders, and creditors, both holders of public and of private debt.

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4.2.1. Shareholder-Manager contracting and the demand for independent auditors

Absent debt contracts, contracting costs stem solely from the moral hazard problem that affects contracting between management and shareholders. Jensen and Meckling (1976, pp.312-330) argue that the moral hazard problem, and thus contracting costs, varies with management's share of ownership of a firm. Contracting costs arise in this setting because of the incentives management has to allocate resources of the firm in a way that is not necessarily consistent with the interests of non-management shareholders. One evident example is on-the-job consumption of perquisites. Shareholders, observing and understanding the moral hazard problem in this situation, would discount their investments and lower management's compensation. It may then be less costly for management to bond themselves not to engage in the wealth transfers made possible by the moral hazard problem. This they can do by agreeing, for example, to provide financial statements and have the accuracy of these statements certified by an independent auditor.

Evidently other control mechanisms are imaginable that have the potential to constrain management's wealth transfer possibilities. Other possible devices are (and the list is not exhaustive): (i) the presence of outside directors, (ii) the labour market for managers (Fama (1980)), (iii) provisions in the compensation package for managers that provide incentives to limit wealth transfers.

These mechanisms would have an effect on the demand for external auditors. As Leftwich, Watts and Zimmerman (1981) point out, the direction of the effect depends on whether the mechanisms substitute for or complement external audits. For this chapter only data on the first of these devices was available: the number of outside directors[2].

4.2.2. Shareholder-creditor contracting and the demand for external auditing

In the absence of outside equity an owner-manager, or a manager acting in the interest of shareholders, has incentives to take actions, that are difficult to observe, that have the effect of expropriating debtholders. Thus, again, there exists a moral hazard problem. Smith and Warner (1979) list areas in which such actions may take place: (i) excessive dividend payment, (ii) dilution of existing debtholder claims, (iii) asset substitution and (iv) underinvestment. Jensen and Meckling (1976, pp.333-334) argue that the moral hazard problem increases in

this case, with an increase in the proportion of debt in a firm's capital structure. One potentially cost effective bonding activity is, again, that a firm produces audited financial statements.

Myers (1977) has suggested that the costs of shareholder-debtholder contracting also depend on the importance of the present value of future (growth)opportunities of a firm versus the importance of the firm's assets whose value does not depend on further discretionary investment, so-called assets in place. Myers argues that the moral hazard problem surrounding shareholder-debtholder contracting depends partly on the mix of assets in place and future growth opportunities a particular firm has. Relatively more assets in place is hypothesized by Myers, to reduce the contracting costs of debt, thereby reducing the demand for external audits.

Covenants in loan agreements may be an alternative control mechanism. They may play the role of complement or substitute of external auditing. Also, loan agreement covenants may be a specific source of demand for auditing, when they are accounting information based. Observable covenants in public loan agreements in the Netherlands in 1926 were found to be limited to provisions securing debt and debt convertibility provisions. Therefore only the effect on auditor demand of those covenants can be considered.

4.2.3. The effect of firm size

Firm size can be expected to influence the demand for external independent auditing in an unregulated environment. Two reasons are given by Chow (1982,p.276):
* the total amount of the costs of contracting can be expected to increase with firm size,
* the relative cost of an audit is likely to decrease with firm size.

4.2.4. Recapitulation

This chapter investigates whether the cross-sectional variation in the presence of an external auditor is a function of firm characteristics that are suggested by agency theory. The analysis in the previous sections leads to the following model of the demand for independent external auditing in an unregulated environment.

$$AUD_t = f(NMO_t, NOD_t, DE_t(or\ B_t, CRED_t),\ SDS_t, CONV_t, AP_t, SIZE_t) \qquad (1)$$
$$(+)\quad (?)\quad (+)\quad (+)\ (+)\qquad (?)\quad (?)\quad (-)\quad (+)$$

In (1):

- AUD is the presence (1) or absence (0) of an external auditor,
- NMO is non-management ownership share,
- NOD is the number of outside directors,
- DE is the proportion of total debt, leverage,
- B and CRED are the proportions of public and private debt,
- SDS and CONV are the proportions of secured and convertible debt,
- AP is assets in place.

The meaning of SIZE is evident, and t is 1926. Below the variables in (1) are the hypothesized effects. The distinction between public and private debt is made to investigate what exactly drives the possible effect of leverage: public or private debt.

4.3. Earlier directly related empirical research

Only two earlier studies have empirically analyzed the demand by firms for external auditing in an unregulated environment[3]. Chow (1982) is the pioneering article. He found, for 165 New York Stock Exchange and OTC (over-the counter) industrial firms with common shares listed in 1926, that:

- voluntary engagement of an external auditor varied directly with degree of leverage (debt/firm market value), and number of accounting information based debt covenants,
- firm size was only significantly related to the engagement of an auditor for the OTC subsample,
- measurement problems prevented an adequate test of the effect of management ownership share.

Abdel-khalik (1989) analyzed for 103 U.S. privately owned companies the effect of hierarchical loss-of-control, measured by Log(number of employees), and the amount of tangible economic resources subject to opportunism, measured by Log(total assets), on a continuous presence-of-auditor measure, audit fee. For a subsample of 40 firms, he also analyzed the effect on the same dependent variable of an extra (dummy) variable, registering an audit requirement by a bank. OLS estimates of the coefficients of the explanatory variables are hypothesized to be positive in both analyses, and the results confirm this.

4.4. Data

4.4.1. Time period

The year 1926 is used as the year of study in this chapter. Amsterdam Stock Exchange (ASE) rules in 1926 required that limited liability companies that had either shares or bonds listed provide an annual balance sheet and profit and loss statement accompanied by the directors' annual report to shareholder and/or public debtholders[4]. ASE rules did not specify the contents, in terms of accounting methods to be used or items to be disclosed, of these financial statements.

Company law existing at that time, part of the Dutch Commercial Code, mandated directors to supply shareholders with a profit and loss statement (Staatsblad (1835, p.996)). and to archive a balance sheet for a number of years (Commercial Code, art. 8). No legislation regarding accounting methods or the amount and type of disclosures existed.

In essence then, companies were free in their choice of accounting techniques and disclosure alternatives at the time.

Also, neither in the ASE rules nor in company law the engagement of an external auditor was suggested or mandated in 1926.

The major revision of Dutch company law (Staatsblad (1928), and Handelingen (1929)) taking effect in 1929, first mentioned the possibility of engaging an external auditor in article 42a. But appointment of an auditor to certify the annual report remained optional until the next major revision of Dutch company law in 1970 (WJO 1970, see chapter 1). However, the fact that the engagement of an external auditor was now suggested by legislation, coupled with a tightening of publication requirements for the larger limited liability companies in the legislation changes in 1928/29, has a potential effect on the voluntary engagement of an external auditor by Dutch companies.

Therefore a year before 1929, 1926, was chosen for this chapter. This is the year also used in Chow (1982)[5].

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4.4.2. Sample and variables

4.4.2.1. Sample

In 1926 238 industrial and trading companies were listed with common shares and/or other shares and/or bonds on the ASE (GIDS (1927))[6]. Complete sets of data could be found, in GIDS (1927), OSS (1927, 1928)[7] and the Erasmus University Financial Statements archive (EUR), for 141 of these companies: 118 industrial and 23 trading companies. Examination of the 1926 financial statements revealed that 65 of these were externally audited, 76 were not. Table 4.1. shows the details of sample construction.

Table 4.1.: Details of sample construction.

* Total number of industrial and trading firms listed on the Amsterdam Stock Exchange, December 1926 (GIDS (1927)):	238
* Elimination due to non-availability of 1926 financial statements in the EUR archive:	(27)
* Observations eliminated due to data problems: missing share and bond price data, foreign companies, cooperatives, companies in liquidation, state owned companies, companies incorporated in 1926, companies reorganized financially in 1926:	(70)
* Final sample	141*

* 118 industrial companies and 23 trading companies, of which with at least common shares listed, 95 industrial and 22 trading companies.

Table 4.1. also gives the number of industrial and trading companies with common shares listed in 1926. Twenty-four companies were listed with shares other then common shares, e.g. preferred shares, and/or bonds. Chow (1982) uses only companies with common shares listed. But there seems to be no compelling reason to discard companies listed otherwise. Moreover, all types of shares had voting rights.

Fiscal year reporting periods were not constrained to end in December 1926 in this chapter. Table 4.2. tabulates fiscal year ends for the 141 companies by month. Data were collected for each of the 141 firms.

4.4.2.2. Dependent variable

The presence of an external auditor was recorded from the financial statements of each company in the EUR archive. Three ways of registering the presence of an auditor were considered:

- signature present or presence of auditor mentioned in the (outside) directors' report (yes=83, no=58),
- signature[8] of auditor accompanying the financial statements (yes=74, no=67),

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Table 4.2.: Fiscal year end breakdown by month in 1926, for 141 companies in final sample.

Month	#
January	-
February	-
March	3
April	5
May	-
June	16
July	-
August	3
September	4
October	1
November	1
December	108
Total	141

- signature of auditor accompanying the financial statements, but only auditors that could be traced to auditing firms existing in 1926 were counted (yes=65, no=76)[9].

The empirical analyses in this chapter use the last, and most conservative, presence-of-auditor definition. This ensures that of the observations in the yes-category it is known for certain that an external auditor is present. For the no-category, the absence of an external auditor is of course not certain. Appendix 4.A. lists company and auditor names.

4.4.2.3. Explanatory variables

NMO, non-management ownership share, is proxied by the proportion of common and preferred (cumulative) shares issued that is listed at the ASE (source: GIDS (1927))[10]. NOD registers the number of outside directors in 1926 (source: OSS (1927)). B is the ratio of the market value of public debt (bonds) to SIZE (source: GIDS (1927), OSS (1928)). CRED is the ratio of the book value of private debt to SIZE (source: GIDS (1927), OSS (1928)). DE is (B + CRED), that is the ratio of total debt to SIZE. SDS is the ratio of the market value of secured public debt to SIZE (source: GIDS (1927), OSS (1928)). CONV is the market value of convertible public debt to SIZE (source: GIDS (1927), OSS (1928)). Note that debt covenants were found to be scarce. Thirty-seven bond issue prospectuses, for the sample firms, could be traced in earlier editions

of OSS. Accounting information based covenants ,used by Chow (1982), were absent in those prospectuses. Of the types of covenants mentioned by Smith and Warner (1979) only secured debt and convertibility were present. Therefore only those covenants were registered for the sample companies. Note also, that neither GIDS (1927) nor OSS (1928) specifically lists bond covenants. AP, assets in place, is proxied by the ratio of book value of fixed assets (plus equity investments if present), to book value of total assets (source: OSS (1928)) Book value of equity investments was included in AP to overcome the lack of consolidated financial statements. SIZE is the sum of the market value of common and preferred (cumulative) stock listed, and the book value of unlisted shares, the market value of public debt (bonds) and the book value of private debt. Market values of listed securities was computed as the product of the nominal amount listed and the average of the highest and lowest prices in 1926 (sources: GIDS (1927) and OSS (1928)). Book value data for all variables, where relevant, were also gathered. Simple Pearson correlations between market- and bookvalue data were high (n=141). They ranged from 0.739 for CRED, the proportion of private debt, to 0.995 for SIZE.

4.5.   Univariate results

Table 4.3. presents means, standard deviations ,medians, minima and maxima for the explanatory variables, for audited and non-audited companies, for the entire sample and for industrial and trading companies seperately.

Table 4.3. shows that:
- Audited and non-audited companies hardly differ in terms of the proportion of shares issued, that is listed (NMO).
- Audited firms have a higher mean and median number of outside directors (NOD).
- The average and median proportion of public debt does not differ much between audited and non-audited firms (B).
- The average and median proportion of private debt is higher for audited firms (CRED).
- The same is true for the proportion of total debt, the leverage ratio DE.
- Audited firms are smaller on average, although their median firm size is larger (SIZE).

Table 4.3.: Summary statistics of means, standard deviations, medians, minima and maxima (except for OD) of the explanatory variables.

		Entire Sample audited		Industrial firms audited		Trading firms audited	
		yes	no	yes	no	yes	no
n		65	76	55	63	10	13
NMO	mean	0.848	0.831	0.822	0.812	0.990	0.922
	s.d.	0.323	0.325	0.345	0.333	0.032	0.277
	med.	1	1	1	1	1	1
	min.	0	0	0	0	0.900	0
	max.	1	1	1	1	1	1
NOD	mean	5.03	4.28	5.16	4.34	4.30	3.92
	s.d.	2.82	1.92	2.79	1.96	3.02	1.75
	med.	5	4	5	4	4	3
	min.	0	0	0	0	0	2
	max.	14	9	14	9	9	9
DE	mean	0.422	0.365	0.416	0.352	0.458	0.425
	s.d.	0.218	0.222	0.230	0.226	0.226	0.196
	med.	0.390	0.370	0.380	0.340	0.455	0.410
	min.	0.080	0.010	0.080	0.010	0.170	0.130
	max.	0.890	0.850	0.890	0.850	0.800	0.680
B	mean	0.107	0.092	0.124	0.103	0.012	0.041
	s.d.	0.169	0.139	0.178	0.140	0.027	0.129
	med.	0	0	0.070	0.010	0	0
	min.	0	0	0	0	0	0
	max.	0.790	0.530	0.790	0.530	0.080	0.470
CRED	mean	0.316	0.272	0.292	0.249	0.446	0.384
	s.d.	0.237	0.201	0.230	0.202	0.455	0.370
	med.	0.240	0.210	0.230	0.210	0.455	0.370
	min.	0	0.010	0	0.010	0.120	0.120
	max.	0.890	0.850	0.890	0.850	0.800	0.680

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Table 4.3.: Continued.

		Entire Sample audited		Industrial firms audited		Trading firms audited	
		yes	no	yes	no	yes	no
n		65	76	55	63	10	13
SDS	mean	0.034	0.038	0.041	0.039	0	0.036
	s.d.	0.084	0.095	0.089	0.088	0	0.130
	med.	0	0	0	0	0	0
	min.	0	0	0	0	0	0
	max.	0.326	0.469	0.326	0.318	0	0.469
CONV	mean	0.007	0.004	0.008	0.005	0	0
	s.d.	0.037	0.027	0.041	0.029	0	0
	med.	0	0	0	0	0	0
	min.	0	0	0	0	0	0
	max.	0.220	0.210	0.220	0.210	0	0
AP	mean	0.456	0.423	0.503	0.468	0.192	0.202
	s.d.	0.247	0.252	0.224	0.230	0.210	0.244
	med.	0.415	0.460	0.490	0.440	0.130	0.070
	min.	0	0	0.050	0.150	0	0
	max.	1.010	1	1.010	1	0.650	0.670
SIZE	mean	9.18*	9.80	9.73	9.61	6.56	11.74
	s.d.	25.13	16.62	27.56	15.85	9.14	20.70
	med.	3.75	2.84	3.75	2.88	3.11	2.26
	min.	0.22	0.30	0.22	0.30	0.57	0.53
	max.	194.0	96.77	194.0	96.77	29.35	69.48

* SIZE is in 10^6 Dutch guilders, 1 US $ = 2.5 Dutch Guilders In 1926 (GIDS (1927)).

The existence and direction of differences between audited and non-audited industrial and trading companies for each of the variables are rather similar. Therefore results in the rest of this chapter will only be given for the entire sample.

The results for the variables SDS and CONV raise doubt as to their practical significance. Median and average values of SDS and CONV are zero and close to zero. Moreover, few companies in the sample

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have SDS >0 (27/141) or CONV >0 (5/141). SDS and CONV are dropped therefore in the rest of this chapter.

Table 4.4. shows results of the Mann-Whitney U test[11] for the remaining explanatory variables. A correction for ties was not made. Ties exist for NMO and B. Hence z-scores and probability levels in table 4.4. are conservative for those variables (Siegel (1958, pp.115-116)). Table 4.4. shows that DE, the total debt variable, as expected, is significantly higher for audited companies at the 0.1 significance level.

NOD, the number of outside directors is higher in the audited group of companies at almost the significance level of 0.1. The difference for CRED (private debt) is in the expected direction, but is only marginally significant[12]. Assets in place are, contrary to what was hypothesized, more important in audited firms, but the difference is only marginally significant. No differences between audited and non-audited firms exist, at conventional levels of significance, for SIZE, NMO (non-management ownership) and B (public debt).

Table 4.4.: Mann-Whitney U test results for the explanatory variables.

Variable	Entire sample (n=141)			
	audited (n=65)	not audited (n=76)	z-score	probability, 1-tailed
	Average Rank	Average Rank		
NMO	71.47	70.60	0.13	0.4483
NOD	76.85	65.99	1.57	0.1164*
B	71.55	70.53	0.15	0.4404
CRED	74.77	67.78	1.01	0.1562
DE	76.40	66.38	1.45	0.0735
AP	74.08	68.36	0.83	0.2033
SIZE	71.05	70.96	0.01	0.4960
* 2-tailed probability.				

4.6. Multivariate results

To assess the partial effect of each explanatory variable, holding other variables constant, and to test the combined explanatory power of contracting cost related variables, the following two cross-sectional Logit regressions were estimated:

$$AUD = a_0 + a_1NMO + a_2NOD + a_3B + a_4CRED + a_5AP + a_6SIZE \quad (2)$$
$$AUD = a_0 + a_1NMO + a_2NOD + a_3DE + a_4AP + a_5SIZE \quad (3)$$

Logit regression[13] is appropriate here given the 0-1 dependent variable AUD, which registers the presence (AUD=1) or absence (AUD=0) of an external independent auditor. In (3) DE replaces B and CRED.

Table 4.5. reports Logit estimates[14] (t-statistics) for the coefficients of the variables in both model (2) and (3). Table 4.5. documents in model (2) a significantly positive effect of NOD (number of outside directors) and, as expected, of CRED (proportion of private debt). The coefficient of the proportion of public debt (B) is positive and marginally significant in this multivariate analysis. In model (3) the result for NOD is again present. Also, the coefficient of the leverage variable DE is significantly different from zero at the 0.1 significance level. Partial effects of the other variables are not significant at conventional levels in either model.

The performance of the complete models is weak. McFadden's pseudo-R^2 (see Maddala (1988, p. 279)) is low. The percentage of correct predictions, using the coefficients in both models to calculate the probability of each observed firm having an independent auditor and using 0.5 as a cutoff point, is 59.6% for model (2) and 60.2% for model (3). The null hypothesis that the explanatory variables taken together do not affect the dependent variable cannot be rejected at conventional significance levels, for both models[15]. Multicollinearity does not pose a problem. Table 4.6. gives the R_i^2 scores for both models. R_i^2 is the squared multiple correlation coefficient between the ith explanatory variable and the others, suggested in Maddala (1988, p.227) as a multicollinearity diagnostic. None of the R_i^2 in table 4.6. is high.

Table 4.5.: Multivariate results: Logit estimates, t-statistics, and p-values for both models.

MODEL (2)				
Variable	**Predicted Sign**	**Coefficient**	**t-statistic**	**p-value, one tailed**
constant	(?)	-1.629	2.092	0.036[#]
NMO	(+)	.276	0.467	0.320
NOD	(?)	.130	1.700	0.089[#]
B	(+)	1.323	1.000	0.159
CRED	(+)	1.161	1.380	0.084
AP	(-)	.436	0.611	0.271
SIZE*	(+)	-.003	0.323	0.373

[#] two tailed p-value.
McFadden's pseudo-R^2 : 0.03, percentage correctly classified: 59.6%, Chi-Square: 6.452, probability level 0.374 .

MODEL (3)				
Variable	**Predicted Sign**	**Coefficient**	**t-statistic**	**p-value, one tailed**
constant	(?)	-1.613	2.102	0.036[#]
NMO	(+)	.251	0.454	0.325
NOD	(?)	.130	1.699	0.089[#]
DE	(+)	1.196	1.515	0.065
AP	(-)	.452	0.641	0.261
SIZE*	(+)	-.003	0.309	0.379

[#] two tailed p-value.;
McFadden's pseudo-R^2 : 0.03, percentage correctly classified: 60.2%, Chi-Square: 6.438, probability level 0.266.
* SIZE is in 10^6 Dutch Guilders.

Table 4.6.: Squared multiple correlation coefficient between the ith explanatory variable and the other explanatory variables, for both models.

Model (2)	Model (3)
R^2 (NMO) = 0.172	R^2 (NMO) = 0.053
R^2 (NOD) = 0.040	R^2 (NOD) = 0.039
R^2 (B) = 0.253	R^2 (DE) = 0.042
R^2 (CRED) = 0.123	R^2 (AP) = 0.020
R^2 (AP) = 0.047	R^2 (SIZE) = 0.044
R^2 (SIZE) = 0.064	

4.7. Other explanations of the demand for external auditing

Other factors, outside the contracting framework outlined above, have been suggested as explanations for external auditing demand. This section considers a number of these factors.

Demand for an external auditor could be due to loss-of-control problems inside hierarchical organizations such as companies[16]. Abdel-khalik (1989) measures hierarchical loss-of-control by the logarithm of Total Assets, and finds a significant effect of this firm size variable on the demand for an external audit for privately owned U.S. firms. However the effect of firm size was found to be insignificant on the basis of this chapter's sample.

Chow (1982) suggested an investigation of the effect of disaggregation by industry, to control for the effect on the demand for auditing of differences in operational characteristics of firms. Table 4.7.,panel a,

Table 4.7.: Industry disaggregation and demand for external auditors.

Panel a:			
industry	**audited**	**not audited**	**total**
Industrial companies	55	63	118
Trading companies	10	13	23
total	67	74	141
(Source industry classification, GIDS (1927))			

Panel b:			
Industry	**audited**	**not audited**	**total**
Food,drink and tobacco	21	15	36
Shipbuilding,metal and wood manufacture	12	23	35
Construction	3	3	6
Textiles	4	4	8
Chemicals	4	5	9
Electrical power, gas, water	2	4	6
Trade and transport	12	14	26
Miscellaneous	7	8	15
total	65	76	141
(Source industry classification, Sternheim (1934))			

disaggregates the sample into industrial and trading companies. Panel b disaggregates the sample into 8 industries.

Both panels in table 4.7. reveal very little effect of disaggregation by industry on the demand for external auditing.

Signalling, reduction of information assymetry between management and the capital market, is another potential explanation of the demand for external auditing (see, Francis and Wilson (1988,p.668) and Whittred and Zimmer (1988,p.27)). In this chapter two variables are used to probe this explanation:

- NEWISSUE: publicly issued shares or debt within the previous five calender years (1/1/1922 - 31/12/1926) as a fraction of 1926 SIZE (book value) (source: OSS (1928))
- REORG: financial reorganizations, that is reductions in the par-value of paid-in capital, between 1915 and 1925 (inclusive) (source: Mey (1946, appendix II) and/or GIDS (1927))[17].

In both situations an external auditor may have signalling value; signalling higher expected cash flows (see: Bar-Yosef and Livnat(1984)).

Table 4.8. gives results for NEWISSUE an REORG (panel a and b). The top panel shows that NEWISSUE does not effect auditor demand.

Table 4.8.: New issues and financial reorganization and the demand for external auditors.

Panel a: New issue of debt and/or equity (between 1/1/1922 and 31/12/1926) as a fraction of fiscal year 1926 Total Assets (book value).			
		audited (n=65)	not audited (n=76)
NEWISSUE*	mean	0.069	0.060
	S.D.	0.155	0.143
	median	0	0
	min.	0	0
	max.	0.800	0.980

* Mann Whitney U test, z-score=0.05, not significant at conventional levels.

Panel b: Financial reorganizations and demand for external auditors.			
	audited (n=65)	not audited (n=76)	total
REORG=yes	13 (10.6)	10 (12.3)	23
REORG=no	52 (54.4)	66 (63.6)	118
total	65	76	41

(expected frequency)

Visual inspection of the bottom panel reveals the absence of an effect of financial reorganizations on the demand for external auditing.

Arguably, NEWISSUE and REORG are also contracting related variables. However, note that these variables register events spaced in time, and that it is difficult to explain why they would lead to contracting related demand for auditing, except for the time surrounding the events. That is, in issue prospectuses and at financial reorganizations meetings with shareholders. Inclusion of NEWISSUE and REORG in the Logit models was not attempted therefore.

4.8. Summary and discussion

The results in this chapter are similar to those in Chow (1982). They show that contracting costs of debt affect the external auditor engagement decision, and that, more specifically, the proportion of private debt is an important variable. However, firm size, public debt, assets in place and non-management ownership share have little effect. Of course, measurement of the firm specific management ownership variable used in this chapter is still not ideal.

The finding in this chapter, that the presence of auditors and the existence of larger boards of outside directors coincide, suggests that if they are monitoring devices, they are complementary[18].

Variables chosen on the basis of non-contracting related explanations of external auditor demand do not have much explanatory power.

However, given the weak complete models results, to some extent the question remains: why do companies engage external auditors in an unregulated environment?

Still other factors may be at work. For instance, two events related to the first world war have triggered in the Netherlands an upsurge in the demand for auditor expertise[19]. During that war a special war tax on profits was introduced and there also existed a maritime blockade of Germany by the U.K.. Both events led to a demand for auditors ,as tax advisors, and as controller for the British to prevent transit of goods through the Netherlands, that had remained neutral. Once inside companies in either or both capacities, external auditors could have taken on the task of certifying financial statements as well. Note, that completion of such an explanation requires either a market

inefficiency or a neutral mutation argument (in the sense of Miller (1977)).

Future research should look at the composition of private debt in relation to demand for external auditors. Possibly banks as creditors are a driving force. A further decomposition of the private debt variable was not feasible in OSS(1928). Also direct measurement of (non-)management ownership share would improve confidence in the results.

Appendix 4.A. Names of companies and auditors: 141 Dutch companies in 19261 = signature of auditor present.

1 = signature of auditor present.
2 = auditor mentioned, no signature.
* = not traceable to audit firm.

Algemeene Nederlandsch-Indische Electriciteit Maatschappij	0	
Algemene Norit Maatschappij	2	
Allan & Co.'s Kon. Ned. Fabrieken...	1	D. Eggink
Beiersche Bierbrouwerij "De Amstel"	0	
Lettergieterij "Amsterdam" v/h N.Tetterode	1*	W.F. Van Tulder
Amsterdamsche Droogdok-Maatschappij	0	
Amsterdamsche Superfosfaatfabriek	1	A.E. Meyer, J.Horchner
Verffabrieken Avis	1	J.B. Kamperdijk
Batava Margarine Fabrieken	1	J. Nijst & Co.
N.V. Van den Bergh's Fabrieken	0	
Van den Bergh's Stoomschoenenfabriek	1	J.A. van Nimwegen
Arnold I. van den Bergh's Emballage-Fabrieken	1	Acc.Kant. Dr M. Smith
Van Berkel's Patent	1	J.J.Moret, Wm.K. De Brey
Machinefabriek "Breda" (v/h Backer & Rueb)	2	L. van Rhijn
Burgerhout's Machinefabriek en Scheepswerf	1	J. Beerenberg
Calve-Delft	0	
J.A.Carp's Garenfabriek	1	A.E. Meyer, J.Horchner
Carton- en Papierfabriek v/h W.A.Scholten	1	Johs. Doornbos
Centrale Suiker Maatschappij	1	Van Dien, Van Uden & Co.
Delftsche Leerlooierij en Drijfriemenfabriek	1	Accountants & Trustee's kantoor G.A. Gieseler
Dordrechtsche Metaalwarenfabriek v/h Wed. J.Bekkers	1	J.C. Post
Bierbrouwerij "De Drie Hoefijzers"	0	
Eerste Nederlandsche Kogellager-en Schroevenfabriek Enkes	1	Acc.Kant. Wm.K. De Brey
Electromotorenfabriek "Dordt"	1*	W.G. Gelton
Metaalbuizenfabriek Maatschappij "Excelsior"	0	
Maatschappij voor Scheeps-en Werktuigbouw "Feyenoord"	0	
Bierbrouwerij en Azijnmakerij "De Gekroonde Valk"	0	
N.V. Gerofabriek	1	J. Groot (NIVA)

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Koninklijke Stearine Kaarsenfabriek	1	A. Tresfon
P. de Gruyter & Zoon	0	
Hero Conserven Breda	1	Acc. Kant. van H. Sparrius (W.J. - Brenkman, NIVA)
W.A. Hoek's Machine- en Zuurstoffabriek	0	
Holland, Scheepswerf en Machinehandel	0	
Stoom-Meelfabriek "Holland"	2	Bianchi & Co.
N.V. Hollandia-Fabrieken Kattenburg & Co.	0	
Hollandia, Hollandsche Fabriek van Melkproducten..	2	
Hollandsche Cacao- en Chocoladefabrieken v/h Bensdorp & Co.	1	Amsterdamsch Trustee's kantoor, Afdeling Accountancy, Lucas
Hollandsche Draad- en Kabelfabriek	0	
Hollandsche Kunstzijde Industrie	1	Acc.Kant. Wm.K. De Brey
Hollandsche Overman Banden Maatschappij	1	Acc.Kant. P. Klijnveld (M.F.C. van Teeseling)
Hollandsche Vereniging tot Exploitatie van Margarinefabrieken	0	
Industrieele Maatschappij	0	
Internationale Gewapend Beton-Bouw	2	Wm. K. De Brey
Anton Jurgens' Vereenigde Fabrieken	1	Martin, Farlow & Co., incorporated accountants
Koninklijke Fabriek van Rijtuigen en Spoorwagens J.J. Beynes	0	
Koninklijke Nederlandsche Edelmetaal Bedrijven Van Kempen, Begeer & Vos	0	
Koninklijke Nederlandsche Fabriek van Gouden en Zilveren Werken Gerritsen & van Kempen	1*	S.P. Bosch
Koninklijke Nederlandsche Grofsmederij	0	
Koninklijke Nederlandsche Papierfabriek	0	
Koninklijke Nederlandsche Zoutindustrie	1	Wm.K. De Brey
Koninklijke Pharmaceutische Fabriek v/h Brocades & Stheeman	0	
Koninklijke Stoomschoenenfabriek A.H. van Schijndel	0	
Koninklijke Tabak- en Sigarenfabriek, v/h G. Ribbius Peletier Jr.	0	
Koninklijke Vereenigde Tapijtfabrieken	1	B.I. Eelkerna (NIVA)
Brood- en Meelfabrieken Maatschappij "De Korenschoof"	0	
Stoom Chocolade- en Cacaofabriek "Kwatta"	1	Eerste Nederlandsche Accountantskantoor, J.F. Starke
Glasfabriek "Leerdam"	2	Centraal Accountantskantoor Utrecht, Mr. P.H.G. Dop
N.V. De Lever's Zeep Maatschappij	1	Acc.Kant. Brugmans
A.N. de Lint's Industrie- en Handelsmaatschappij	0	

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W. van der Lugt & Zoon's Stoomkuiperij en Kistenfabriek	1	Accountantsbureau Dr M.F.J. Smith
N.V. Lyempf	1	Accountantskantoor N. De Kramer & V. De Ploeg (N. De Kramer, K. Arkema)
Lijm- en Gelatinefabriek Delft	0	
Machinefabriek en Scheepswerf van P.Smit Jr.	0	
Maekubee	0	
Meelfabrieken der Nederlandsche Bakkerij	1	G.Ph. Wielenga (NIVA), Wm. Haaksma (NIVA)
L.A. Moll's Automobielen-en Technische-Industrieele Maatschappij	1	Accountantskantoor Schlimmer & Winters (H. Winters)
Chemische Fabriek Naarden	0	
Nederlandsch-Indische Gas-Maatschappij	0	
Nederlandsch-Indische Portland Cement Maatschappij	0	
Nederlandsche Fabriek van Bronswerken	1*	G.J. Annegarn (Den Haag)
Nederlandsche Fabriek van Verduurzaamde Levensmiddelen	1	J. De Tombe (NIVA)
Werkspoor	0	
Nederlandsche Gist- en Spiritusfabriek	0	
Nederlandsche Gutta-Percha Maatschappij	1	Acc.Kant. van J.H. Hoogenboom & R.A. Dijker (R.A. Dijker)
Nederlandsche Huistelefoon Maatschappij	2	
Nederlandsche Kabelfabriek	2	Eerste Ned. Acc. Kant.
Nederlandsche Kunstzijdefabriek	0	
Nederlandsche Staalfabrieken	1	Frese & Hogeweg
Noorsche Gas-Maatschappij	1	J. Groot (NIVA)
Industrieele Maatschappij Palembang	1*	H. Van Veen
Philips' Gloeilampenfabrieken	1*	L. De Vries
Houtindustrie Picus	0	
N.V. Pope's Metaaldraadlampenfabriek	1	H. Winters
Maatschappij tot Exploitatie der C.G. Rommenholler'sche Koolzuur- en Zuurstofwerken	0	
Rotterdamsche Droogdok-Maatschappij	1	Accountantskantoor van J.H. Rosenboom & R.A. Dijker
Rouppe van der Voort's Industrie- en Metaalmaatschappij	1	Accountantskantoor van J. Nijst & Co. (Bak, Bernsen)
De Rutten's Bierbrouwerij "De Zwarte Ruiter"	1	Accountantskantoor van W. Kreukniet & R.A. Dijker (Dijker)
Frank Rijsdijk's Industrieele Ondernemingen	1	Accountantskantoor van W. Kreukniet & R.A. Dijker (W.J. Brenkman)

Koninklijke Maatschappij "De Schelde"	1	Accountantskantoor Burgmans (J.Th. van Douwe)
W.A. Scholten's Aardappelmeelfabrieken	1	Accountantskantoor van Johs. Doornbos (Johs. Doornbos)
Droogdok-Maatschappij Soerabaja	0	
Handelsmaatschappij R.S. Stokvis & Zonen	1	Eerste Nederlandsche Accountantskantoor J. Moret & J.F. Starke
Machinefabriek Gebr. Stork & Co.	0	
Tabaksindustrie v/h Gebr. Philips	1	Frese & Hogeweg
Droogdok-Maatschappij Tjandjong Priok	0	
Tilburgsche Waterleiding-Maatschappij	0	
Twentsch Centraal Station voor Electrische Stroomlevering	1	Acc.Kant. Meyer, Horchner
U.Twijnstra's Oliefabrieken	2	Accountantskantoor van De Kramer & Van der Ploeg
Unie van IJsfabrieken	1	Kantoor H.J.Vooren Belastingzaken en Accountancy (K. Blom)
Utrechtsche Asphaltfabriek	1	P. Slagman jr. NIVA
De Vereenigde Blikfabrieken	1	Accountantskantoor P.Klijnveld (J.H. Damman)
Vereenigde Chemische Fabrieken	1	Frese & Hogeweg
Vereenigde Glasfabrieken	1	L. Van Rhijn NIVA
Vereenigde Hollandsche Sigarenfabrieken	1	H. Burgmans Czn.
N.V.Vereenigde Kleedingmagazijnen	1	Frese & Hogeweg
Vereenigde Koninklijke Papierfabrieken Van Gelder	0	
Verenigde Nederlandsche Chamottefabrieken	1	S. Myerson, Deventer
Vereenigde Nederlandsche Rubberfabrieken	1*	C. van Geel
N.V.Verschure & Co.'s Scheepswerf en Machinefabriek	1*	P.G. Van Berge
Victoria, Egyptische Cigaretten Maatschappij	0	
P.F. van Vlissingen & Co.'s Katoenfabrieken	0	
Naamloze Vennootschap v/h G.van Voorneveld	0	
Wester-Suikerraffinaderij	1	Van Dien, Van Uden & Co.
Wilton's Dok- en Werf-Maatschappij	0	
IJselwerf	0	
Maatschappij tot Exploitatie van Zeepfabrieken	1	Accountantskantoor Burgmans, J.Th. van Douwe
Zuid-Hollandsche Bierbrouwerij	1	Accountantskantoor Burgmans, J.Th. Van Douwe
Maatschappij voor Zwavelzuurbereiding v/h G.T.Ketjen & Co.	1	Accountantskantoor A.E. Meyer, J. Horchner

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Algemene Vruchten Import Maatschappij	1	M. Pimentel
Amsterdamsch Kantoor voor Indische Zaken	0	
Crediet- en Handelsvereeniging "Banda"	1	J. Lubsen Jzn.
Borneo Sumatra Handel Maatschappij	1	Accountantskantoor van J.H. Rosen-boom en R.A. Dijker (Dijker)
Curacaosche Handel-Maatschappij	0	
Handel-Maatschappij "Deli-Atjeh"	0	
Export-Maatschappij "Jacarta"	0	
Handelsmaatschappij Guntzel & Schumacher	0	
Handel- en Cultuurmaatschappij v/h Smidt & Amesz.	0	
Handelsvennootschap v/h Maintz & Co.	0	
Handelsvereeniging Holland	0	
Handelsvereeninging "Holland-Bombay"	1	Van Dien, Van Uden & Co.
Handelsvereeniging v/h Reiss & Co.	1	Elles & Hamelberg
Heijbroek & Co.'s Handelsmaatschappij	1	Van Dien, Van Uden & Co.
N.V. A.J.ten Hope's Handel Maatschappij	1	J. Beerenberg
Internationale Handels- en Credietmaatschappij	1*	J. van der Zouwe, Heemstede
Ned.-Ind.Mij. tot voortzetting der zaken Van der Linde & Teves en R.S.Stokvis & Zonen	1	Bianchi & Co.
Nieuwe Afrikaansche Handels-Vennootschap	1	J.J. Moret
Import- en Exportmaatschappij "Oranje-Nassau'	0	
L.E.Tels & Co.'s Handelsmaatschappij	1	L. Van Kampen

Notes

1. I am grateful, for their help with this chapter, to Mrs. A. Stichova and Dr J.Brezet of the EUR financial statements archive in Rotterdam. J.Seegers, of the 'Economisch-Historische Bibliotheek' in Amsterdam, kindly made available to me successive early versions of the Amsterdam Stock Exchange listing requirements. I am also grateful to L.Van Kampen and A. Van Rietschoten for first hand background information on auditing in the Netherlands in the twenties and thirties. Jan Schoonderbeek deserves my thanks for arranging these contacts and for his encouragement. I am endebted to Jan van de Poel, Rick Hayes and Steven Maijoor for helpful discussion and suggestions. Constructive comments on an earlier version of this chapter were made Marc Jegers, Laury Bollen, Henk Brink and Gerard Mertens.

2. Note that limited liability companies in the Netherlands have, and have always had if present, separate boards of outside directors.

3. Francis and Wilson (1988) reviews, and is itself a contribution to, empirical work on the question of what explains firms' demand for a higher quality external audit (in a regulated environment). Pincus, Rusbarsky and Wong (1989) analyse voluntary formation of internal corporate audit committees with US data. Bradbury (1990) does the same with New Zealand data. All three papers use contracting cost related explanatory variables. The first two papers report some positive results, Bradbury's findings are negative.

4. Since 1909; see 'Reglement'(1909).

5. The Dutch auditing profession organised itself at about the same time as the American. In 1895 the first professional society of auditors was founded (NIVA = 'Nederlands Instituut van Accountants' or Dutch Institute of Auditors). 1926 therefore captures the accounting profession in the U.S. and the Netherlands at about the same age. Sternheim (1933) documents that in a 1932/33 sample of mostly listed Dutch industrial and trading limited liability corporations, 52% were externally audited. This provides an interesting benchmark.

6. GIDS = 'Gids bij de prijscourant van de vereeniging van den effec-tenhandel te Amsterdam'.

7. OSS = Van Oss' Effectenboek, part I. Dr Brezet kindly lent me an EUR archive spare copy of OSS(1928).

8. Note that signature is used to denote those cases in which an auditor name was printed, either under balance sheet or profit or loss statement, or under a seperate auditors' report.

9. The distinction was made on the basis of either the EUR archive financial statements, or on the basis of the membership lists, the nearest to 1926 available, of the three main professional auditor societies existing in the Netherlands in 1926. Membership lists are available in the NIVA archive at the 'Rijksarchief' in The Hague. Eliminating auditors not traceble to an auditor firm, corrects for, possibly not entirely correctly, internal auditors certifying the financial statements of a firm.

10.In 1926 corporations that had obtained a listing after 1919 were required to list at least 1/4th of issued shares. No threshold existed for corporations that had obtained a listing before 1919, the majority of firms used in this chapter (source: successive versions of ASE listing requirements available in the 'Economisch-Historische Bibliotheek' in Amsterdam). The decision on the fraction of shares issued to be listed was therefore essentially the shareholders' decision. Although firm-specific, and in that sense an improvement over the Chow (1982) management's ownership variable (Chow imputed industry level data to his sample firms), the measure used here is still not ideal, since even listed shares may end up in the hand of a few parties with ties with management.

11. A non-parametric test is used. See chapter 3 for a discussion of the distributional properties of financial ratios.

12. On the use of significance levels in hypothesis testing obviously a 'liberal' view is taken here and in the discussion of the multivariate results. See Maddala (1988, section 2.9., especially points 6 and 9) for a similar view.

13. The Logit model appears to be robust (Maddala (1983, p.27)) in the presence of non-normally distributed explanatory variables. See chapter 3 for a study of distributional properties of financial ratios.

14. Probit estimates were very similar. OLS estimates showed identical signs and similar t-statistics.

15.Results for individual explanatory variables and the complete model were very similar for Logit regressions with the other two presence-of-auditor definitions as dependent variable.

16. An argument also made by A. Van Rietschoten (oral communication).

17. Both variables were also suggested by L.Van Kampen (oral communication).

18. An alternative explanation of this result is that a board of directors is not always a monitoring device, but measures antagonism among shareholder factions. Larger boards of outside directors could reveal stronger antagonism, hence a need for an auditor as arbitrator. This may especially be the case following (recent) mergers and in firms with still, partly, family share ownership. Board membership may in such cases be a reflection of antagonism between factions representing the firms that merged or factions with the 'family' shareholders. In firms dealing with several credit institutions a similar situation may arise. However more detailed data are needed to probe this reasoning.

19. The importance of the first event for the demand for the expertise of auditors is mentioned in De Vries(1985, p.113). A. Van Rietschoten (oral communication) stressed the need for consideration of the second event.

Chapter 5

Research opportunities in economics based empirical financial accounting research in the Netherlands

5.1. Introduction

The purpose of this chapter is to reflect on further empirical research opportunities in each of the three subject areas in chapters 2, 3 and 4. Given the relative paucity of empirical financial accounting research in the Netherlands, it is not difficult to suggest a list of unexplored empirical financial accounting research possibilities. That is what this chapter does. The organizing principle is that these possibilities for further research are linked to chapters 2, 3 and 4. The last section of this chapter is a reflection on the overall potential of economics based empirical financial accounting research.

5.2. Economic determinants of compliance with financial accounting regulations

There exists a sizable literature on the economic effects of financial accounting regulation. Chow (1983) summarizes studies upto 1983. These effects can take many forms. Regulation may affect stock and bond prices and have various forms of real impact. There can be effects on production (e.g. through competitive disadvantage effects of mandated disclosure of sales segmentation), investment (e.g. as a

consequence of mandating expensing of all R&D expenses) and financing decisions of companies (as a consequence, e.g., of changes in mandated accounting techniques for leases). There can be effects on accounting method choice in the context of income smoothing, and so on.

While such studies are valuable, their implicit assumption is that companies comply with the regulations issued. This needs not be the case, as is demonstrated in chapter 2. Maijoor (1991), another example, documents a massive evasion of new Duch financial reporting requirements in 1970 (WJO 1970, see chapter 1). Dutch companies evaded financial accounting regulations by switching legal form. Chapter 2 shows apparent non-compliance among Belgian companies, lowering the quality of their financial statements. At present little is known about what drives non-compliance. Embryonic contracting cost or agency theoretic arguments are used in an attempt to explain observed non-compliance (see chapter 2. and Kinney and McDaniel (1989)). Maijoor (1991, p.155) is more articulate here, but his work is also falls short of a direct test of non-compliance with contracting cost theory based explanatory variables. Indeed, theoretical work in this area could be made much more explicit. Section 2.6.2. of chapter 2. lists firm characteristics that might explain compliance. One empirical research possibility (suggested in Maijoor (1991)) is to try to explain, using table 2.8. in chapter 2., why quite a few Dutch companies fail to file on time their financial statements with the Dutch chambers of commerce as required by existing Dutch financial accounting legislation. Poorthuis (1990, p.55) estimates that in 1984 up to 45% of the companies mandated to file (under Title 9) where not complying at all, or very late, in the Netherlands. More descriptive and positive empirical research in this area would be highly desirable (see for a first serious attempt, the very recent paper of DeFond and Jiambalvo (1991)). Evidently such research would also have to model the role of the external auditor in firm compliance with financial accounting regulation. This is particularly true in an environment in which the auditor checks compliance (see the recent changes in that direction in the Dutch auditor's statement text).

5.3. Economic determinants of distributional properties of financial ratios

There is a need for research on the cross-sectional distribution of financial ratios to move into a next phase. The distributional properties

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of ratios are by now well documented as is evident in chapter 3. What are needed now are theories of ratio distribution form. Lev and Sunder (1979) already envisaged the need for such a change, and Foster (1986, p.120) points out that " .. [a]n important but little researched area is the determinants of the distributions of ratios". The plural 'theories' is used here advisedly since for different ratios different strands of theory will probably have to be used.

As an illustration, consider two of the seven classes of financial ratios that Foster (1986, ch.3) discusses: (1) profitability ratios, and (2) capital structure ratios.

(1). Theoretical and empirical research in industrial economics suggests several firm characteristics that may explain the form of the distribution of profitability ratios. One prominent ratio in this respect is return on equity (net-income/equity).

Scherer and Ross (1990), a leading industrial organization textbook, posit the following functional relation explaining firm level profitability:

$$\text{return on equity}_i = f(s_i, C_j, B_j, X_{ij}, OS_{ij}, D_j, e_i),$$

where s_i is market share of firm i, C_j measures seller concentration in market j in which firm i is active, B_j are entry barriers to that market, X_{ij} measures the extent of coordination among firm i and the other industry j incumbent firms, OS_{ij} represents other structural factors in market j such as risk, D_j measures the state of demand in market j, and e_i is an error term. All factors with i as subscript would be determinants of the shape of the distribution of return on equity over the firms in market or industry j.

(2). Theoretical and empirical research in financial economics is groping towards a theory of capital structure. A goal that is not easy to reach (see Myers (1984)). In a recent paper Harris and Raviv (1991) list in detail all theory driven suggestions (one of the theories involved is agency or contracting cost theory) of leverage determining firm characteristics (see their table II). They also discuss what empirical material, testing the effects of theoretically leverage determining factors, there is. Knowledge of the dispersion of the important firm level determinants of leverage will help explain the distributional properties of the leverage ratio.

Work along these lines will also shed light on the process of ratio formation itself. It will help to identify those settings where size

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deflation of financial statement items of interest is appropriate, and where not.

5.4. Economic determinants of the demand for external auditing in an unregulated environment in the Netherlands: a time-series analysis for 1895-1960

The results in chapter 4, notably the differences in results with Chow (1982), suggest the need for more research on the demand for independent external auditing in the Netherlands.

The first Dutch professional society of auditors, NIVA, was formed in 1895 (De Vries, 1985, p.44), 41 years after the first Scottish society, 25 years after the first English society , 8 years after the first U.S. society (Watts, Zimmerman, 1983, p.632). An independent audit of annual financial statements, however was only mandated in 1961 in the Netherlands for listed companies, for financial statements in prospectuses, by the Amsterdam Stock Exchange. For all open limited liability companies (all 'naamloze vennootschappen' and the larger 'besloten vennootschappen' an independent audit was only mandated by law in 1971. This gives researchers in the Netherlands an unusually long period, at the least until 1961, to study the development of the auditing profession in an unregulated environment. Audits became compulsory for companies, in England in 1900 (Edwards (1989, ch. 11)), in the U.S. in 1933/1934 (Chow, 1982).

Growth in the number of privately owned for-profit business companies, joint stock companies with limited liability, in the Netherlands, also accellerated , towards the end of the nineteenth century. The use of the corporate form, limited liability joint stock company, suggests management no longer supplying all of the owners' equity. Watts (1977), Chow (1982), Watts and Zimmerman (1983) and chapter 4 have argued that managerial incentive problems are created in such an environment, leading to the engagement of some kind of auditing. When the number and importance of such firms increase, more audits are required. De Vries (1985), in his admirable history of Dutch professional auditing upto 1935, has also suggested such a link between the rise of the joint-stock company and the creation and growth of professional societies of auditors. A study presenting empirical material on the intertemporal covariation between professional independent auditing and the extent of joint stock company formation in the

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Netherlands over the period 1895-1960 seems feasible, with NIVA archive material on the number of active independent auditors each year and Central Bureau of Statistics (CBS) annual data on the number of limited liability companies and their average size in terms of capital supplied.

Evidently other factors, such as changes in the degree of corporate leverage over time and possibly changes in the Dutch corporate tax law (see the final sections of chapter 4.) would need to be documented as well. Econometric causality tests could then be used to investigate whether auditor demand is caused by the independent variables mentioned (see Madalla (1988, section 9.4.) for a short introduction to causality tests).

Research in this area is important given the ever growing number of companies in the Netherlands, and within the EC member states in general, for which an external audit is mandated.

5.5. The potential of economics-based empirical financial accounting research

As explained in chapter 1 economics based financial accounting research studies financial reporting phenomena as they exist in two markets:
(i) the market for financial accounting and disclosure techniques;
(ii) the market for financial accounting information.

The aim of this research is to explain the real-world phenomena as they can be observed accross the entire domain of financial reporting activities by firms.

This kind of financial accounting research originated in the late 1960s and its rise in importance in the literature occured against the background of a strong tradition of financial accountuing research with a 'design' perspective.

The advent of theory based financial accounting research was intimitaly coupled with a shift in the accounting research literature towards rigorous empirical testing of theoretically derived hypotheses.

This shift in the literature towards theory based empirical work has shown several strong points compared with previous, and also contemporaneous, research done from a design perspective.

(i) It stresses the importance of an understanding of financial accounting practice. This aim of an understanding of phenomena strengthens the ties of financial accounting research with research done in other areas of applied economics. This creates possibilities of cross-fertilization. The contracting cost based theoretical explanation of accounting and disclosure rule choice is a clear example.

(ii) It creates the possibility of theoretical unification of attempts to understand seemingly diverse financial reporting phenomena. It leads to a situation in which the same theoretical tools can be used to model practices on the demand side of the accounting information market, as well as on the supply side of the accounting techniques market. These tools can also be used to model the effect of regulation of financial reporting in both markets.

(iii) It has the potential to inform work done in financial accounting research from a 'design' perspective. Several examples were given in chapter 1. This point deserves stressing. While the essays in this dissertation are empirical, ultimately financial accounting research as a field of study, needs both theory based empirical work ('social sciences' perspective) as well as work done from a 'design' perspective, but without preconceptions.

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Samenvatting

Drie centrale onderzoeksvragen op het terrein van externe berichtge-
ving (Financial Accounting) door ondernemingen zijn:
1. welk gebruik wordt gemaakt van, wat bepaalt de vraag naar,
   externe berichtgeving,
2. wat bepaalt de vraag van ondernemingen naar technieken, regels
   van externe berichtgeving en wat bepaalt de keuze uit van onderne-
   mingen uit beschikbare technieken,
3. wat bepaalt het aanbod van beschikbare technieken ?

De drie vragen gaan over twee markten waar informatie het verhan-
delde goed is: de markt voor externe berichtgeving met gebruikers als
vragers en ondernemingen als aanbieders en de markt voor technieken
van externe berichtgeving met de ondernemingen als vragers en de
ontwerpers van technieken (academici, accountants) als aanbieders.
Indien, en dat is zo in veel westerse economieën, de overheid regule-
rend optreedt op het gebied van externe berichtgeving, heeft dat voor
beide markten gevolgen. Het is het gebeuren op beide markten dat de
verschijnselen oplevert, primair in de vorm van jaarstukken van
ondernemingen, die het vakgebied van externe berichtgeving uitma-
ken.

Internationaal is in de literatuur een beweging te zien in de richting
van pogingen tot een (economische) verklaring van deze verschijnse-
len. Dat betekent een beweging weg van de overheersende aandacht
die tot voor kort in dit vakgebied bestond voor de aanbodzijde van de
markt voor technieken van externe berichtgeving. In hoofdstuk 1 van
deze dissertatie wordt betoogd dat dit een gelukkige ontwikkeling is.
Niet omdat het ontwerpen van technieken van externe berichtgeving

geen interessant onderwerp is, maar omdat deze ontwikkeling, onder-meer, de mogelijkheid creëert om beter geïnformeerd, vrij(er) van vooroordelen, te ontwerpen. De drie hoofdstukken in deze dissertatie pogen een bijdrage te leveren aan het beschrijven en verklaren van verschijnselen van externe berichtgeving.

Deze dissertatie omvat drie empirische studies. Twee van de drie studies zijn zeer gegevensintensief. Daarin wordt gebruik gemaakt van een groot computerbestand met jaarrekeningen van Belgische onderne-mingen. Bestanden van vergelijkbare omvang zijn in Nederland (nog) niet beschikbaar. Het beschikbaar komen van het jaarrekeningenbe-stand is een direct gevolg van de harmonisatie van de Belgische jaarrekeningwetgeving met de Europese Richtlijnen op het gebied van het vennootschapsrecht: de jaarrekeningrichtlijnen.

De eerste studie, hoofdstuk 2, bestudeert de kwaliteit van jaarrekening-gegevens in het bestand in de jaren van 1977 tot en met 1983. Ruim 10.000 jaarrekeningen in 1977, oplopend tot 18.000 in 1983, worden onderzocht op het voorkomen van logische fouten, rekenkundige fouten en gebreken in de verstrekking van gevraagde detailinformatie. Het gaat om jaarrekeningen van ondernemingen die tussen 1977 en 1983 50 tot 70% van de totale omzet van het Belgische bedrijfsleven voor hun rekening namen. Het percentage foutloze jaarrekeningen neemt in de beschouwde periode toe. Echter, in 1983 bevat 70% van de jaarrekeningen nog fouten: gemiddeld zijn dat er iets minder dan 2. In 1977 was het percentage foutloze jaarrekeningen maar 20%, met een gemiddeld aantal fouten van 3. Het gegevensbestand wordt samen-gesteld door een afdeling van de Belgische Nationale Bank. Deze afdeling brengt aangeleverde jaarrekeninggegevens zo veel mogelijk ongewijzigd over naar het bestand. Daardoor geeft het bestand ook een beeld van de mate waarin de betrokken ondernemingen regelge-ving op het gebied van jaarrekeningen in België naleven. Hoofdstuk 2 laat zien dat de kwaliteit van Belgische jaarrekeningen, en dus de mate waarin regelgeving terzake wordt nageleefd, positief varieert met ondernemingsomvang en, in mindere mate, met solvabiliteit (vreemd vermogen/totaal vermogen). Ook zijn stabiele verschillen in kwaliteit te constateren tussen bedrijfstakken. De kwaliteit van jaarrekeningen varieert niet met liquiditeit en winstgevendheid. Het hoofdstuk sluit af met een aantal theoretische beschouwingen over de gevonden regelma-tigheden, en een aansporing voor meer onderzoek naar de naleving van regelgeving m.b.t. jaarstukken. Gelet op de grote hoeveelheid duidende literatuur over de Europese jaarrekeningrichtlijnen, en de implementatie daarvan in de EG lidstaten, is het opvallend hoe weinig verklarend onderzoek er is naar de wijze waarop het bedrijfsleven deze regelgeving naleeft.

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Hoofdstuk 3 onderzoekt de kenmerken van verdelingen van financiële ratio's. De beschouwde periode is 1977-1981. Getoetst wordt de normaliteit en symmetrie van verdelingen van 11 gangbare financiële ratio's. De ratioverdelingen worden onderzocht op het 3-cijfer bedrijfstak niveau (de EG NACE bedrijfstakindeling wordt gebruikt) in rond de 70 bedrijfstakken binnen de be- en verwerkende nijverheid, en op niveau van 18 2-cijfer nijverheidssectoren in België. Verdelingen van 'ruwe' ratioscores worden onderzocht, evenals de verdelingen van op vier wijzen getransformeerde ratioscores. Als X de 'ruwe' ratio score is, zijn de gebruikte transformaties: log X, 1/X, wortel X en derdemachtswortel X. Het onderzoek leidt tot de bevinding dat ratioverdelingen op gedisaggregeerd bedrijfstakniveau en na transformatie (1 of meer) beduidend vaker normaal en symmetrisch verdeeld zijn. Dit is ondermeer van belang voor de keuze van statistische technieken bij onderzoek waarin financiële ratio's worden gebruikt. Een voorbeeld daarvan is het onderzoek naar modellen voor faillissement voorspelling. Ook voor intra-sectoriële vergelijkingen tussen ratioscores van individuele ondernemingen en een bedrijfstakgemiddelde, zijn de resultaten in hoofdstuk 3 van belang. Het hoofdstuk onderzoekt ook, voor het eerst in de literatuur, het persisteren van de vorm van ratioverdelingen. Dat blijkt vaak het geval te zijn in de beschouwde periode. Dit maakt de resultaten uit de doorsnede analyses relevanter.

Hoofdstuk 4 beschrijft een onderzoek naar de determinanten van de vraag naar externe controlerende accountants door Nederlandse beursgenoteerde ondernemingen. De gebruikte gegevens komen uit een periode (1926) waarin er geen verplichting tot externe accountantscontrole en maar een minimale jaarrekeningwetgeving bestond. Bij 65 van 141 onderzochte beursgenoteerde ondernemingen in 1926 was een externe accountant aanwezig. Theoretische inzichten op basis van een beschouwing over contractkosten in ondernemingen ('agency' of 'contracting cost' theorie) leiden tot de voorspelling dat de aanwezigheid van een externe accountant afhangt van 1. de mate waarin management geen aandeelhouder meer is, 2. de mate van financiering met vreemde middelen, 3. de activa structuur, en 4. ondernemingsomvang. Het effect van een alternatief middel om contractkosten te beheersen, de Raad van Commissarissen (RvC), op de vraag naar externe accountants wordt eveneens onderzocht. De resultaten geven aan dat de omvang van de RvC bij aanwezigheid van een accountant groter is. Dat wijst er op dat beide mechanismen van beheersing van contractkosten complementair zijn. Van de andere variabelen is het effect van solvabiliteit significant (en positief). Met name ook het effect van niet-genoteerde schulden. Een model met alle verklarende variabelen blijkt niet goed te werken. Het effect van enkele niet aan contract-

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kosten gerelateerde verklarende variabelen wordt ook onderzocht, overigens met weinig resultaat.

Deze dissertatie behandelt empirische vraagstukken uit verschillende deelgebieden van externe berichtgeving. Hoofdstuk 5 laat zien dat er in de hoofdstukken 2, 3 en 4 een gemeenschappelijke vraagstelling bestaat. Wat zijn de (economische) determinanten van de beschouwde fenomenen van externe berichtgeving ? Bovendien bevat hoofdstuk 5 nog enige voorstellen voor verder onderzoek op de gebieden die aangeraakt worden in hoofdstukken 2, 3, en 4.

Curriculum Vitae

Willem (Frederik Jan) Buijink werd in 1951 geboren in Utrecht. Hij slaagde in 1969 voor het eindexamen Atheneum in Etterbeek (Brussel, België). Hij studeerde Industrieel Ontwerpen aan het Nationaal Hoger Instituut voor Bouwkunst en Stedebouw te Antwerpen van 1969 tot 1974, en daarna, van 1974 tot 1977, Toegepaste Economische Wetenschappen (Bedrijfseconomie) aan het Rijksuniversitair Centrum Antwerpen (RUCA). Na een verblijf van drie maanden als 'post-graduate' student aan het Department of Design Research van het Royal College of Art in London, werkte hij als onderzoeksmedewerker aan de Rijksuniversiteit Gent en het RUCA. In 1981 werd hij wetenschappelijk medewerker (assistent) aan het RUCA. Hij verrichtte aan het RUCA voornamelijk industrieel-economisch onderzoek. In 1983 werd hem (samen met Marc Jegers) de twee-jaarlijkse onderzoeksprijs van de Vereniging voor Economie toegekend. Eind 1984 ging hij als Universitair Docent Berichtgeving naar de pas opgerichte economische faculteit van de Rijksuniversiteit Limburg in Maastricht. Hij verricht daar onderwijs en onderzoek op het terrein van Externe Berichtgeving. Sinds begin 1990 is hij (beoogd) Universitair Hoofddocent bij de Sectie Berichtgeving en Accountancy van de vakgroep Bedrijfseconomie en in april 1990 werd hij voorzitter van die sectie. In 1990/1991 was hij secretaris-generaal van de 'European Accounting Association' (EAA), en medeorganisator van het 14e jaarlijkse congres van de EAA in april 1991 in Maastricht. Sinds eind 1991 is hij het Nederlandse lid van het Executive Committee van de EAA.

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STELLINGEN

behorende bij het proefschrift

Empirical Financial Accounting Research

compliance with regulation, distributional properties of
financial ratios and demand for external auditing

Willem Buijink

1. De rol die banken hebben gespeeld bij het ontstaan en de groei van de vraag naar externe accountantscontrole is onvoldoende onderzocht (vgl. hoofdstuk 4).

2. Externe accountantscontrole en het toezicht door een Raad van Commissarissen zijn geen alternatieve mechanismen om contractkosten in ondernemingen te beheersen (vgl. hoofdstuk 4).

3. Aan het vóórkomen van fouten en onvolledige informatie in jaarstukken ligt geen toevalsproces ten grondslag (vgl. hoofdstuk 2 en [1]).

   [1] M. DeFond, J. Jiambalvo, Incidence and circumstances of accounting errors, in: Accounting Review, 1991, 66, 3, pp. 643-655)

4. Bezien over een reeks van jaren, persisteert de vorm van sectorale frequentieverdelingen van financiële ratio's (vgl. hoofdstuk 3).

5. Onderzoek naar de mate van mededinging op de markt voor accountantscontrole dat zich baseert op statische meting van aanbiedersconcentratie, leidt tot een duidelijke onderschatting van de werkelijke mate van wedijver in die markt (vgl. [2]).

   [2] W. Buijink, S. Maijoor, Entry, exit, market share mobility and seller concentration in the Dutch audit market: 1968-1990, 1992, working paper, FdEW, RL

6. Salamon (in [3]) gebruikt een berekeningswijze voor de 'Cash Recovery Rate' (CRR), die ten onrechte voorbij gaat aan de wel door hem genoemde neiging van grotere ondernemingen om relatief vaker versneld af te schrijven (vgl. [4]).

   [3] G. Salamon, Accounting rates of return, in: American Economic Review, 1985, 75, 3, pp.495-504.
   [4] W. Buijink, M. Jegers, Accounting rates of return: comment, in: American Economic Review, 1989, 79, 1, pp.287-289.

7. De stelling van Baruch Lev (in [5]), dat er sprake is van een: " ... universality of similar disclosure regulations [van jaarstukken van ondernemingen] accross practically all free market economies." , is onjuist.

   [5] B. Lev, Toward a theory of equitable and efficient accounting policy, in: Accounting Review, 1988, 63, 1, pp.1-22.

8. Het accountantsberoep heeft in Nederland een andere ontwikke-
ling gekend dan in België. Dit is terug te voeren op verschillen in
de inrichting van de economie, bijvoorbeeld berustend op verschil-
len in "rent seeking opportunities" (vgl. [6]), en niet op een cultu-
reel onderscheid.

*[6] G. Tullock, Rent seeking, in: J. Eatwell, M. Milgate, P. Newman, (eds.), The New
Palgrave: a dictionary of economics, 1987, Macmillan, London.*

9. R. Watts en J. Zimmerman onderscheiden in [8] in een ongeregu-
leerde markt van technieken van externe berichtgeving meerdere
bronnen van vraag. Ze gaan echter ten onrechte voorbij aan de
vraag die uitgeoefend wordt door de beroepsverenigingen van
accountants.

*[7] R. Watts, J. Zimmerman, Positive accounting theory, 1986, Prentice Hall, Englewood
Cliffs.*

10. Externe berichtgeving is, evenals de Art Déco, grenzeloos.

11. "The modern [academic] conference resembles the pilgrimage of
medieval Christendom in that it allows the participants to indulge
themselves in all the pleasure and diversions of travel while
appearing to be austerely bent on self-improvement." (in [8])

*[8] David Lodge, Small world: an academic romance, 1985, Penguin Books, London,
prologue.*