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Profiles of Cash Flow Components

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*Paul Newbold*  
*David T. Whitford*



College of Commerce and Business Administration  
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University of Illinois Urbana-Champaign



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FACULTY WORKING PAPER NO. 89-1540

College of Commerce and Business Administration

University of Illinois at Urbana-Champaign

February 1989

Profiles of Cash Flow Components

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## ABSTRACT

Cash flow information is recognized as fundamental in analyzing a company's financial health and in determining its theoretical value. This paper presents a methodology for determining cash flow components. An approach is developed for using cash flow components to evaluate financial performance and strategy. Annual financial statement data for a sample of 333 companies are used to calculate standardized values for the cash flow components during the period 1982-1986. The cash flow components are used in a probit model to estimate the Value Line safety rankings of approximately 200 companies for the years 1983-1987. The model correctly classified from 58 to 67 percent of the companies according to their Value Line safety ranking.



## PROFILES OF CASH FLOW COMPONENTS

Cash flow information is a basic ingredient for analyzing the financial health of a company and in determining its theoretical value. Several authors have surveyed the empirical literature and concluded that decision makers gain substantive insights from multivariate models that utilize accounting and financial information.<sup>1</sup> Valuation models that utilize a net present value approach are based on cash flow information.<sup>2</sup> Likewise, FASB 95 is an acknowledgement of the importance of cash flow information for financial analysis purposes.

Cash flow components have been found to be useful in the prediction of bankruptcy, bond ratings, and loan risk classification.<sup>3</sup> However, a set of standardized cash flow components has not been available to encourage comparative analysis by financial analysts. Therefore cash flow components lack the credibility that is accorded to standardized financial ratios. A primary purpose of this article is to provide an overview of cash flow components and highlight their use in financial analysis. The other objectives of the article are to present a framework for determining cash flow components; to use empirical data to generate standardized profiles of cash flow components; to develop an approach for using cash flow components to interpret financial performance and strategy; and to use the cash flow components for classifying a sample of companies according to their Value Line safety rankings.

## A CASH FLOW MODEL

One of the most useful financial tools for analyzing the performance of management is the statement of cash flows. The cash flow model integrates accounting information from the balance sheet and the income statement and it provides a unique interpretation of the allocation of a firm's resources. The cash flow statement is a basic financial analysis tool for evaluating the performance of management related to the strategic use of corporate resources. The cash flow analysis reflects the subtleties and nuances of management trade-offs, and it provides chronological benchmarks for measuring and judging management effectiveness and changes in corporate strategy.

In 1972 Erich Helfert developed a unique format for presenting a funds flow statement. The Helfert technique integrates balance sheet and income statement variables and subdivides the funds flow into three natural decision areas of management. Structurally, these three areas are related to operating, financing and discretionary investment/dividend decisions. The Helfert technique closely resembles the FASB 95 Statement of Cash Flows which utilizes the direct method for reporting operating cash receipts and disbursements.

The statement of cash flows presents a summary of changes in the financial position of the firm between two time periods. It is widely used by corporate executives, credit analysts, investors, and other outside parties to evaluate the financial changes occurring in a firm and to identify the trend of major cash receipts and payments. It is computed by measuring changes in each of the balance sheet items

between two periods and by including the income statement items for the period under study.

#### REVISED MODEL

After extensive use of the Helfert funds flow analysis statement, we restructured and refined it into 12 major components. The objectives of this redesign are to improve the organization of the cash flow information; to provide better diagnostic capabilities to management for analyzing the chronological movement of the inflows and outflows of cash; to expand the number of components in order to identify explicitly the one component that is usually a net inflow generator, the three components that usually result in a net outflow and the eight that are swing components; to provide a tool for evaluating the effect of management strategies and policies on the allocation of resources; and finally, to introduce an integrated financial statement that provides information for measuring and judging the overall effectiveness of management.

The 12 cash flow components are operations, receivables, inventories, other current assets, payables, other current liabilities, financial, fixed coverage expenditures, investment, dividends, other asset and liability flows, and the change in cash and marketable securities. A net flow is determined for four of the components, namely operations, other assets and liabilities, financing, and investment. A cash inflow has a positive sign and a payment has a negative sign. The algebraic sum of the components is equal to the change in cash and marketable securities. The revised format for the cash flow analysis and the acronyms for each variable are presented below.

Operating Flows

Inflows (OI)  
minus: Outflows (OO)  
equals: Net Operating Flow (NOF)

Working Capital Components (WCC)

Determine if each WCC is either an inflow or outflow:

	<u>Inflow (I)</u>	<u>Outflow (O)</u>
ARF	ARFI	ARFO
INVF	INVFI	INVFO
OCAF	OCAFI	OCAFO
APF	APFI	APFO
OCLF	OCLFI	OCLFO

Other A&L Flows

Inflows (OA&LI)  
minus: Outflows (OA&LO)  
equals: Net Other A&L Funds Flow (NOTHER)

Financial Flows

Inflows (FI)  
minus: Outflows (FO)  
equals: Net Financial Flow (NFF)

Investment Flows

Inflows (II)  
minus: Outflows (IO)  
equals: Net Investment Flow (NIF)

Dividend Outflows (DIV)

Fixed Coverage Expenditure Outflows (FCE)

Net Inflow (-) or Net Outflow (+)

Sum of the above cash flow components

minus: Change in Cash (CC)  
(Ending Cash - Beginning Cash,  
where a - = Outflow and a + = Inflow)

equals: zero

The cash flow components contained in the revised cash based model are presented in equation (1).

$$\begin{aligned} & \text{NOF}_t + \text{ARF}_t + \text{INVF}_t + \text{OCAF}_t + \text{APF}_t + \text{OCLF}_t + \text{NFF}_t \\ & + \text{FCE}_t + \text{NIF}_t + \text{DIV}_t + \text{NOTHER}_t - \text{CC}_t = 0 \end{aligned} \quad (1)$$

Because the interrelationship among the components is complex, equation (2) is presented in a sources and uses format of a most likely case. Excepting changes in cash and marketable securities, a source (S) would be a positive number and a use (U) would be negative. As a first cut, the following equation presents a formulation of the cash flow model and the most likely source/use classification of each component for a financially healthy firm.

$$\begin{aligned} & \text{NOF}_t + \text{ARF}_t + \text{INVF}_t + \text{OCAF}_t + \text{APF}_t + \text{OCLF}_t + \text{NFF}_t + \text{FCE}_t \\ & \begin{array}{cccccccc} + & - & - & - & + & + & + & - \\ (S) & (U) & (U) & (U) & (S) & (S) & (S) & (U) \end{array} \\ & + \text{NIF}_t + \text{DIV}_t + \text{NOTHER}_t - \text{CC}_t = 0 \end{aligned} \quad (2)$$

$$\begin{array}{cccc} - & - & - & + \\ (U) & (U) & (U) & (S) \end{array}$$

Net operating flows (NOF) are composed of all operating inflows (OI), of which sales is the primary source, minus all operating outflows (OO). The primary operating outflows are expenditures related to the cost of goods sold, selling and advertising, taxes, research and development, rental, extraordinary, minority interest, deferred taxes, investment credit, and tax loss carry forward. Normally, NOF is the primary source of cash receipts. However, seasonal and/or random

events may cause NOF to be negative, which represents an outflow of cash. Also declining market share or size of market, or internal operating inefficiencies may cause NOF to be negative.

The working capital components are either receipts or payments of cash. A net outflow of funds for working capital components occurs when accounts receivable (ARF), or inventories (INVF), or other current assets (OCAF) are increasing or when accounts payable (APF), or other current liabilities (OCLF) are decreasing, or a combination of both. Under these conditions, the working capital components are negative because they reflect an outflow of cash. Alternatively, when the level of ARF, INVF, or OCAF is reduced or when APF or OCLF is increased, or both, this represents an inflow of cash, and the working capital components are positive.

During a transition in current operations, management and/or economic conditions may change the level of AR, INV, and AP. Thus working capital funds potentially provide management a buffer to adjust the cash flow in order to maintain an equilibrium condition between sources and uses.

If all funds uses in (2) are financed totally by net operating funds (NOF), e.g.,  $-(ARF + INVF + OCAF + APF + OCLF + FCE + NIF + DIV + NOTHER - CC) = NOF$ , the firm does not need to utilize other sources of funds. Such a condition is consistent with a firm in a strong competitive position.

When a firm's internal net operating flows are insufficient to meet its key outflows for investment or net working capital, net financial flows (NFF), in the form of either external debt or equity,



may be sold to finance the shortfall. When debt and/or lease financing are utilized, interest and/or lease expenses are paid; these are defined as the fixed coverage expenditure flow (FCE). FCE will always be an outflow (use) of funds, and usually NIF will be an outflow.

When operating flows are relatively unstable, complex investment and financing policies emerge. In these circumstances we observe that firms create a buffer by adjusting their working capital components, net financing flow components (NFF), change in cash and marketable securities (CC), and net other assets and liabilities (NOTHER). However, when a firm experiences a rapid decline in its net operating flows, the shortfall in cash inflows is frequently offset by short-term borrowing (NFF). Although short-term borrowing may be considered a part of working capital, we follow the convention established by Helfert that includes short-term debt in financial flows.

#### Cash Flow Components

Exhibit 1 presents the percentage contribution each cash flow component makes to the total cash flow. The percentage contribution of each component is based on the concept that the sum of the inflows equals the sum of the outflows. The revised cash flow model is based on the overall accounting relationship that results in the sum of flows being equal to zero as shown in equation (1).

The percentage contribution is calculated by dividing each component by the total cash flow (TCF), which is equal to either the total inflow (TI) or total outflow (TO).<sup>3</sup> The total inflows of \$90 million equals the total outflows as shown in Exhibit 1. Each inflow and outflow component is divided by \$90 million. For example, the net

operating cash flow contributed 44.4 percent of the total inflows, while net investment cash flow composed 42.2 percent of the total outflows. Exhibit 1 presents the percentage contribution of each of the 12 components. The contribution of each component takes on special interpretative significance when a time series of each component is developed over several periods. The stability and level of contribution reflects the results of management decisions.

Previous studies<sup>4</sup> have found that cash flow components are closely related to the prediction of bankruptcy and bond ratings.<sup>5</sup> The cash flow components that are significant in the prediction of bankruptcy are dividends, investment and receivables.<sup>6</sup> In the prediction of bond ratings the significant components are inventories, other current liabilities, financing and dividends. The dividend component was significant in both studies, which is supportive of a dividend signalling hypothesis advanced by Miller and Rock. They state: "In fact the best place for empirical researchers to look for evidence of dividend signaling may well be among firms falling into adversity, not because they then start signaling, but because the stop."<sup>7</sup> In a forthcoming study, cash flow components are being used to develop a loan risk classification system, and, coincidentally, the dividend component was also statistically significant.<sup>8</sup>

#### Summary of Key Relationships

In evaluating management performance with the revised cash flow components, a hierarchy of relationships emerge. Analyzing the chronological trend of each component and evaluating their interrelationships provides a solid framework for interpreting the financial health

of a firm. In turn it reflects the success of management strategies and policies during the period of analysis. For example:

$\frac{NOF_t}{TCF_t}$  - What proportion of the total inflows are generated from operations? The closer the ratio is to 1.0 the stronger the financial health of the firm. That is, the firm is not dependent on external sources of capital and does not have to sell assets.

$\frac{NIF_t}{TCF_t}$  - What proportion of the total expenditures are flowing to capital investments? The higher the proportion, the stronger the financial health. That is, the firm has opportunities in which it is willing to make a long-run investment commitment.

$\frac{NFE_t}{TCF_t}$  - What proportion of the total inflow of funds are from external sources? An increasing trend, especially of debt, may indicate an increase in financial risk.

$\frac{FCE_t}{TCF_t}$  - What proportion of total outflows are used to meet fixed coverage expenditures? The lower the ratio, the stronger the financial health of a firm, because the level of financial risk is lower.

$\frac{DIV_t}{TCF_t}$  - What proportion of total outflow is devoted to dividends? An outflow to dividends has a positive meaning for investors, while a zero outflow carries a mixed signal. In a growing firm, a ratio of zero means the firm is retaining all of its dividends for reinvestment. In a declining firm or a firm approaching failure, a zero flow to dividends indicates cash resources are being used to finance assets or repay trade credit or short-term debt and/or interest.

PROFILES OF CASH FLOW COMPONENTS

One objective of this section is to develop profiles of cash flow components for a sample of companies. The companies are subdivided into four categories based on the level of sales, which makes it possible to determine if there is a size effect associated with a cash flow component. Cash flow trends convey unique and subtle information concerning the financial health of a firm. Additionally, these trends supply insights that aid in interpreting corporate strategic decisions. Finally, industry effects are examined.

Sample

There are 333 industrial companies in the total sample. The companies were selected from the 1986 Annual Industrial Compustat tape. To be included in the sample a company needed a December fiscal year end and complete balance sheet and income statement information for the six-year period 1981-1986. The selected companies were segmented into four categories based on sales. They were:

<u>Description of Company Size</u>	<u>Sales Range</u>	<u>Number of Companies</u>
Small	0 - \$100 million	95
Medium	\$100+ million - \$1 billion	137
Large	\$1+ billion - \$4 billion	53
Giant	Over \$4 billion	<u>48</u>
	Total	333

Selecting a sample was an important decision for this study. To maintain the integrity of the sample size for all six years, we decided it was necessary for a company's sales to be in the same size

category for all six years. We could have ignored the integrity of the sales size in each cell and had a larger sample size. Because the number of companies moving to another cell was relatively small, we decided to maintain the integrity of the sales size for all six years.

### Time Series Profiles

A primary purpose of this article is to establish standards for cash flow components that will allow future users comparative benchmarks. One task is to present means and standard deviations of the cash flow components for a large sample of industrial companies. Exhibit 2 presents the means for each of 13 cash flow components,<sup>9</sup> and Exhibit 3 presents the standard deviations for each component. There are five years of information reported in Exhibits 2 and 3 that cover the period 1982-1986. A brief illustration based on net operating cash flows/TCF will highlight the interpretation of Exhibits 2 and 3. For the small companies in 1982, operating flows composed 57.97 percent of total inflow, +17.56 percent, while for the giant companies operating flow represented 66.81 percent of the total inflows, +14.62 percent. The data in Exhibit 2 show the operating flows represent a lower percent of total inflows for small companies than for the other three categories. In contrast, the standard deviation of the operating flows is smallest for the giant companies as shown in Exhibit 3. During this five-year period operating flows have been declining as a percent of total cash inflows for all four size categories.

A few observations that stand out in Exhibits 2 and 3 provide additional insight. The fixed coverage expenditure (FCE) component

is markedly lower for small companies, and it tends to increase with size. Also the standard deviation of the FCE component tends to be relatively stable as the size increases. The percent of total outflow going to net investment is lower for the small companies than for the other three size groups. In general, the deviation of net investment are reasonably similar among the four size groups. Exhibits 2 and 3 show the percentage of cash outflows going to dividends is positively related to the size of the company, and the deviation of dividend flows are inversely related to company size. The cash flows related to the five working capital components have a mixed performance record for the period 1982-1986.

#### Industry Profile

Another comparative benchmark is the performance of cash flow components by industry classification. The 333 sample companies were organized into Standard Industry Code (SIC) groups. From the industry groups we selected five industries that had 10 or more companies in order to demonstrate the presence of an industry effect. The means of the cash flow components of these five industries are reported in Exhibit 4, and the standard deviations are in Exhibit 5. The industry based cash flow components are reported for the periods 1982-1986.

A brief review of the cash flow patterns of selected industries shows there are substantive industry effects. The interindustry differences provide a unique perspective for evaluating corporate strategy and financial performance. The mean operating flows are significantly different among the five industries. For example, operating flows for the pharmaceutical industry were generally close to

70 percent, +15 percent, while the operating flows for the machine and equipment industry are approximately 53 percent, +20 percent. The operating flows of the companies in the remaining three industries generally range from 60-70 percent, +10-25 percent.

The mean investment flows are generally 40-50 percent, +10-20 percent, for the allied products industry. In contrast, the pharmaceutical industry and the machine and equipment industry had net investment flows that ranged from 25-35 percent, +8-12 percent. Naturally, research and development expenditures account for a portion of this difference. The investment flows for the remaining industries are generally in between the two extremes.

In general the strategies pursued by the pharmaceutical industry and the machine and equipment industry are to have net flows from operations being two or more times greater than the outflow going to net capital expenditures. The ratio of operating/investment flow is modestly lower for the other three industries. The gap between operating inflows and investment outflows is a fundamental relationship that drives financial performance. The larger the gap the greater the ability to distribute a higher proportion to dividends.

Nevertheless, the industry data show that the dividend strategies vary significantly among the five industries. The pharmaceutical industry has the highest percentage of outflows going to dividends, which ranges from 16-21 percent, +10-12 percent. The miscellaneous plastics industry has the lowest dividend flow of 7 percent, +5 percent. For the remaining three industries the outflow to dividends generally range from 10-14 percent, +3-11 percent.

The fixed coverage expenditure (FCE) serves as a final example of industry cash flow components. FCE ranged from 6-9 percent, +4-9 percent of total outflow for the pharmaceutical, miscellaneous plastics and the machine and equipment industries. For the two remaining industries, the FCE component ranged from 8.5-12.5 percent, + 5-8 percent. Although we have only presented cash flow information on four key cash flow components, it is apparent they provide the basis for evaluating firm performance and analyzing corporate strategy. The patterns of the remaining components are generally quite mixed.

#### Frequency Distribution Profile

Time series profiles of means and standard deviation were presented earlier as a standard for comparison. Creating a frequency distribution for each component supplies information in greater depth. These distributions provide a fresh perspective that becomes an invaluable standard for comparison. The performance of a specific firm's cash flow components can be compared to the appropriate standard frequency distribution profile.

A three dimensional graphic is used to illustrate the distribution of three cash flow components--operations, investment, and dividends--for the four size groups in 1986. Exhibit 6 provides the cash flow component information used to create each graphic. The three dimensional graphic of net operating flows is presented in Exhibit 7. The Y axis represents the percentage frequency of operating flow subdivided into the seven rows of performance ranges shown on the X axis. The Z axis portrays in columns the four size categories in



which the companies were subdivided. The seventh row in the forefront of Exhibit 7 represents the net operating flow components that range from 80 percent or more for all four company sizes. The sixth row has NOF ranging from 70.1-80 percent. The remaining rows decrease the operating cash flow component by 10 percent. Exhibit 7 shows that the highest percent of operating flows occurs between 50 and 70 percent for all company sizes.

A three dimensional graphic of the percent of cash outflows going to capital investment (NIF/TCF) by size of company is shown in Exhibit 8. The underlying data used to create this three dimensional perspective are found in Exhibit 6. The investment components range from -60 percent and lower in the first row, and it increases by 10 percent for each of the subsequent seven cells. The frequency diagram shows that the giant companies are investing a higher percent of their total outflow than companies in the other three size categories.

The percent of cash outflows going to dividends for each of the four size groups are presented as a three dimensional graphic in Exhibit 9. The basic data for producing the plot is located in Exhibit 6. The highest percentage dividend components range from -30 percent and lower in the forefront of Exhibit 9 to zero in the last row. Each row is decreased by 5 percent, which shows only a few companies distribute more than 20 percent of their total outflow to dividends. The peak ranges are between 5 and 20 percent, and they are highest for the large and giant companies.

### CLASSIFICATION OF VALUE LINE SAFETY RANKINGS

The preceding analysis has focused on developing profiles of cash flow components in order to establish standards for comparison. This section uses a given year's cash flow components for selected sample companies in a polytomous probit model to classify subsequent Value Line safety rankings.<sup>10</sup> The objective of the test is to determine the accuracy of the cash flow components in classifying companies according to their Value Line safety rankings.

The Value Line safety rank is a measurement of total risk which encompasses both the inherent volatility of the stock--independent of the market as a whole--and the stock's sensitivity to market changes as measured by Beta.<sup>11</sup> The safety ranking is derived primarily from the standard deviation of weekly percentage changes in the price of a stock during the past five years.<sup>12</sup> The smaller the standard deviation, the more stable the stock. All stocks are ranked for safety from 1 (highest) to 5 (lowest).

The April safety rankings were acquired for all of the sample companies that were ranked by Value Line in the years 1983 through 1987. The April safety ranking was used to allow for a reasonable delay in the release of the previous year's accounting information and cash flow components. Recall that to be included in the sample, each firm was required to have a December fiscal year end. The number of sample companies with publically available Value Line safety rankings ranged from 190 in 1983 to 208 in 1987 as shown in Exhibit 10.

Significant Components

The coefficients and t values for each component are reported in Exhibit 10. The coefficients presented in Exhibit 10 were estimated on the cash flow components for the years 1982-1986. There were three cash flow components that consistently were statistically significant. The dividend component was significant at the 1 percent level of significance in each of the five years. The investment component was significant at the 1 percent level of significance in four of the five years, and the fixed coverage expenditure component was significant at the 1 percent level for one year and the 5 percent level for three years.

As outflows the dividend and investment components carry a negative sign, but the probit coefficient is positive for both variables therefore, they are both positively related to the Value Line safety ranking. That is, the higher the percent of total cash outflow going to dividends or investment the higher the safety ranking, i.e., the closer to 1, and, of course, vice versa. The fixed coverage component is an outflow and has a negative sign, but it has a negative probit coefficient. The result is that fixed coverage flows are negatively related to the Value Line safety ranking. That is, the lower the percent of total cash outflow going to fixed coverage expenditure the higher the safety ranking, i.e., the closer to 1, and vice versa. Thus these three cash flow components show that Value Line safety rankings are significantly related to the cash flow performance of dividends, investment, and fixed coverage expenditures.

Classification Accuracy of the Model

The objective of the test is to determine the accuracy of cash flow components in the probit model to classify the Value Line safety rankings of the sample companies. There are five safety rankings, but in the sample there was only one company in 1984 with a safety ranking of a 5, the lowest ranking. That company was excluded from the test in 1984.<sup>13</sup> Thus the model was used to classify the sample companies into four Value Line safety rankings. The safety rankings were for the years 1983 through 1987.

The classification matrix is presented in Exhibit 11. Using the cash flow components in the probit model resulted in a classification accuracy that ranged from 67 percent in 1987 to 58 percent in 1986. On average during the five-year period the model correctly classified 61 percent of the sample companies with the appropriate Value Line safety ranking.

In each year the model classified approximately 80 percent of the companies as having the cash flow characteristics of a 3 rank in the Value Line system. The preponderance of the companies ranked either 1 or 2 by Value Line were classified as resembling a rank of 3. Likewise, nearly all of the companies ranked a 4 by Value Line, that were misclassified by the model, were assigned the ranking of a 3. These tests show that qualitative factors such as diversity of market, quality of earnings, and balance sheet conditions are included in the safety rankings established by Value Line.<sup>14</sup> In conclusion, using cash flow components in the probit model produce classification results that were modestly successful. However, the Value Line manual

states that some allowances are made for less quantifiable factors which permit a shift of one grade that is established by the underlying price stability of a company.

#### CONCLUSIONS

Cash flow components provide unique information for evaluating a company's financial performance and strategy. The ranking of the importance of specific cash flow components for financial analysis is dependent on the task to be accomplished, such as the prediction of bankruptcy, bond ratings, or Value Line safety rankings. The profiles generated from a large sample of companies show that the cash flow components vary according to company size and the industry in which a company operates.

In classifying companies according to their Value Line safety ranking, the study found that using cash flow components in a probit model resulted in a 61 percent classification accuracy. A portion of the misclassification is related to qualitative factors identified by Value Line. The study also found three cash flow components--dividends, investment, and fixed coverage--were statistically significant in classifying the Value Line safety rankings.

FASB 95 ensures a growing usage of cash flow information. Also as companies become more comfortable with cash flow statements, their use in financial analysis will increase substantially. With an increase in the usage of cash flow information, the need for comparative standards will also increase. We are hopeful that the profiles in this study will provide an initial base for encouraging the use of cash flow statement as a powerful and insightful tool for financial analysts.

FOOTNOTES

<sup>1</sup>See, for example, E. I. Altman, R. B. Avery, R. A. Eisenbeis, and J. F. Sinkey, Jr., "Application of Classification Techniques," in Business, Banking and Finance. Greenwich, Conn.: JAI Press, Inc., 1981; G. Foster, Financial Statement Analysis, Second Edition. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1986; B. Lev, Financial Statement Analysis: A New Approach. Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1976.

<sup>2</sup>See, for example, A. Rappaport, Creating Shareholder Value. New York: The Free Press, 1987.

<sup>3</sup>Empirically, we have observed that TCF is a relatively stable variable. However, when a major financial restructuring occurs, TCF deviates substantially from its previous level.

<sup>4</sup>See, for example, J. Gentry, P. Newbold, and D. T. Whitford, "Classifying Bankrupt Firms With Funds Flow Components," Journal of Accounting Research, Vol. 23 (Spring 1985), pp. 140-160; \_\_\_\_\_, "Predicting Bankruptcy: If Cash Flow's Not the Bottom Line, What Is?" Financial Analysts Journal, Vol. 41 (September/October 1985), pp. 47-56; \_\_\_\_\_, "Predicting Industrial Bond Ratings with a Probit Model and Funds Flow Components," Financial Review, (August 1988), pp. 269-286.

<sup>5</sup>The cash flow components have been used in a logit regression to predict bankruptcy and bond ratings. The test results were 83.3 percent accurate in classifying a matched sample of bankrupt and non-bankrupt companies. The three components that were statistically significant were dividends, net investment and accounts receivable. That is, the probability of failure was inversely related to the proportion of total outflow going to dividends, investment and the expansion of receivables. In general, receivables were an inflow of cash for companies declaring bankruptcy. When classifying companies according to their Moody's bond rating, the classification accuracy was approximately 55 percent for companies issuing new debt and 59 percent for companies whose bond ratings were reclassified. The cash flow components that were significant at the .05 level of confidence for the reclassified issues were inventories, other current liabilities, financing, fixed coverage, and dividends. For the new bond offerings the only significant variable was dividends.

<sup>6</sup>In general, receivables declined for companies that declared bankruptcy because sales were declining and/or they were collecting cash from their customers more rapidly than in previous periods. Companies facing bankruptcy have a need to convert assets to cash as rapidly as possible.

<sup>7</sup>See Merton H. Miller and Kevin Rock, "Dividend Policy under Asymmetric Information," Journal of Finance, Vol. 40 (September 1985), pp. 1045-1046.

<sup>8</sup>In January 1988 Gentry and Shaw received a grant from the Prochnow Educational Foundation to develop a loan risk classification system. This study involves developing a statistically based loan risk classification system that is based on cash flow components, and subsequently creating an expert system that mimics the loan decision making process and determines a risk rating of each company. See Michael J. Shaw and James A. Gentry, "Using an Expert System with Inductive Learning to Evaluate Business Loans," Financial Management, Vol. 17 (Autumn 1988), pp. 45-56.

<sup>9</sup>The thirteenth component is total cash flow/total assets (TCF/TA).

<sup>10</sup>Tests were also run using Value Line timeliness rankings and financial strength rankings. The best classification results were achieved with the Value Line safety ratings, therefore, we are only reporting these findings.

<sup>11</sup>The discussion concerning the safety rankings is based on the publication by Arnold Bernhard, Investing in Common Stocks, Arnold Bernhard Company, 1975, page 38.

<sup>12</sup>Some allowance is made for less quantifiable factors, such as diversity of market, quality of earnings, and balance sheet condition by permitting a shift of one grade from that determined by the standard deviation alone. For example, a stock that might rate a 1 on the basis of price stability alone but has questionable earnings quality would be assigned a safety grade of 2. The top 100 companies are assigned a rating of 1, the next 300 a grade of 2, the next 830 are in grade 3, the next 300 in 4 and the lowest 100 in grade 5.

<sup>13</sup>The distribution of the safety rankings of the sample companies do not conform to the distribution standard established by Value Line, as shown below.

	Percent in each ranking				
	1	2	3	4	5
Value Line	6.1	18.4	50.9	18.4	6.1
Sample Companies:					
1987	17.8	19.7	59.1	3.4	0
1986	17.2	24.7	13.5	4.5	0
1985	16.8	23.3	55.4	4.5	0
1984	17.7	25.5	55.2	4.7	0.05
1983	17.4	24.7	52.1	5.8	0

The proportion of sample companies ranked 1 is approximately 2.8 times larger than the Value Line proportion. The percent of sample companies ranked 2 are approximately 1.3 times greater than the Value Line percentages, while the proportion of companies ranked 4 are only 25 percent the size of the Value Line proportion. The number of sample companies ranked 3 are from 1-16 percent larger than the Value Line proportion. Except for 1984 none of the sample companies were ranked a 5. Thus the sample has substantially more companies ranked 1 than the Value Line distribution, while rankings 2 and 3 are modestly larger than the standard. The sample also contains substantially fewer companies than the Value Line distribution for rankings 4 and 5.

<sup>14</sup> See footnote 12.



Exhibit 1

Contribution Each Cash Flow Component Makes  
to Total Cash Flow  
(in millions of dollars)

<u>Inflows (+)</u>		<u>Outflows (-)</u>	
Net Operating	\$ 40	Net Investment	\$ 38
Receivables	5	Inventories	13
Payables	15	Other CA	2
Other CI	8	Dividends	8
Net Other A&L	12	Fixed Coverage Expenses	3
Net Financial	<u>10</u>	Change in Cash	<u>26</u>
Total Inflow (TI)	<u>\$ 90</u>	Total Outflow (TO)	<u>\$ 90</u>

TI = TO = TCF

Percentage Contribution of Each Cash Flow Component

<u>Cash Flow Component/TCF</u>	<u>Percent of Total Inflow (TI) of Total Outflow (TO)</u>
Net Operating	+ 44.4
Receivables	+ 5.6
Payables	+ 16.7
Other CL	+ 8.9
Net Other A&L	+ 13.3
Net Financial	<u>+ 11.1</u>
Total Inflow	100.0
Net Investment	- 42.2
Inventories	- 14.5
Other CA	- 2.2
Dividends	- 8.9
Fixed Coverage Expenses	- 3.3
Change in Cash	<u>- 8.9</u>
Total Outflow	100.0

Exhibit 2

Mean Cash Flow Components Segmented According  
to Level of Sales, 1982-1986

	<u>Small</u> <u>(95)</u>	<u>Medium</u> <u>(137)</u>	<u>Large</u> <u>(53)</u>	<u>Giant</u> <u>(48)</u>
Net Operating Flows/Total Cash Flow				
1982	0.5797	0.6135	0.6488	0.6681
1983	0.5372	0.6128	0.6530	0.7397
1984	0.5959	0.6572	0.6544	0.7071
1985	0.5717	0.6156	0.6571	0.6560
1986	0.5275	0.5773	0.5996	0.5989
Receivables/Total Cash Flow				
1982	0.0023	0.0135	0.0124	0.0255
1983	-0.1084	-0.1329	-0.0322	-0.0193
1984	-0.1129	-0.0741	-0.0531	-0.0147
1985	-0.0776	-0.0627	-0.1020	-0.0643
1986	-0.0239	-0.0810	-0.0437	0.0045
Inventories/Total Cash Flow				
1982	0.0382	0.0302	0.0779	0.0538
1983	-0.0534	-0.0604	0.0120	0.0503
1984	-0.1409	-0.1106	-0.0523	-0.0210
1985	-0.0473	-0.0406	-0.0205	-0.0251
1986	-0.0660	-0.0698	-0.0143	0.0053
Other Current Assets/Total Cash Flow				
1982	-0.0133	0.0002	-0.0170	-0.0032
1983	-0.0084	-0.0122	-0.0125	-0.0003
1984	-0.0007	-0.0092	-0.0181	-0.0124
1985	-0.0327	-0.0092	-0.0233	-0.0265
1986	-0.0024	-0.0195	-0.0115	-0.0015
Payables/Total Cash Flow				
1982	-0.0275	-0.0056	-0.0078	-0.0262
1983	0.0388	0.0614	0.0313	0.0058
1984	0.0251	0.0196	0.0241	-0.0021
1985	-0.0072	0.0153	0.0371	0.0372
1986	0.0211	0.0257	0.0096	-0.0251

Exhibit 2 (continued)

	<u>Small (95)</u>	<u>Medium (137)</u>	<u>Large (53)</u>	<u>Giant (48)</u>
Other Current Liabilities/Cash				
1982	-0.0046	-0.0082	-0.0198	0.0128
1983	0.0257	0.0695	0.0316	0.0239
1984	0.0419	0.0316	0.0483	0.0229
1985	0.0271	0.0433	0.0507	0.0585
1986	0.0027	0.0548	0.0464	0.0362
Net Other/Total Cash Flow				
1982	-0.0096	0.0029	-0.0072	0.0313
1983	0.0207	0.0188	-0.0066	0.0094
1984	-0.0213	0.0024	0.0263	-0.0393
1985	0.0230	0.0065	0.0028	0.0596
1986	-0.0086	0.0036	0.0317	-0.0273
Net Financing Flows/Total Cash Flow				
1982	-0.0319	-0.0588	-0.0363	-0.0621
1983	0.0964	0.0061	-0.0915	-0.0979
1984	0.0012	-0.0053	-0.0904	-0.0658
1985	-0.0031	0.0464	-0.0004	-0.0160
1986	0.0425	0.0493	-0.0818	-0.0069
Fixed Coverage Expenditure/Total Cash Flow				
1982	-0.0855	-0.0951	-0.1038	-0.1229
1983	-0.0554	-0.0729	-0.0920	-0.1167
1984	-0.0657	-0.0784	-0.0892	-0.1180
1985	-0.0568	-0.0768	-0.0942	-0.1119
1986	-0.0510	-0.0725	-0.0835	-0.1047
Net Investment Flows/Total Cash Flow				
1982	-0.2242	-0.2897	-0.3223	-0.4192
1983	-0.2373	-0.2665	-0.2587	-0.3478
1984	-0.2935	-0.3125	-0.2706	-0.3314
1985	-0.2859	-0.3268	-0.3337	-0.4040
1986	-0.2670	-0.3212	-0.3113	-0.3246

Exhibit 2 (continued)

	<u>Small</u> <u>(95)</u>	<u>Medium</u> <u>(137)</u>	<u>Large</u> <u>(53)</u>	<u>Giant</u> <u>(48)</u>
Dividends/Total Cash Flow				
1982	-0.0816	-0.1274	-0.1604	-0.1471
1983	-0.0764	-0.1215	-0.1594	-0.1683
1984	-0.0750	-0.1254	-0.1610	-0.1551
1985	-0.0776	-0.1232	-0.1612	-0.1410
1986	-0.0795	-0.1155	-0.1376	-0.1276
Change in Cash/Total Cash Flow				
1982	-0.1420	-0.0756	-0.0604	-0.0108
1983	-0.1793	-0.1022	-0.0751	-0.0787
1984	0.0458	-0.0047	-0.0186	0.0298
1985	-0.0335	-0.0877	-0.0124	-0.0223
1986	-0.0955	-0.0311	-0.0037	-0.0272
Total Cash Flow/Total Assets				
1982	0.2714	0.2456	0.2066	0.2188
1983	0.2969	0.2532	0.2183	0.1960
1984	0.2688	0.2517	0.2554	0.2190
1985	0.2467	0.2439	0.2249	0.2288
1986	0.2494	0.2575	0.2478	0.2335

Exhibit 3

Standard Deviation of Cash Flow Components Segmented  
According to Level of Sales, 1982 to 1986

	<u>Small</u> <u>(95)</u>	<u>Medium</u> <u>(137)</u>	<u>Large</u> <u>(53)</u>	<u>Giant</u> <u>(48)</u>
Net Operating Flows/Total Cash Flow				
1982	0.1756	0.1777	0.1389	0.1462
1983	0.2006	0.1799	0.1810	0.1266
1984	0.1843	0.1752	0.1778	0.1692
1985	0.1929	0.1600	0.1883	0.1573
1986	0.1928	0.1928	0.1839	0.1617
Receivables/Total Cash Flow				
1982	0.2109	0.1458	0.1219	0.1142
1983	0.1608	0.1319	0.1483	0.0860
1984	0.1530	0.1230	0.1504	0.0815
1985	0.2199	0.1429	0.1273	0.0983
1986	0.1908	0.1267	0.1147	0.1214
Inventories/Total Cash Flow				
1982	0.1516	0.1641	0.1239	0.0931
1983	0.1867	0.1510	0.1009	0.1053
1984	0.1894	0.1498	0.1006	0.0849
1985	0.1999	0.1677	0.0928	0.0888
1986	0.1775	0.1547	0.1202	0.0955
Other Current Assets/Total Cash Flow				
1982	0.0372	0.0787	0.0682	0.0387
1983	0.0874	0.0727	0.0757	0.0365
1984	0.0713	0.0642	0.1130	0.0442
1985	0.0725	0.0530	0.0929	0.0587
1986	0.0950	0.0599	0.0922	0.0665
Payables/Total Cash Flow				
1982	0.1186	0.1015	0.1087	0.0781
1983	0.1270	0.0810	0.1460	0.0574
1984	0.1131	0.0722	0.0833	0.0602
1985	0.1029	0.0731	0.0809	0.0420
1986	0.1280	0.0780	0.0683	0.1104

Exhibit 3 (continued)

	<u>Small</u> <u>(95)</u>	<u>Medium</u> <u>(137)</u>	<u>Large</u> <u>(53)</u>	<u>Giant</u> <u>(48)</u>
Other Current Liabilities/Cash				
1982	0.1438	0.1156	0.0984	0.0809
1983	0.1377	0.0976	0.0933	0.0813
1984	0.1262	0.0907	0.1121	0.0939
1985	0.1301	0.0962	0.0872	0.0957
1986	0.1434	0.0867	0.0942	0.1141
Net Other/Total Cash Flow				
1982	0.1416	0.1230	0.1310	0.0971
1983	0.1483	0.1225	0.1705	0.1347
1984	0.1322	0.1355	0.1121	0.1626
1985	0.1335	0.1164	0.1343	0.1395
1986	0.1572	0.1508	0.1572	0.1872
Net Financing Flows/Total Cash Flow				
1982	0.2614	0.2569	0.2274	0.2216
1983	0.3017	0.2509	0.2395	0.1933
1984	0.2479	0.2448	0.2556	0.2749
1985	0.2271	0.2469	0.2277	0.2117
1986	0.3204	0.2915	0.3073	0.2871
Fixed Coverage Expenditure/Total Cash Flow				
1982	0.0827	0.0716	0.0559	0.0657
1983	0.0561	0.0535	0.0522	0.0613
1984	0.0695	0.0629	0.0558	0.0664
1985	0.0548	0.0581	0.0522	0.0555
1986	0.0535	0.0602	0.0434	0.0505
Net Investment Flows/Total Cash Flow				
1982	0.2012	0.1713	0.1722	0.1842
1983	0.1900	0.1531	0.2156	0.1799
1984	0.1874	0.1879	0.2127	0.2082
1985	0.2011	0.1721	0.1638	0.1743
1986	0.1935	0.1700	0.2069	0.2466

Exhibit 3 (continued)

	<u>Small</u> <u>(95)</u>	<u>Medium</u> <u>(137)</u>	<u>Large</u> <u>(53)</u>	<u>Giant</u> <u>(48)</u>
Dividends/Total Cash Flow				
1982	0.1062	0.0953	0.0811	0.0711
1983	0.0988	0.0883	0.0847	0.0888
1984	0.0995	0.0926	0.0990	0.0832
1985	0.0984	0.0875	0.0943	0.0767
1986	0.1003	0.0897	0.0826	0.0613
Change in Cash/Total Cash Flow				
1982	0.2806	0.2043	0.1774	0.1165
1983	0.2955	0.2211	0.1669	0.1132
1984	0.2640	0.1860	0.1614	0.1294
1985	0.2595	0.2189	0.1713	0.1454
1986	0.2654	0.2136	0.1678	0.1348
Total Cash Flow/Total Assets				
1982	0.1030	0.0833	0.0560	0.0670
1983	0.1565	0.0847	0.0846	0.0528
1984	0.0954	0.0913	0.1659	0.0698
1985	0.0822	0.0725	0.0788	0.0788
1986	0.1090	0.0931	0.1031	0.0622

Exhibit 4

Mean Cash Flow Component of Five Industries, 1982-1986

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Allied Products SIC 2600, N = 12					
Operations	0.6266	0.6176	0.6582	0.6930	0.6808
Receivables	0.0177	-0.0759	-0.0303	-0.0657	-0.0469
Inventories	0.0315	-0.0207	-0.0663	-0.0231	-0.0357
Other C.A.	0.0005	-0.0124	0.0078	-0.0077	-0.0331
Payables	-0.0169	0.0456	0.0104	0.0442	-0.0015
Other C.L.	-0.0121	0.0560	0.0273	0.0126	0.0406
Other A&L	0.0497	0.0604	-0.0418	0.0414	0.0431
Financing	-0.0714	0.0208	-0.0746	0.0417	0.0154
Fixed Coverage	-0.0981	-0.0848	-0.0841	-0.1007	-0.1110
Investment	-0.4299	-0.4280	-0.2749	-0.5133	-0.4087
Dividend	-0.1366	-0.1224	-0.1218	-0.1351	-0.1191
Change in Cash	0.0389	-0.0561	-0.0368	0.0128	-0.0237
TCF/TA	0.2123	0.2284	0.2987	0.2274	0.2271
Pharmaceutical SIC 2834, N = 10					
Operations	0.7067	0.7373	0.7560	0.7172	0.5832
Receivables	-0.0565	-0.0900	0.0132	-0.1354	-0.0780
Inventories	-0.0299	-0.0205	-0.0177	-0.0425	-0.0481
Other C.A.	-0.0086	-0.0061	-0.0340	-0.0179	0.0010
Payables	0.0254	0.0154	-0.0089	0.0281	0.0330
Other C.L.	0.0091	0.0205	0.0331	0.0669	0.1137
Other A&L	-0.0058	-0.0257	0.0364	0.0286	0.0198
Financing	0.0551	0.0590	-0.0643	-0.0039	-0.0701
Fixed Coverage	-0.0825	-0.0834	-0.0939	-0.0747	-0.0609
Investment	-0.3551	-0.2607	-0.2498	-0.2704	-0.2965
Dividend	-0.2038	-0.2113	-0.2083	-0.1934	-0.1576
Change in Cash	-0.0538	0.1344	-0.1616	-0.1025	-0.0395
TCF/TA	0.2639	0.2483	0.2538	0.2510	0.2935



Exhibit 4 (continued)

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Petroleum					
SIC 2911, N = 19					
Operations	0.6371	0.7275	0.6466	0.6494	0.6557
Receivables	0.7221	-0.0148	-0.0329	-0.0324	0.1057
Inventories	0.0560	0.0603	0.0136	0.0026	0.0562
Other C.A.	0.0027	0.0055	-0.0430	0.0134	0.0088
Payables	-0.0638	-0.0033	0.0224	0.0247	-0.1574
Other C.L.	-0.0104	0.0266	0.0469	0.0353	-0.0581
Other A&L	0.0843	0.0492	0.0718	0.1211	0.0571
Financing	-0.0004	-0.0593	-0.1263	-0.1311	-0.1129
Fixed Coverage	-0.1138	-0.1140	-0.1216	-0.1190	-0.1254
Investment	-0.5479	-0.4452	-0.3732	-0.4215	-0.2585
Dividend	-0.1301	-0.1447	-0.1139	-0.1123	-0.1194
Change in Cash	0.0142	-0.0876	0.0097	-0.3007	-0.0518
TCF/TA	0.2191	0.1901	0.2404	0.2453	0.2152

Miscellaneous Plastics  
SIC 3079, N = 14

Operations	0.6175	0.5928	0.6434	0.5971	0.6343
Receivables	0.0205	-0.0806	-0.0967	-0.0731	-0.0865
Inventories	0.0458	-0.0737	-0.0699	-0.0432	-0.0898
Other C.A.	-0.0039	-0.0566	0.0412	-0.0371	0.0000
Payables	-0.0127	0.0059	0.0297	0.0052	0.0617
Other C.L.	-0.0404	0.0533	0.0189	0.0522	0.0450
Other A&L	0.0375	0.0102	0.0236	0.0440	-0.0261
Financing	-0.0829	0.0742	-0.1127	-0.0418	0.0127
Fixed Coverage	-0.0810	-0.0731	-0.0821	-0.0576	-0.0458
Investment	-0.3780	-0.3001	-0.3540	-0.4068	-0.3926
Dividend	-0.0713	-0.0706	-0.0636	-0.0612	-0.0653
Change in Cash	-0.0510	-0.0816	0.0222	0.0223	-0.0492
TCF/TA	0.2598	0.2905	0.2689	0.2670	0.2480

Exhibit 4 (continued)

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
General Industry, Machine and Equipment SIC 3560, N = 10					
Operations	0.5260	0.5313	0.5507	0.5305	0.4994
Receivables	0.0366	-0.1010	-0.1224	-0.0947	-0.0342
Inventories	0.0457	0.0441	-0.1012	0.1111	-0.0745
Other C.A.	-0.0090	-0.0050	-0.0427	-0.0296	0.0111
Payables	-0.0756	0.0189	0.0687	0.0335	0.0029
Other C.L.	-0.0651	0.0717	0.0699	0.0991	-0.0089
Other A&L	-0.0092	0.0805	-0.0038	0.0583	0.0408
Financing	0.0432	0.0001	-0.0561	0.1097	-0.0282
Fixed Coverage	-0.0840	-0.0772	-0.0608	-0.0666	-0.0675
Investment	-0.1952	-0.2947	-0.2941	-0.2617	-0.1674
Dividend	-0.1240	-0.1128	-0.1051	-0.0933	-0.1092
Change in Cash	-0.0893	-0.1604	0.0972	-0.1741	-0.0642
TCF/TA	0.2395	0.2162	0.2503	0.2130	0.2193

Exhibit 5

Standard Deviations of Cash Flow Components  
of Five Industries, 1982-1986

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Allied Products SIC 2600, N = 12					
Operations	0.1073	0.1886	0.2354	0.2095	0.1936
Receivables	0.0985	0.1014	0.0832	0.0894	0.0869
Inventories	0.1133	0.0688	0.0868	0.0445	0.1137
Other C.A.	0.0113	0.0191	0.0202	0.0225	0.0417
Payables	0.0508	0.1219	0.0402	0.0911	0.0451
Other C.L.	0.0642	0.0187	0.0608	0.0326	0.0694
Other A&L	0.1045	0.0676	0.2658	0.0484	0.1109
Financing	0.3027	0.2723	0.2874	0.2683	0.2144
Fixed Coverage	0.0577	0.0531	0.0619	0.0625	0.0827
Investment	0.2324	0.1948	0.3644	0.1565	0.1922
Dividend	0.0588	0.0607	0.0588	0.0630	0.0542
Change in Cash	0.1546	0.1313	0.1030	0.1141	0.1753
TCF/TA	0.0464	0.0812	0.2531	0.0993	0.0795
Pharmaceutical SIC 2834, N = 10					
Operations	0.1445	0.1317	0.1871	0.1510	0.1487
Receivables	0.0467	0.0950	0.1138	0.1628	0.0753
Inventories	0.0867	0.0990	0.0592	0.0962	0.0435
Other C.A.	0.0393	0.0520	0.0919	0.0977	0.0584
Payables	0.0515	0.0478	0.0454	0.0374	0.0313
Other C.L.	0.0590	0.0811	0.0455	0.0563	0.0479
Other A&L	0.0645	0.1255	0.0815	0.0783	0.1950
Financing	0.2289	0.1379	0.2631	0.1960	0.2961
Fixed Coverage	0.0579	0.0512	0.0663	0.0514	0.0383
Investment	0.0777	0.1045	0.0799	0.1103	0.1192
Dividend	0.0987	0.1210	0.1170	0.1202	0.0860
Change in Cash	0.2049	0.2124	0.1918	0.1359	0.1856
TCF/TA	0.1044	0.0632	0.0843	0.0468	0.0813

Exhibit 5 (continued)

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Petroleum SIC 2911, N = 19					
Operations	0.1128	0.0645	0.1448	0.1470	0.1203
Receivables	0.0978	0.0584	0.0580	0.0614	0.0911
Inventories	0.0964	0.0751	0.0603	0.0670	0.0781
Other C.A.	0.0172	0.0356	0.1548	0.1157	0.0313
Payables	0.1052	0.0589	0.0626	0.0534	0.0726
Other C.L.	0.0813	0.0651	0.0688	0.0667	0.0584
Other A&L	0.0649	0.0660	0.1846	0.1331	0.0949
Financing	0.1137	0.1758	0.2268	0.2338	0.1634
Fixed Coverage	0.0425	0.0412	0.0505	0.0527	0.0543
Investment	0.1160	0.1486	0.2699	0.2305	0.2157
Dividend	0.0381	0.0444	0.0393	0.0406	0.0389
Change in Cash	0.0748	0.1109	0.1663	0.1637	0.1487
TCF/TA	0.0321	0.0269	0.1056	0.1084	0.0389

Miscellaneous Plastics SIC 3079, N = 14					
Operations	0.1283	0.2330	0.1183	0.1253	0.1362
Receivables	0.0928	0.1016	0.0848	0.1783	0.1172
Inventories	0.1144	0.1288	0.1895	0.1431	0.1819
Other C.A.	0.0340	0.2073	0.1583	0.0541	0.0477
Payables	0.1072	0.1737	0.0821	0.0961	0.0929
Other C.L.	0.0871	0.0713	0.0625	0.0552	0.0831
Other A&L	0.0642	0.0347	0.1702	0.0464	0.1162
Financing	0.2909	0.2860	0.2928	0.2635	0.1712
Fixed Coverage	0.0533	0.0489	0.0534	0.0360	0.0344
Investment	0.2685	0.2405	0.2191	0.1424	0.1120
Dividend	0.0589	0.0599	0.0483	0.0433	0.0462
Change in Cash	0.1893	0.2709	0.1139	0.2282	0.1988
TCF/TA	0.0822	0.1600	0.0886	0.0632	0.0608

Exhibit 5 (continued)

<u>Cash Flow Components/TCF</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
General Industry, Machine and Equipment SIC 3560, N = 10					
Operations	0.2647	0.1590	0.2057	0.1906	0.2298
Receivables	0.2009	0.1610	0.2083	0.1844	0.1794
Inventories	0.1851	0.1708	0.1492	0.0978	0.1619
Other C.A.	0.0183	0.0657	0.0655	0.0899	0.0571
Payables	0.0567	0.0699	0.0974	0.0786	0.1012
Other C.L.	0.0834	0.1253	0.1341	0.1004	0.1969
Other A&L	0.0923	0.0917	0.0889	0.0620	0.0421
Financing	0.3001	0.2882	0.2792	0.2496	0.3809
Fixed Coverage	0.0886	0.0705	0.0497	0.0475	0.0558
Investment	0.1621	0.1972	0.1717	0.1196	0.2240
Dividend	0.1095	0.0902	0.0966	0.0892	0.1171
Change in Cash	0.2524	0.1935	0.1543	0.2325	0.3107
TCF/TA	0.1033	0.0737	0.0803	0.0633	0.0530

Exhibit 6

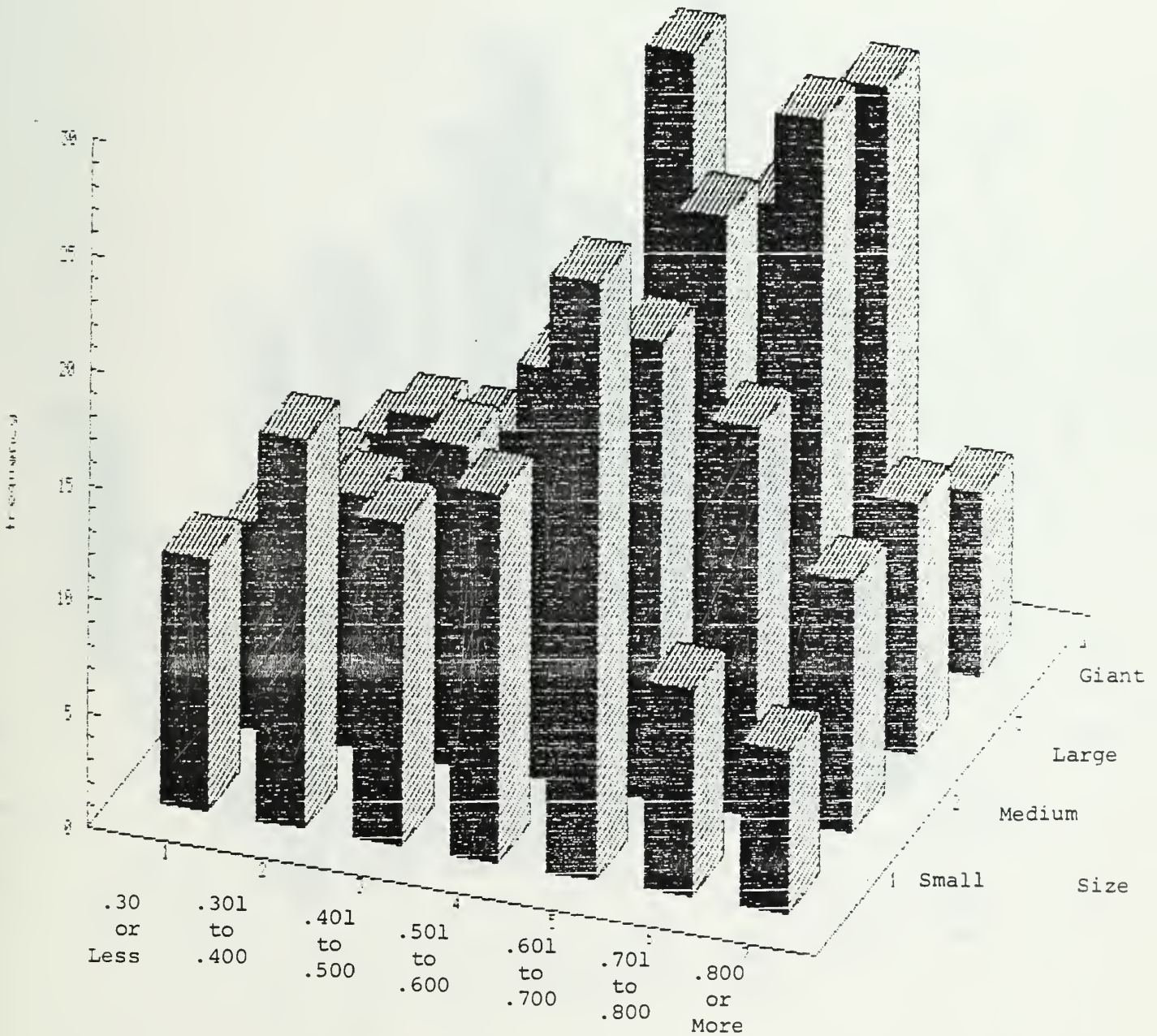
Distribution of Selected Cash Flow Components  
by Size, 1986<sup>1</sup>

	<u>Small</u> (95)	<u>Medium</u> (137)	<u>Large</u> (53)	<u>Giant</u> (48)
<u>Net Operating Flows/TCF</u>				
.300 or less	0.1053	0.0949	0.0755	0.0625
.301 - .400	0.1789	0.1022	0.1132	0.0625
.401 - .500	0.1368	0.1460	0.1132	0.1042
.501 - .600	0.1579	0.1752	0.0943	0.2500
.601 - .700	0.2632	0.1971	0.2264	0.1875
.701 - .800	0.0842	0.1752	0.2642	0.2500
.800 or more	0.0737	0.1095	0.1132	0.0833
Total	1.0000	1.0000	1.0000	1.0000
<u>Net Investment Flow/TCF</u>				
-.600 or less	0.0842	0.0365	0.0755	0.0625
-.599 - -.500	0.0316	0.1095	0.1132	0.1458
-.499 - -.400	0.0947	0.1606	0.1509	0.2292
-.399 - -.300	0.2211	0.1898	0.2264	0.1667
-.299 - -.200	0.1684	0.2774	0.1321	0.1458
-.199 - -.100	0.1895	0.1679	0.1887	0.1250
-.100 - .000	0.1789	0.0365	0.0377	0.0208
.001 or more	0.0316	0.0219	0.0755	0.1042
Total	1.0000	1.0000	1.0000	1.0000
<u>Dividend/TCF</u>				
-.300 or less	0.0737	0.0584	0.0189	0.0208
-.299 - -.250	0.0211	0.0365	0.0000	0.0208
-.249 - -.200	0.0105	0.0803	0.1321	0.0833
-.199 - -.150	0.0316	0.0949	0.2453	0.1250
-.149 - -.100	0.2105	0.1825	0.3208	0.4583
-.099 - -.050	0.1263	0.3066	0.2075	0.2292
-.049 - -.001	0.2105	0.1898	0.0377	0.0625
.000	0.3158	0.0511	0.0377	0.0000
Total	1.0000	1.0000	1.0000	1.0000

<sup>1</sup>A test of normality was completed for each size group within each variable in Exhibit 6. All twelve tests showed the null hypothesis could not be rejected, that is the data distributions are not significantly different from a normal distribution.

Exhibit 7

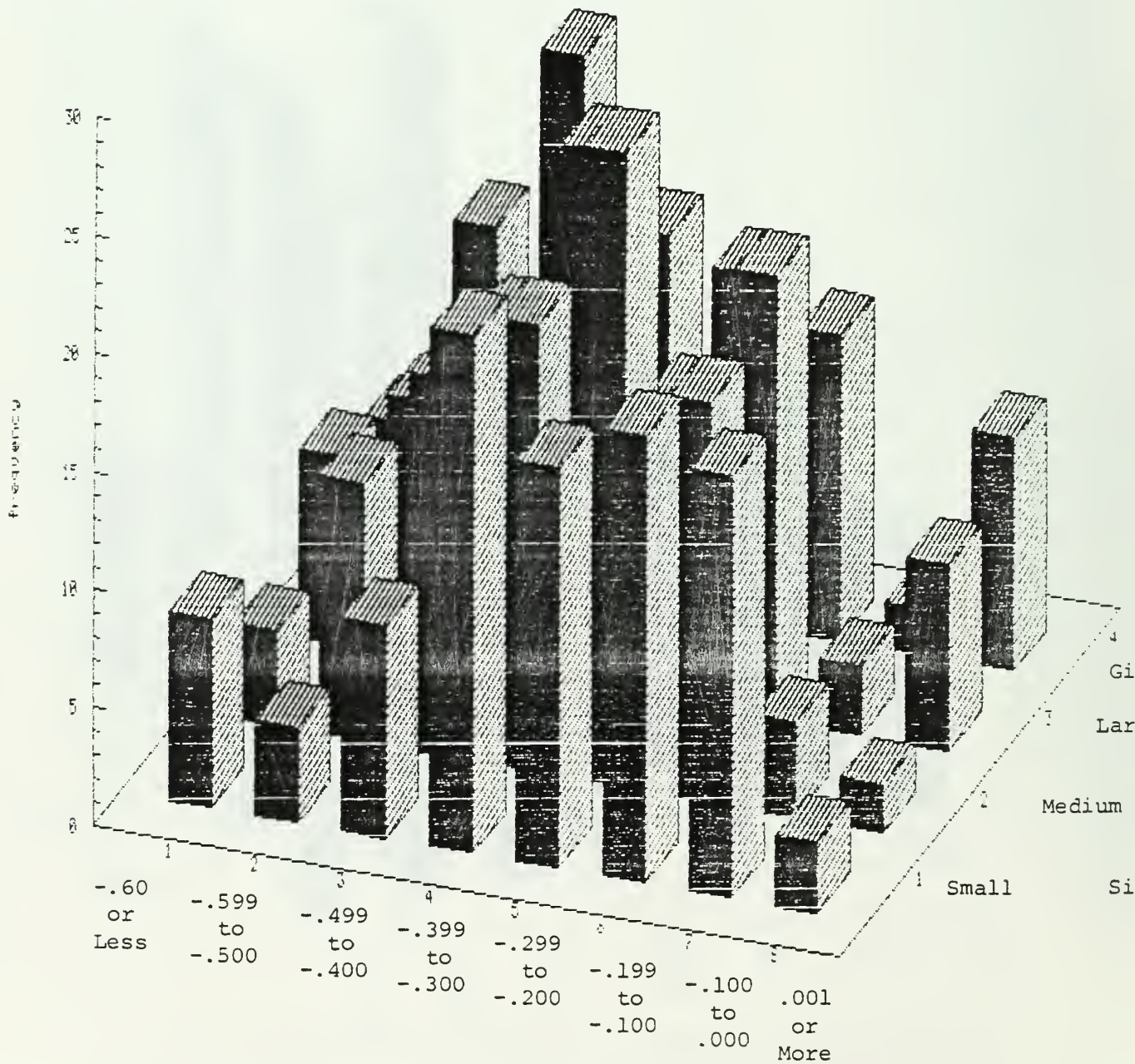
Profiles of Net Operating Cash Flow Components  
For Small, Medium, Large and  
Giant Companies in 1986



Net Operating Cash Flow Components

Exhibit 8

Profiles of Net Investment Cash Flow Components  
For Small, Medium, Large and Giant  
Companies in 1986

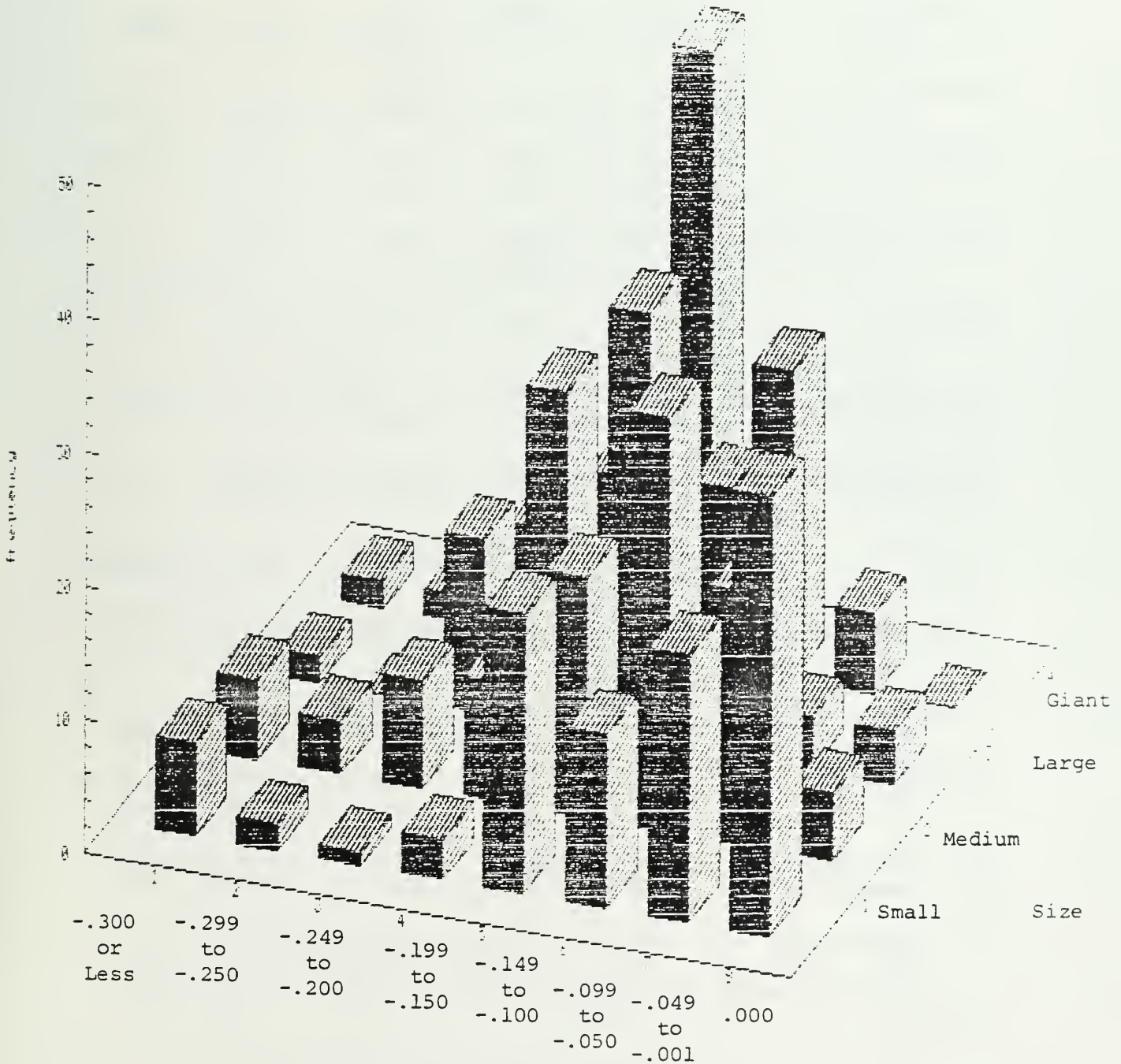


Net Investment Cash Flow Components



Exhibit 9

Profile of Dividend Cash Flow Components  
For Small, Medium, Large and Giant  
Companies in 1986



Dividend Cash Flow Components

Exhibit 10

Polytomous Probit Analysis of 1983-1987  
Value Line Safety Rankings Using 1982-1986 Cash Flow Components

Cash Flow Component/ Total Cash Flow	Coefficient (t-value)				
	1982	1983	1984	1985	1986
Intercept	2.517*** (2.857)	3.054*** (3.283)	2.178 (2.810)	2.682*** (3.535)	2.424*** (3.336)
Operations	-.202 (-.231)	-.793 (-.894)	-1.268 (-1.554)	-.484 (-.640)	.105 (.139)
Receivables	1.076 (1.162)	-.711 (-.713)	-1.346 (1.599)	.389 (.501)	-.730 (-.854)
Inventory	-1.060 (-1.160)	.593 (.675)	-2.062 (-2.329)	.969 (-1.304)	-2.110** (-2.541)
Other Current Assets	.096 (.071)	3.080** (2.069)	1.261 (1.064)	1.698 (1.290)	-.923 (-.691)
Payables	1.481 (1.171)	.027 (.019)	-4.537*** (-2.918)	-2.774* (-1.897)	-.351 (-.255)
Other Current Liabilities	-.144 (-.150)	-.201 (-.176)	-2.683*** (-2.689)	-1.309 (-1.303)	-1.403 (-1.271)
Other Assets & Liabilities	2.510*** (2.991)	.684 (.861)	-1.302 (-1.599)	-.131 (-.178)	-.261 (-.375)
Financing	.915 (1.473)	1.765*** (2.807)	-.644 (-1.138)	.245 (.476)	.198 (.388)
Fixed Coverage	-3.103** (-2.014)	-2.475 (-1.390)	-5.778*** (3.282)	-3.784** (-2.210)	-4.551** (-2.536)
Investment	2.362*** (3.227)	2.207*** (2.853)	.224 (.335)	1.585*** (2.666)	1.795*** (2.700)
Dividend	6.549*** (5.237)	7.434*** (5.709)	5.563*** (4.255)	6.781*** (5.139)	7.336*** (5.098)
Total Cash Flow/ Total Assets	1.540 (.919)	1.148 (.611)	1.131 (8.23)	.452 (.302)	-1.052 (-.695)
# of Observations	190	193	202	198	208
-2 x Log Likelihood Ratio	76.363	97.090	79.856	70.106	79.549

\* = 10%      \*\* = 5%      \*\*\* = 1% level of significance

Exhibit 11

The Accuracy of the 1982-1986 Cash Flow Components in  
the Probit Model in Classifying Companies  
According to Their 1983-1987 Value Line Safety Ranking

1987 Ranking

	<u>Number</u>	<u>Classified</u>				<u>Total</u>
		1	2	3	4	
	1	19	0	18	0	37
	2	8	0	33	0	41
Actual	3	3	0	120	0	123
	4	0	0	7	0	7
	Total					208

	<u>% of Total</u>	<u>Classified</u>				<u>Total</u>
		1	2	3	4	
	1	51.35	0	48.64	0	100
	2	19.51	0	80.49	0	100
Actual	3	2.44	0	97.56	0	100
	4	0	0	100.00	0	100
	Total percent classified correctly					66.83

1986 Ranking

	<u>Number</u>	<u>Classified</u>				<u>Total</u>
		1	2	3	4	
	1	14	4	16	0	34
	2	9	2	38	0	49
Actual	3	6	2	98	0	106
	4	0	0	9	0	9
	Total					198

	<u>% of Total</u>	<u>Classified</u>				<u>Total</u>
		1	2	3	4	
	1	41.18	11.76	47.06	0	100
	2	18.37	4.08	77.55	0	100
Actual	3	5.66	1.89	92.45	0	100
	4	0	0	100.00	0	100
	Total percent classified correctly					57.58

Exhibit 11 (continued)

1985 Ranking

	<u>Number</u>	Classified				Total
		1	2	3	4	
	1	14	6	14	0	34
	2	10	1	36	0	47
Actual	3	4	2	106	0	112
	4	0	0	9	0	9
	Total					202

	<u>% of Total</u>	Classified				Total
		1	2	3	4	
	1	41.18	17.65	41.18	0	100
	2	21.28	2.13	76.60	0	100
Actual	3	3.57	1.79	94.64	0	100
	4	0	0	100.00	0	100
	Total percent classified correctly					59.90

1984 Ranking

	<u>Number</u>	Classified				Total
		1	2	3	4	
	1	18	0	19	0	37
	2	14	0	25	0	39
Actual	3	6	0	100	0	106
	4	0	0	7	3	10
	Total					192

	<u>% of Total</u>	Classified				Total
		1	2	3	4	
	1	48.65	0	61.35	0	100
	2	35.90	0	64.10	0	100
Actual	3	5.86	0	94.34	0	100
	4	0	0	70.00	30.00	100
	Total percent classified correctly					63.02

Exhibit 11 (continued)

1983 Ranking

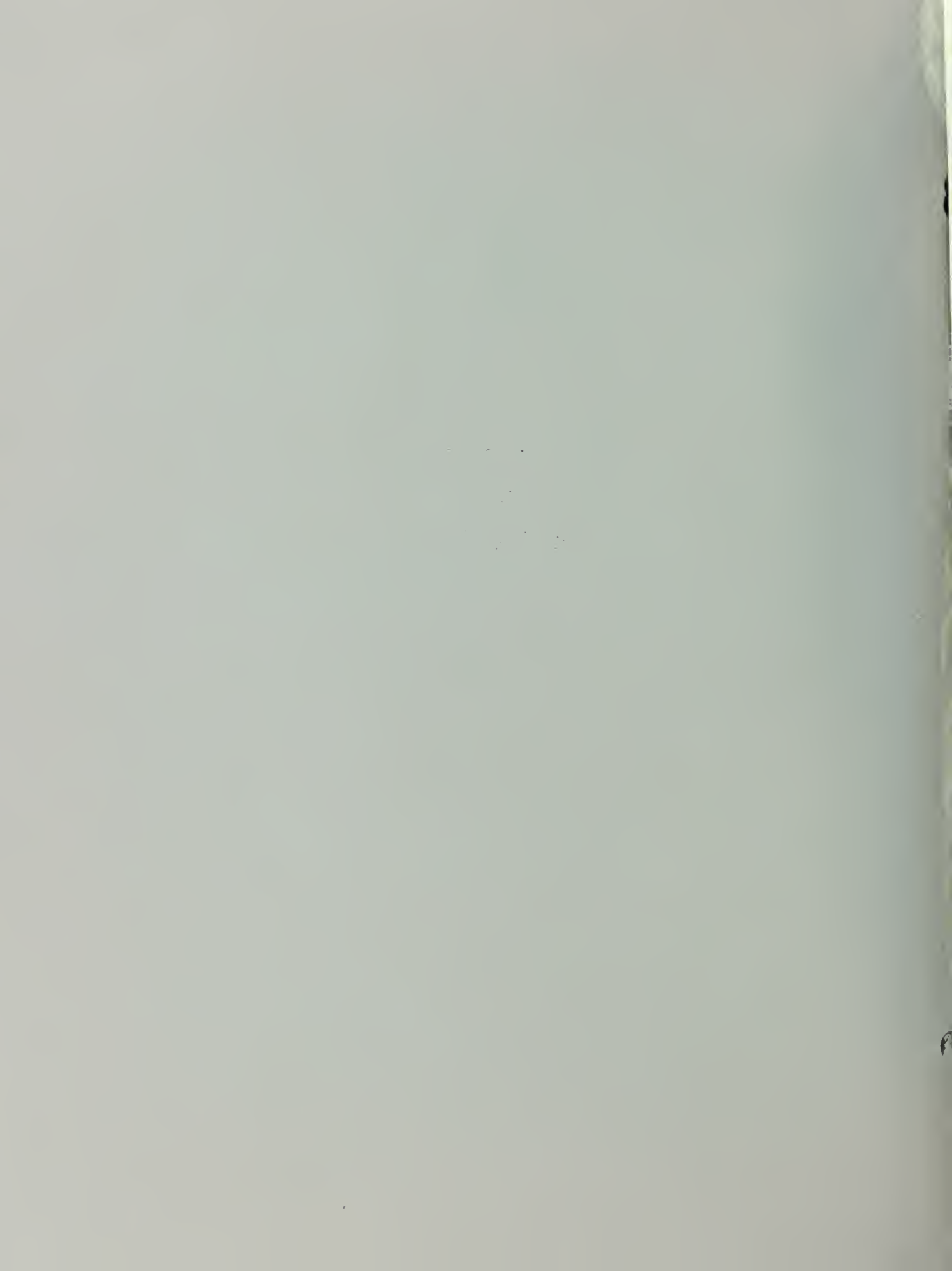
	<u>Number</u>	Classified				Total
		1	2	3	4	
	1	15	2	16	0	33
	2	10	2	35	0	47
Actual	3	5	1	93	0	99
	4	0	0	10	1	11
	Total					190

	<u>% of Total</u>	Classified				Total
		1	2	3	4	
	1	45.45	6.06	48.49	0	100
	2	21.28	4.25	74.47	0	100
Actual	3	5.05	1.01	94.89	0	100
	4	0	0	90.9	9.1	100

Total percent classified correctly 58.947













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