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Number 38 – Summer 1993/94

Die
Beleggings-
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Tydskrif

Nommer 38 – Somer 1993/94

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This issue in brief

A Two-stage Model for the prediction of corporate failure in South Africa

An accurate evaluation of business failure should be of concern to management and investment analysts. Were it possible to predict failure with a certain degree of confidence, steps could be taken to rectify the negative consequences thereof.

The objective of this research is to undertake an investigation of micro- and macroeconomic variables that are freely available to researchers and which may be used in a failure prediction model. The intention is to obtain a comprehensive, yet simple model which can be used as an overall predictor of PENDING failure.

Determinante van die Kapitaalstruktuur van Genoteerde Suid-Afrikaanse Nywerheidsmaatskappye: 1970-1990

This paper examines the relationships between capital structure and a number of independent variables representative of so-called determinants of capital structure. The determinants are derived from empirical studies that have been conducted internationally.

The aim is to investigate the influence of industry classification, size, operating leverage, growth and profitability of a company on the use of debt. In order to enhance the explanatory power of the exercise, different measures of debt are established, e.g. total debt, long-term debt, current liabilities and interest bearing debt. Multiple regression analysis is used to determine the nature of the relationships.

An Analysis of the Price/Earnings Ratio of the Industrial Sector of the JSE

This paper attempts to identify the significant hypothesised determinants of the aggregate Price/Earnings multiple of the industrial index of the JSE. Four variables, the payout ratio, return on equity, the debt/equity ratio and the average growth in dividends are identified as having a statistically significant association with the aggregate Price/Earnings ratio. A regression model is derived from the analysis. The model is useful both as a tool for forecasting future earnings in the industrial sector and for its interpretive power.

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Inhoud

The P/E Ratio and the Cost of Equity Capital

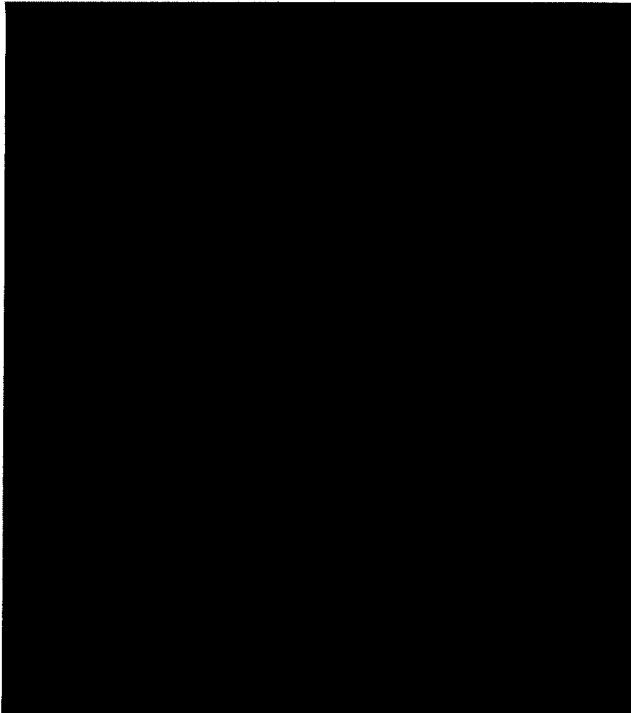
The cost of equity capital is an elusive measure that is not well understood. The paper aims to clarify a common misconception: namely that this cost is given by the reciprocal of the price/earnings ratio (earnings yield) of the firm. The relationship between the P/E ratio and the firm's cost of equity capital is presented. The factors underlying the P/E ratio at which the firm sells, and hence the determinants of the share price, are discussed.

Cash flow ratios – Investment Basics XXVIII

The incorporation of cash flow ratios into the analysis process has been rather slow and is very much overdue. Current literature has not provided an abundance of current ratios to be used. Companies should be encouraged to include cash flow ratios in their five or ten-year statistical summaries. Ratios in isolation are of little value. By studying cash flow ratios over a longer period, the reader should be able to form an idea as to different norms for different companies and/or industries.

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Bo en behalwe ons adverteerders, het die onderstaande maatskappye hulp verleen met die finansiering van hierdie uitgifte van die tydskrif en hulle word bedank vir hulle vriendelikheid.



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The Investment Analysts Journal

Thirty-eighth issue – Summer 1993/94

There was always danger in setting a date for a general election before agreement had first been reached on a new and final constitution. The danger was that disagreement would fill the time between the setting of the election date and the election date itself making it necessary to postpone the planned voting or to go ahead with it in a context of heightened recrimination and violence. That is what we are witnessing at present. Our last editorial referred to the possibility of a Transitional Executive Council (TEC) being instituted by the end of June 1993. Now we will be lucky if such a body is in place by the end of October. The life of the contemplated TEC, squeezed between continued political bickering and 27 April 1994, is shrinking by the day.

The negotiations situation, however, is not as confused as it might appear to be. Although superficially storm in the form of dispute and conflict are the 'order' of the political day, and violence is escalating, beneath the surface calmer waters prevail. The impression of dispute and conflict is created especially by Inkatha but it is being helped in this by the other members of the Cosag alliance, a strange conglomeration of parties whose cohesion derives solely from their mutual dislike of the ANC and mistrust of the government. 'The enemy of my enemy is my friend' has never been a philosophy for the formulation of any durable policy or strategy.

Its lack of political cohesion, however, is not the only problem with Cosag. Within its separate parties contradictions and inconsistencies also abound which must justify both suspicion and mistrust. Take Inkatha as an example. If the surveys of popular opinion that have been published are any guide, it remains largely a Zulu-based organisation which is losing ground even within its main constituency. It has no mass following outside that provided by Zulus but even amongst them it is contracting because of demographic shifts. Its support is largely derived from an older generation not surprisingly more committed to tribal values. Amongst the youth, its support is shrinking, and the youth today constitute the great majority of all African communities. What Inkatha is gaining in a white switching from the National Party, most importantly in Natal, is being more than offset by losses amongst young people to the ANC. There is a possibility that Inkatha would even lose an election in Natal were one to be held today. A referendum on the new constitution (an issue) rather than a general election (a matter of party political support) would obviously suit its position best in the political tug-o-war that is developing.

The right-wing parties of the Afrikaner Volksfront are no less bedevilled by inconsistencies and anomalies. There is little shared philosophically speaking by the Afrikaans Volksunie and the HNP, or by the CP and the AWB, other than the sentiments of extended family and general agreement that a territorial underpinning of Afrikaner national life is essential to any claims to sovereignty. More importantly, there is no agreement as to where the volkstaat should be, each group (those in Northern Natal and those in the Northern Transvaal, those in the OFS and those in the Western Transvaal) wanting it to incorporate the region immediately surrounding their own farms. What is overlooked, even by General Constand Viljoen, is that the Afrikaner has changed socio-economically. In these terms, Afrikaners have long ceased to be predominantly farmers or poor whites. Forty-five years of NP rule have seen them

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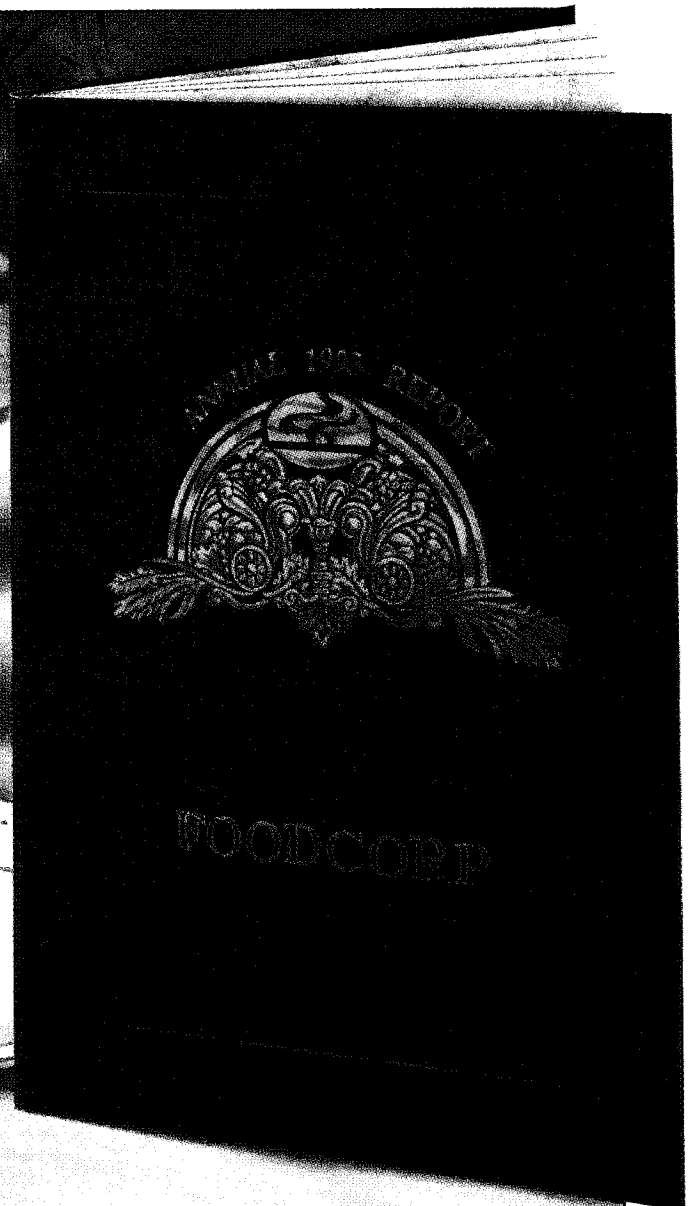
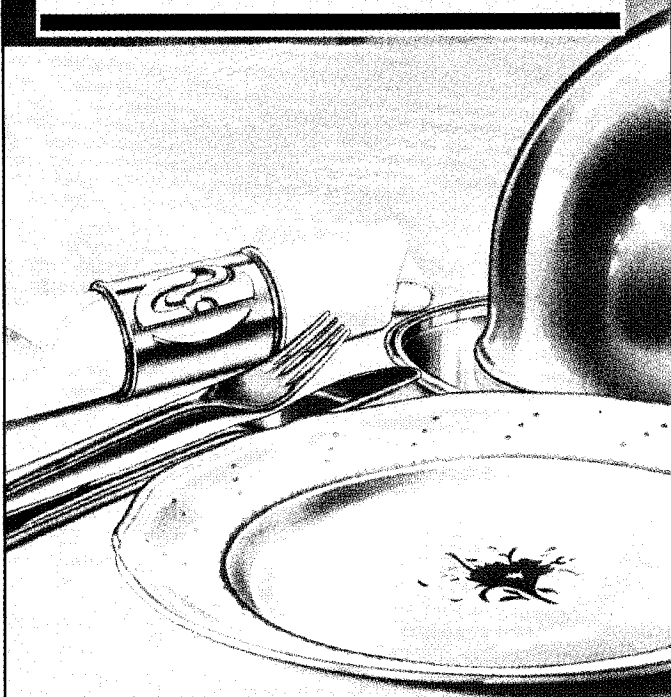
Daar was altyd gevaar daarin om 'n verkiesingsdatum vas te stel voordat 'n ooreenkoms eers bereik is aangaande 'n nuwe en finale grondwet. Die gevaar was dat die tyd tussen die bepaling van 'n verkiesingsdatum en die verkiesing self gevul sou wees met wedersydse verskille wat dit nodig mag maak om die beplande stemming uit te stel of om daarmee voort te gaan te midde van toenemende wedersydse verwyte en geweld. Dit is wat ons tans waarneem. Ons vorige redaksionele kommentaar het verwys na die moontlikheid om 'n Uitvoerende Oorgangsraad in te stel teen die einde van Junie 1993. Nou sal ons gelukkig wees as so 'n liggaam teen die einde van Oktober in plek is. Die leeftyd van hierdie beplande oorgangsgesag, ingeperk tussen voortgesette politieke rusies en 27 April 1994, krimp by die dag.

Die onderhandelingsituasie is egter nie so chaoties as wat dit blyk te wees nie. Alhoewel dit op die oppervlakte lyk asof storms in die vorm van dispute en konflik aan die orde van die politieke dag is, en geweld steeds toeneem, bestaan daar kalmer water onder die oppervlakte. Die indruk van dispuut en konflik word veral deur Inkatha geskep, wat hierin gehelp word deur die ander lede van die Cosag alliansie, 'n vreemde konglomerasie van partye wat kohesie vind uitsluitlik op grond van hul onderlinge afkeer van die ANC en wantroue in die regering. "Die vyand van my vyand is my vriend" was nog nooit 'n filosofie op grond waarvan 'n duursame beleid of strategie geformuleer kon word nie.

Gebrek aan politieke kohesie is egter nie die enigste probleem binne Cosag nie. Tussen die verskillende partye is daar ook teensprake en inkonsekwentheid teenwoordig wat tot suspisie en wantroue moet lei. Neem Inkatha as 'n voorbeeld. As opnames van populêre opinies wat gepubliseer is enigsins as 'n gids kan dien, bly Inkatha hoofsaaklik 'n Zoeloe-gebaseerde organisasie wat besig is om grond te verloor selfs onder sy eie ondersteuners. Inkatha het geen breë gevolg nie buiten dit wat deur Zoeloes verskaf word, maar selfs onder hulle is dit besig om te krimp as gevolg van demografiese verskuivings. Sy steun is hoofsaaklik afkomstig van 'n ouer generasie wat nie verbasend nie 'n verbintenis het met tradisionele stamwaardes. Onder die jeug is Inkatha se ondersteuning besig om te krimp en vandag maak die jeug die oorgrote meerderheid van alle Swart gemeenskappe uit. Wat Inkatha besig is om te wen in terme van blankes wat oorskakel vanaf die Nasionale Party, veral in Natal, word meer as prysgegee deur verliese na die ANC onder jong mense. Daar bestaan die waarskynlikheid dat Inkatha selfs 'n verkiesing in Natal sal verloor as een vandag gehou sou word. 'n Referendum aangaande 'n nuwe konstitusie ('n kwessie), liever as 'n algemene verkiesing ('n saak van party-politieke steun) sal duidelik Inkatha se posisie die beste pas in die politieke toutrekkery wat besig is om te ontwikkel.

Die regse partye van die Afrikaner Volksfront word nie minder beduiwel deur inkonsekwentheid en anomalieë nie. Filosofies gesproke is daar baie min in gemeen tussen die Afrikaanse Volksunie en die HNP, of tussen die KP en die AWB, ander dan die sentimente van 'n uitgebreide familie en algemene ineenstemming dat 'n gebiedsbasis nodig is om Afrikaner nasionale lewe se aanspraak op soewereiniteit op te baseer. Meer belangrik nog, daar bestaan geen ooreenstemming waar die volkstaat behoort te wees nie, elke groep (daardie in Noord-

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graduate into business and the professions, into teaching and the civil service, as well as into the police and the SADF. Their readiness to abandon their farms or their firms, or to resign their jobs and to sacrifice their pensions in order to move to some remote place where Afrikaners would be a majority, must be seriously questioned. Sadly, Afrikaner nationalism sought sovereignty through the capture of the State without putting in place the kind of institutions that can only be secured in a country where a majority has existed or has been contrived and where democracy has been able to function. It was a top-down rather than a bottom-up approach to the national sovereignty matter, and it failed. Now the NP having seen, or having been made to see the light, has transformed itself into a non-racial party with a very substantial backing amongst coloureds and Asians as well as amongst whites, and even amongst some blacks. It may not stand much chance of winning the next election, but it does retain the mass support that should still make it a credible partner for the ANC in any transitional powersharing administration and a serious contender for future power.

This brings us back to what is happening beneath the political surface rather than superficially. Between them, the ANC and the NP command the support of the great majority of all South Africans. They are now largely agreed as to what is required in the way of constitutional as well as of economic immediate change. Only the extremes of feelings at the lowest levels of their respective constituencies prevent a more public acknowledgement of the identity of views amongst their respective leaders. Good sense dictates that they do not, however, push ahead in total disregard of the sentiments of smaller parties. They must take along as many of these as they can into the new South Africa. It is for this reason that the smaller parties are being given so much opportunity to create the impression of superficial political dissension at Kempton Park and elsewhere.

But time is running out for the smaller parties. For the two big ones, getting on with the job of constitutional change is becoming an urgent imperative and not least because of the importance of such change to the economy. Sanctions must be lifted. The country's relationship with the IMF and the World Bank must be normalised. The present period of stagnation must be ended. A return to higher levels of growth, both in real GDP and employment terms, must be achieved. The only problem is that some important political problems still remain unresolved. It has not helped the cause of getting agreement now about the future constitution (not just the interim one that will apply immediately after April next year but the final constitution that will come into effect once the Constitutional Assembly has completed its work) that Inkatha has come to assume the leadership of caution and good sense on a particular issue. It would be tragedy if, in brushing Inkatha aside because of its obstructionism with respect to other things, the bigger parties were to end up agreeing too hastily to interim arrangements which resulted in the end in the wrong kind of final constitution being adopted by the country.

THE EDITOR

Natal en daardie in Noord-Transvaal, daardie in die OVS en daardie in Wes-Transvaal) wil dit inkorporeer in die gebied onmiddellik rondom hul eie plase. Wat oor die hoof gesien word, selfs deur Generaal Constand Viljoen, is dat die Afrikaner op sosio-ekonomiese vlak verander het. Op hierdie gebied het Afrikaners lankal opgehou om oorwegend boere of armblankes te wees. Vyf en veertig jaar van NP regering het hul gesien gradueer na die sakelewe en die professies, na opleiding en die staatsdiens, asook na die polisie en die SAW. Hulle gewilligheid om hulle plase en firmas agter te laat, of om hulle werk te bedank en hulle pensioen op te offer om na 'n afgeleë plek te beweeg waar Afrikaners in 'n meerderheid sou wees, moet ernstig bevreemding word. Jammerlik, het Afrikaner nasionalisme gesoek om soewereiniteit te verkry deur die kaping van die staat sonder om daardie soort institusies te vestig wat slegs beveilig kan word in 'n land waar 'n meerderheid bestaan het of waar 'n demokrasie gefunksioneer het. Dit was 'n poging om nasionale soewereiniteit van bo-af na onder, eerder as van onder na bo af te dwing, en dit het misluk. Noudat die NP die lig gesien het, of gedwing is om die lig te sien, het dit getransformeer na 'n nie-rassige party met 'n substansiële gevolg onder Kleurlinge en Asiërs, asook onder blankes, en selfs onder Swartes. Die NP mag nie 'n kans staan om die volgende verkiesing te wen nie, maar dit behou nog die soort ondersteuning wat dit 'n geloofwaardige vennoot vir die ANC in enige oorgangsmagsdelingsadministrasie maak en dit bly 'n ernstige aanspraakmaker op toekomstige mag.

Dit bring ons terug by wat onder die politieke oppervlakte, eerder dan op die oppervlakte self, gebeur. Tussen hulle beheer die ANC en die NP die steun van die oorgrote meerderheid van alle Suid-Afrikaners. Hulle stem nou hoofsaaklik ooreen oor wat nodig is op die pad van konstitusionele, sowel as ekonomiese verandering. Slegs die ekstreme gevoelens onder die laagste vlakke van hulle onderskeie ondersteuners verhoed 'n meer openlike openbare erkenning van die ooreenkoms van sienings tussen die onderskeie leiers. Goeie oordeel dikteer egter dat hulle nie sal vorentoe beur en die sentimente van die kleiner partye totaal sal verontagsaam nie. Hulle moet soveel moontlik saamneem na die nuwe Suid-Afrika. Dit is om hierdie rede dat daar aan die kleiner partye soveel geleentheid gebied word om die indruk van oppervlakkige politieke verskille by Kempton Park en ander plekke te skep.

Maar die tyd is besig om uit te loop vir die kleiner partye. Vir die twee groot partye het dit dringend nodig geword om aan te gaan met die taak van konstitusionele verandering, veral vanweë die belangrikheid hiervan vir veranderinge in die ekonomie. Sanksies moet opgehef word. Die land se verhouding met die IMF en die Wêreldbank moet genormaliseer word. Die huidige periode van stagnasie moet beëindig word. Hoër vlakke van ekonomiese groei, beide in terme van BBP en indiensname, moet bereik word. Die enigste probleem is dat sekere belangrike politieke probleme nog nie opgelos is nie. Dit het nie die saak van die bereiking van 'n ooreenkoms omtrent die toekomstige grondwet gehelp (nie slegs die interim een wat van toepassing sal wees onmiddellik na April volgende jaar nie, maar die finale grondwet wat in effek sal kom nadat die Oorgangsradaad sy taak afgehandel het) dat Inkatha die leierskap van versigtigheid en gesonde verstand aangaande 'n bepaalde kwessie oorgeneem het nie. Dit sal 'n tragedie wees as, deur Inkatha opsy te skuif as gevolg van sy weerstand met betrekking tot ander dinge, die groter partye te haastig sal wees om die interim reëlings aan te gaan met die gevolg dat die verkeerde tipe finale grondwet uiteindelik deur die land aanvaar sou word.

DIE REDAKTEUR

A Two-stage Model for the prediction of corporate failure in South Africa

INTRODUCTION

According to Altman (1983), the foremost writer on the subject, the unsuccessful company can be classified as failed, insolvent or bankrupt. Failure implies "that the realised rate of return on invested capital with allowances for risk considerations, is significantly and continually lower than prevailing rates on similar investments". (Altman, 1983, p6). Altman maintains that insolvency is more specific than failure and refers to the situation where a firm cannot meet its current obligations thereby signifying a lack of liquidity. This position could either be temporary or permanent although once it is permanent, the firm may be regarded as bankrupt.

Argenti (1976), on the other hand, contends that the most definitive words are insolvency, liquidation, receivership and bankruptcy. A company becomes insolvent when it cannot pay its debts as they fall due or when its net asset value is negative. Should this be the case, the company will be placed in the hands of a Receiver who will decide whether the company should continue to trade or whether it should be placed in liquidation. Finally, Argenti contends that only individuals file for bankruptcy.

In the South African context, de la Rey (1981, p11), has defined corporate failure as follows:

Any business:

1. of which the equity became negative.
2. forced to discontinue operations because of the fact that it had committed an act of insolvency and was, as a result thereof, put under judicial management.
3. which could not show a profit for two out of three years.
4. that was unable to pay its preference dividend on time.
5. that was unable to declare an ordinary dividend for that year.
6. that was unable to honour its loan commitments on time according to a contractual agreement.
7. that reduced the nominal value of its share capital to bring it into line with the assets it represents.

Prior research has shown that companies fail primarily due to managerial incompetence. (See Campsey and Brigham, 1984, p665; Moyer, McGuigan and Kretlow, 1984, p717; Argenti 1976, p122).

Ineffective or poor management leads to mistakes in formulating a strategic plan and/or in its implementation and ultimately to the demise of the company. Accordingly the main body of research has focussed on the firm-specific, financial factors (microeconomic) which contribute to business failure.

As Altman (1983, p83) points out, however,

"the importance of microeconomic issues and the attendant large number of analytical studies have obscured the relevance and influence of macroeconomic influences on the business failure phenomenon".

It is appropriate therefore that the scope of the research be extended to incorporate [into a failure prediction model] the macroeconomic variables which affect business failure.

In essence, the success or otherwise of any business is influenced by two major sets of factors. Firstly, performance is influenced by a variety of internal factors which are firm-specific and which management is generally able to control. These may be classified as microeconomic variables and consist of both financial and non-financial variables. The financial variables are specifically those ratios which can be extracted from

a company's financial statements, as these are the only financial reports to which researchers have access. The non-financial variables could also reflect the financial state of the business. There are a variety of these factors, some of which may be obtained from the financial accounts of a company.

Secondly, performance is influenced by a number of macroeconomic factors which are external to the firm and which in most instances are beyond the control of management. Overall economic conditions have a direct bearing on the activities of individual firms for during periods of economic recession, money and capital market conditions are significant factors in the financial well-being of a firm. Participants in these markets may be unwilling to extend credit to those firms which are mismanaged or which are financially unstable. This could lead to failure and ultimately liquidation.

This paper seeks to combine the two sets of macro- and microeconomic factors in a simple, yet comprehensive, model of corporate failure. As will be seen, the factors cannot be combined in a single stage when evaluating failure and a two-stage model is proposed.

PRIOR RESEARCH

1. The microeconomic variables.

(a) The firm-specific financial variables.

A large body of research has been concerned with the establishment of failure prediction models based on conventional financial ratios extracted from the relevant company's financial statements. See Altman, (1984), for a comprehensive review of the literature starting with Beaver, (1966). The more recent publications on failure prediction models centre on the efficacy of the statistical techniques used in establishing the model. See Deakin (1972), Eisenbeis (1977), Ohlson (1980), Zavgren (1985), Goudie (1987) and in the South African context, Court and Radloff (1990).

More recently, Hing-Ling Lau (1987) departed from the use of a dichotomous dependent variable (failed/non-failed) to an ordinal dependent variable which could assume any one of five states of increasing severity. Using multinomial logistic regression analysis, Hing-Ling Lau determined the probability that a firm will enter one of these states and hence produced a measure of the firm's financial position on a continuous scale. This method highlighted pre-failure distress as well as ultimate failure.

Limited research has been undertaken into the firm-specific financial factors which contribute to corporate failure in South Africa: the most notable published work being that of Strebel and Andrews (1977), de la Rey (1981), Court and Radloff (1990) and Olivier (1992).

(b) The firm-specific non-financial variables.

Some research has been conducted into the firm-specific non-financial variables which could indicate failure.

Although Ahlson (1980) did not specifically address the need to include non-financial variables in a failure prediction model, he found that undue delay in presenting the audited financial statements of US companies could bias the predictive ability of a model. He concluded that the use of company financial statements whose publication date had been delayed, influenced the classification accuracy of the specific model.

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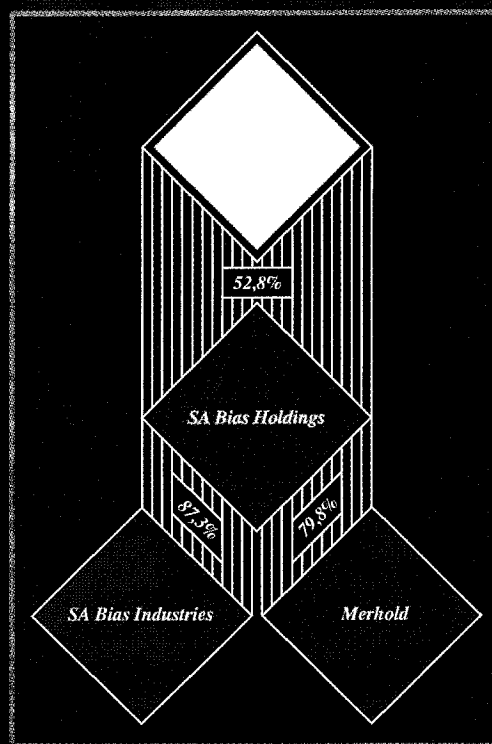
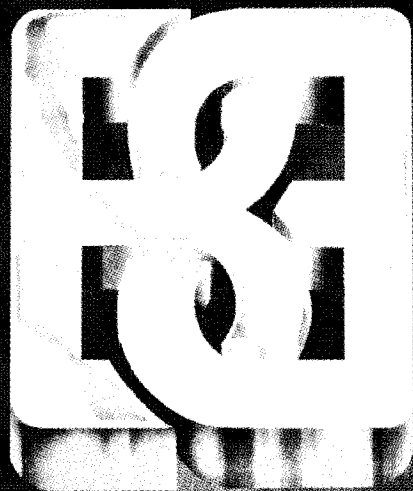
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Lawrence (1983) specifically investigated the significance of a delay in publishing the audited financial statements of American companies. Although not seeking to incorporate this variable into a failure prediction model, he concluded that by ignoring this variable in the year before failure, statistical bias was introduced into the model.

Whitted and Zimmer (1984) investigated the effect of reporting delays on the Sydney Stock Exchange. They found that reporting delays were statistically significant for the two years prior to failure. On the other hand, the inclusion of this variable in a failure prediction model did not result in any significant improvement in its predictive ability.

Peel, Peel and Pope (1986) were the first to incorporate the non-financial variables which could contribute to corporate failure together with conventional financial ratios in a failure prediction model. The significance of eight financial and non-financial independent variables was tested against a sample of thirty-four failed and forty-four non-failed companies using conditional logit analysis at a 5% level of significance. In the main, the research indicated that the addition of non-financial variables to a conventional failure prediction model leads to a marked improvement, both in terms of explanatory and of predictive ability, in the model. In particular, the lag in publishing the financial statements was identified as a significant predictor when combined with conventional financial ratios.

Keasey and Watson (1988) investigated the extent to which reporting delays affected small companies in the UK. Although they concede that the size of companies affects their "propensity to submit accounts", they conclude that it is possible to develop cost effective monitoring procedures for small companies when predicting failure.

Merks (1986) evaluated the significance of certain non-financial variables using South African data for the period 1972 to 1986. He found that three variables: changes in director shareholdings, the lag in publishing financial statements and shareholder approval for directors to increase gearing could be significant contributors in a model using multiple regression.

Court (1992) applied the variables used by Peel *et al* (1986) to the South African context. He concluded that certain non-financial variables are significant predictors of corporate failure and in fact showed greater predictive ability than a model containing only financial ratios. When these variables were combined with the financial ratios in a failure prediction model, the accuracy of the model improved from 66,7% to 100% in the year prior to failure.

2. The macroeconomic variables.

Very little research has been conducted into the macroeconomic factors which contribute to business failure. The first paper of any note was that of Rose, Andrews and Giroux (1982) who maintain that failure is more likely to occur in an economic downturn. In a lagged regression model based on the United States economy, they found that six variables were significant predictors of failure and explained 91% of the variance in the business failure rate (BFR).

Altman (1983) also investigated the aggregate effect of various economic variables on the BFR in the USA using failure statistics compiled by Dun and Bradstreet over the period 1951–1978. Altman expected the explanatory variables to have a coincident association with the BFR which in some instances could be lagged. He accordingly observed the structure, amount and the significance of the various lagged periods coefficients by using the percentage changes in the variables (where appropriate) to re-

move the exponential trend effect over time. The research indicated that four variables contributed cumulatively to a greater propensity to fail: these were changes in real gross domestic product, the Standard and Poor index, the money supply and new business incorporations.

Altman did not attempt to relate these variables to the firm-specific variables which contribute to corporate failure.

He felt that in so much as the firm-specific financial ratios can be assigned specifically to the dichotomous dependent variable, the macro-variables relate to both the failed and non-failed firms and are represented by a continuous variable. For this reason, he made no attempt to establish a more comprehensive model for the prediction of corporate failure.

Goudie (1987) realised the need to incorporate the macroeconomic variables in a model of corporate failure if its predictive ability was to be enhanced. As such, he focussed on what he believed were the two central issues in the prediction of corporate failure. Firstly that there be a maximum period of forewarning of impending failure and secondly that the projective efficiency of the model be enhanced with reference to future macroeconomic developments. Goudie therefore linked the traditional multivariate discriminant model with the multisectorial model of the UK economy developed at Cambridge University.

Goudie began with a general evaluation of the financial ratios which affect corporate failure in the UK. In order to extend the period of forewarning of failure, Goudie attempted to project the individual company's financial performance by estimating the cash flow for each company for the following year. From this information, the company's pro-forma accounts were constructed and the failure prediction score calculated for each company for the following year. Firms were thereafter classified as either "financially sound" or "in severe financial difficulty". Finally, Goudie sought to integrate the firm-specific model with a dynamic model of the UK economy developed at Cambridge University.

This research is an advance on Altman's work in that it is able to incorporate the macroeconomic variables which impinge on the business failure rate. On the other hand it lacks statistical precision although it establishes a framework for further investigation.

Court and Barr (1989) applied Altman's work in the South African context. They chose seven categories of economic variables when investigating the BFR and applied a factor analysis to the chosen variables in order to investigate their interrelationship. Four factors were found to have a bearing on the BFR. Four variables were accordingly chosen to represent these factors and their significance was examined using stepwise regression analysis.

Ultimately, visits by foreigners lagged for two months (representing socio-economic conditions) and total advances from the banking sector lagged for four months (representing money market conditional), were significant predictors of the BFR at a 10% level.

RESEARCH METHODOLOGY

This paper attempts to establish a failure prediction model using both macro- and microeconomic variables. This cannot be achieved in a single regression model and a two-stage model is developed. In the first stage the significant macro- and microeconomic variables in predicting business failure are established. In the second stage, all the relevant information is combined into a model which will establish a range of failure prediction scores.



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STAGE ONE

When assessing the macroeconomic environment, the dependent variable is the BFR which is observed on a monthly basis. Certain macroeconomic variables were selected to represent the independent variables and their interrelationship examined using factor analysis. Based on the results of the factor analysis, specific variables were chosen to represent the factors and, due to the sequential nature of these variables, the significance of these variables in their lagged form was examined using a polynomial distribution lag. Finally the lagged variables were tested for significance using regression analysis and the BFR was estimated on a monthly basis.

At the same time a sample of microeconomic variables was arbitrarily selected to represent the independent variables in the prediction of failure. Factor analysis was again used to investigate their interrelationship and to assist in the reduction of the predictor variables. The significance of the financial and non-financial variables was then examined using multivariate discriminant analysis.

STAGE TWO

In the second step, a Bayes-Fisher discriminant analysis (Huang and Li, 1991) was performed on the significant microeconomic variables in order to obtain a failure prediction score for different levels of the BFR. In this way a range of failure scores allied to the BFR was obtained.

In the Bayes-Fisher discrimination method knowledge of the probability density functions of the populations, failed or non-failed companies, is not required but use is made of the BFR estimated previously as the prior probabilities of the populations.

In particular, assume that we have two random samples from the two populations consisting of the three financial variables and three non-financial variables. If the means, covariance matrices and prior probabilities of the two populations are denoted by μ_i , v_i and p_i for ($i = 1, 2$), respectively and x denotes a vector of the financial and non-financial variables then the Bayes-Fisher discriminant function is given by:

$$l(x) = 2p_1 p_2 x' (p_1 v_1 + p_2 v_2)^{-1} (\mu_1 - \mu_2)$$

with the failure score (Rhodes-score) determined by:

$$\text{Rhodes-score} = p_2 l(\mu_1) + p_1 l(\mu_2)$$

THE RESULTS

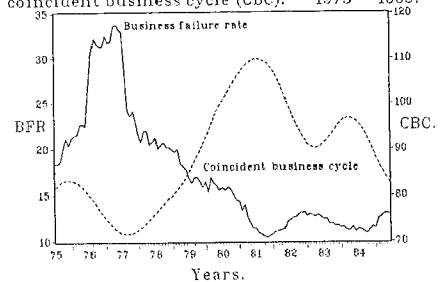
1. The macroeconomic variables.

The BFR was obtained as follows. The monthly liquidations and deregistrations was obtained from the Registrar of Companies. The total of these was then divided by the number of registered companies at the end of the period and adjusted in order to obtain the business failure rate per 10 000 companies.

A graphical representation of the BFR and the coincident business cycle in South Africa over the period 1975 to 1985 appears in Figure 1. The period chosen was regarded as being typical of an economic cycle.

From Figure 1 it can be seen that the BFR peaks during 1977 and drops to a low in 1982. Thereafter, until the end of 1985, the trend appears to be upward although at a significantly lower rate than in 1977. The figure supports the contention of Rose *et al* (1982, p21) that the BFR and the business cycle are negatively correlated.

Figure 1: The business failure rate (BFR) and the coincident business cycle (CBC), 1975 - 1985.



APPENDIX 1

SUMMARY OF THE ECONOMIC VARIABLES USED IN THE INVESTIGATION OF THE BUSINESS FAILURE RATE.

CATEGORY	ECONOMIC VARIABLE
Economic growth	Gross domestic product Corporate profits
Money market activity	Money supply Real rate of interest Total advances from banks
Capital market	Share prices activity Share transactions Bank debt
Price level changes	Consumer price index Production price index
Socio-economic conditions	Gold price Terms of trade
Social-political conditions	Visits by foreigners Ratio of emigrants to immigrants Exchange rate

Fifteen economic variables, which appear in Appendix 1, were selected to represent the independent variables and their interrelationship examined using factor analysis. After rotating the variables in a varimax manner, four factors emerged with eigenvalues greater than one. These factors explained approximately ninety percent of the variance in the data set. The results of the factor analysis appear in Appendix 2.

APPENDIX 2

SORTED ROTATED FACTOR LOADINGS (PATTERN)

	Loading
Factor 1	
Money Supply	0,88
Total advances	0,84
Consumer price index	0,84
Emigrants/immigrants	-0,81
Factor 2	
Exchange rate	0,95
Terms of rate	0,89
Real rate of interest	0,81
Index of corporated profits	-0,63
Factor 3	
Value of share transactions	0,98
Share price transactions	0,93
Gold price	0,87
Bank debt	0,55
Factor 4	
Tourists	-0,79
Production price index	0,80

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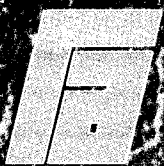
There has to be a happy medium between the need for industrial development and the desire to protect our natural resources: a middle ground where conservation and consumption can co-exist in harmony.

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Factor one can be characterised as a money market activity, factor two related to the general level of economic activity, factor three reflects capital market activity, while factor four represents the political environment. The four variables chosen to represent the four factors were:

- (i) total advances from the banking sector;
- (ii) the index of corporate profits;
- (iii) the value of share market transactions;
- (iv) the number of tourists visiting South Africa.

In order to establish the lagged structure of the four variables, a polynomial distributed lagged structure was incorporated into the regression analysis. The lag distribution schedule of the chosen factors is given in Appendix 3.

**APPENDIX 3
LAG DISTRIBUTION SCHEDULES OF SELECTED VARIABLES**

Lag Distribution of TOTR3	Lag	Coef	S.E.	T-Stat
	0	0.01317	0.03940	0.33422
	1	-0.02259	0.02205	-1.02466
	2	-0.04984	0.00940	-5.29932
	3	-0.06858	0.00839	-8.17020
	4	-0.07880	0.01447	-5.44604
	5	-0.08052	0.01867	-4.31334
	6	-0.07373	0.01993	-3.70028
	7	-0.05842	0.01817	-3.21564
	8	-0.03461	0.01375	-2.51788
	9	-0.00229	0.00898	-0.25454
	10	0.03855	0.01335	2.88679
	11	0.08789	0.02685	3.27336
0	Sum	-0.32977	0.01340	-24.6176

Lag Distribution of CPR3	Lag	Coef	S.E.	T-Stat
	0	9.38315	4.69078	2.00034
	1	2.25505	2.58119	0.87365
	2	-3.27885	1.01670	-3.22499
	3	-7.21856	0.94165	-7.66584
	4	-9.56407	1.72167	-5.55511
	5	-10.3154	2.23187	-4.62186
	6	-9.47249	2.37190	-3.99363
	7	-7.03541	2.13514	-3.29506
	8	-3.00412	1.55348	-1.93380
	9	2.62136	0.89189	2.93911
	10	9.84103	1.51131	6.51159
	11	18.6549	3.22964	5.77616
0	Sum	-7.13338	2.51416	-2.83729

Lag Distribution of VOVR3	Lag	Coef	S.E.	T-Stat
	0	0.00259	0.00547	0.47223
	1	0.00034	0.00268	0.12498
	2	-0.00148	0.00079	-1.88129
	3	-0.00256	0.00151	-1.88692
	4	-0.00380	0.00252	-1.50603
	5	-0.00431	0.00301	-1.43296
	6	-0.00439	0.00293	-1.49744
	7	-0.00403	0.00229	-1.75733
	8	-0.00324	0.00119	-2.73332
	9	-0.00202	0.00118	-1.71103
	10	-0.00036	0.00341	-0.10492
	11	0.00174	0.00637	0.27233
0	Sum	-0.02183	0.00654	-3.33709

Lag Distribution of VTR3	Lag	Coef	S.E.	T-Stat
	0	-0.16266	0.06190	-2.62781
	1	-0.12858	0.03152	-4.07901
	2	-0.09754	0.00879	-11.0957
	3	-0.06954	0.01321	-5.26574
	4	-0.04459	0.02462	-1.81082
	5	-0.02268	0.03039	-0.74622
	6	-0.00381	0.03011	-0.12668
	7	0.01201	0.02378	0.50494
	8	0.02478	0.01176	2.10731
	9	0.03452	0.00971	3.55364
	10	0.04120	0.03364	1.22498
	11	0.04485	0.06463	0.69394
0	Sum	-0.37204	0.08606	-4.32318

The results of the initial regression analysis using the Auto-regressive one technique (ARI) showed that the index of corporate profits and the value of share market transactions are not significant predictors of the BFR and they were eliminated from the investigation. In the final analysis, total advances from the banking sector was significant at the 6% level while visits by foreigners was highly significant. The results of the regression analysis are presented in Appendix 4.

**APPENDIX 4
LEAST SQUARES REGRESSION ANALYSIS ON THE TWO SIGNIFICANT LAGGED VARIABLES INCORPORATING AUTO-REGRESSION.**

Variable	Coefficient	Std. error	T-stat	2-Tail Sig
Const	21,019	4,177	5,03	0,00
TOTR3(-4)	-0,914	0,102	-1,89	0,06
VTR3(-2)	-0,351	0,077	-4,59	0,00
AR(1)	0,960	0,039	24,80	0,00
R-squared	0,982	Mean of dep.var.	17,232	
Adj R-squared	0,981	S.D. of dep. var.	6,812	
S.E. of regression	0,940	Sum of squared resid.	88,376	
Durbin-Watson stat	1,532	F-statistic	1769,172	
Log likelihood	-139,105			

2. The microeconomic variables

Twenty-one variables were arbitrarily selected to represent the microeconomic variables which could be used in the prediction of corporate failure. As discussed, a factor analysis was initially conducted on these variables in order to assist in the selection of the variables with the best predictive ability.

After the variables had been rotated in a varimax manner, six factors emerged with eigenvalues greater than one. The first three factors reflected specific financial ratios while the last three pointed to non-financial variables. These factors explained eighty-eight percent of the variance in the data set. The results of the factor analysis appear in Appendix 5.

**APPENDIX 5
SORTED ROTATED FACTOR LOADINGS**

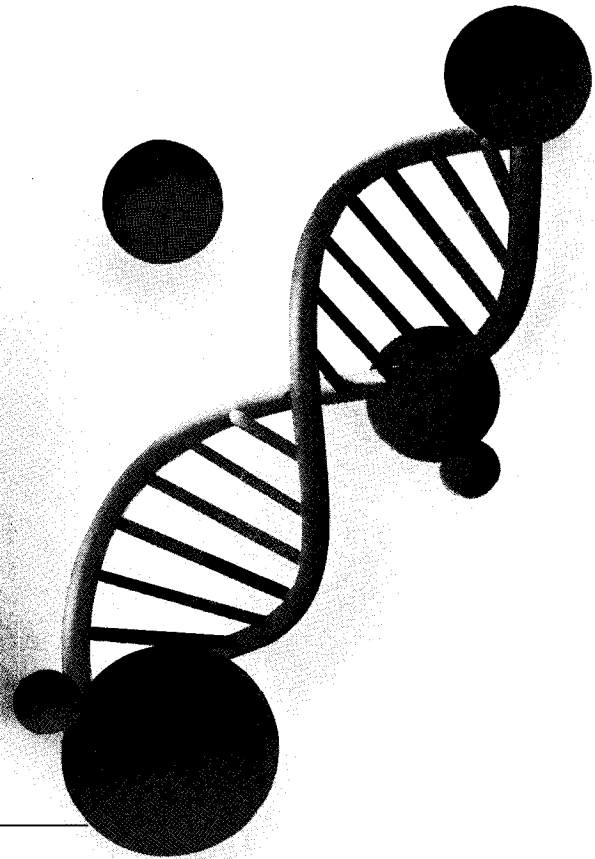
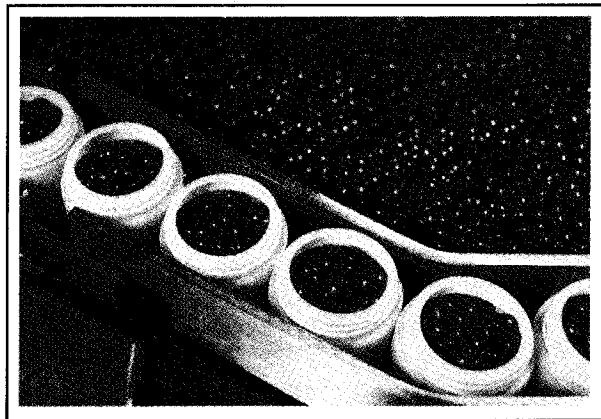
Factor	Loading
Factor 1	
Profit before interest after tax/Total assets	0,955
Retained earnings/Total assets	0,946
Profit after interest and tax/Total assets	0,934
Profit after interest but before tax/Total assets	0,818
Operating profit/Operating assets	0,818
Profit before tax/Total current liabilities	0,783
Factor 2	
Current assets/Total debt	0,968
Total current assets/Total current liabilities	0,940
Profit after tax/Total long term debt	0,654
Factor 3	
Total debt/Total assets	- 0,780
Total owner's interest/Total funds	0,780
Profit before interest and tax/Interest paid	0,743
Factor 4	
Director resignations and appointments	0,948
Director resignations and appointments/ Number of directors	0,948
Factor 5	
One year lag in director shareholding	0,987
Director shareholding	0,978
Factor 6	
Change in delay in published financial statements	0,824
Delay in published financial statements	0,546
Total current liabilities/Total funds	- 0,543

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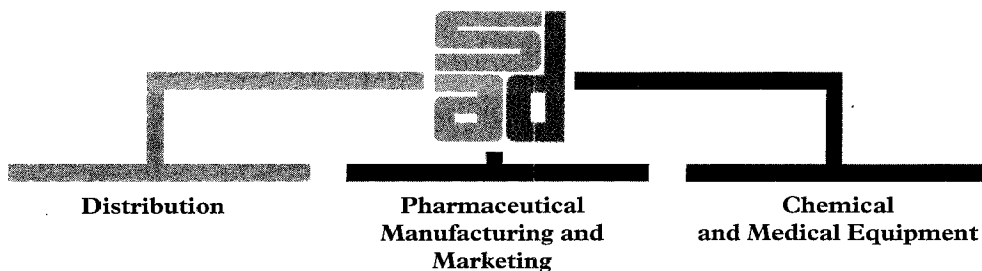


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A Two-stage Model for the prediction of corporate failure in South Africa

Factor one represents a profitability ratio and accounted for thirty-nine percent of the variance in the data. Factor two, which represents a liquidity ratio, contributed fourteen percent of the variability while factor three, which represents a solvency ratio explained twelve percent of the variability in the data.

Factor four which is a reflection of changes to the board of directors accounts for ten percent of the variance explained. Factor five represents director share activity and accounts for seven percent of the variance, while factor six represents the publication of the audited accounts and explains six percent of the variance. Factor six also contains a financial variable (Total current liabilities to total funds).

In the final analysis, the following variables were chosen to represent the six factors in the regression model.

- (i) Profit before interest after tax/Total assets. (X_1)
- (ii) Current assets/Total debt. (X_2)
- (iii) Owners equity/Total capital employed. (X_3)
- (iv) Director appointments and resignations/Number of directors in the year prior to failure. (X_4)
- (v) Director shareholdings two years prior to failure. (X_5)
- (vi) The delay in publishing the financial statements in the year prior to failure. (X_6)

The significance of these variables was then examined using discriminant analysis and the final discriminant model given by

$$Y = 0,00646X_1 - 0,00096X_2 + 0,03217X_3 - 0,97098X_4 + 0,00003X_5 - 0,01169X_6 \quad (\text{see Court and Radloff, 1990})$$

STAGE TWO: THE BAYES-FISHER ANALYSIS

The Bayes-Fisher discriminant analysis was applied to the selected microeconomic variables for the two years prior to failure. The R-score obtained for different levels of the BFR in the year prior to failure is presented in the following table.

TABLE 1
The Rhodes-Score in the year prior to failure with different BFR assumptions up to a 50% failure rate.

BFR	SUCCESS		FAILURE		R-SCORE
	18	Percent	20	Percent	
0,05	18	100	8	40	-1,54
0,10	18	100	8	40	-1,67
0,15	18	100	8	40	-1,67
0,20	18	100	8	40	-1,64
0,25	18	100	10	50	-1,59
0,30	18	100	10	50	-1,53
0,35	18	100	11	55	-1,47
0,40	18	100	13	65	-1,41
0,45	17	94	15	75	-1,34
0,50	17	94	15	75	-1,28

The R-score peaks between the 10% and 15% interval of BFR. From Figure 1, it is apparent that the probability of failure does not drop below 10% indicating that the R-scores for 5% and 10% are unreliable as these should be less than the R-score at 5%. At these levels of the BFR only eight companies out of the possible twenty were correctly classified as a failed company. On the other hand, such a low BFR would be conducive to the majority of companies being successful.

At a BFR level of 50%, the R-score is -1,28 which would be the score if the conventional discriminant analysis were used to establish a failure prediction score. At this level the predic-

tive accuracy is 75% which is lower than the predictive accuracy of the conventional single-stage model using logistic regression analysis. The calculated R-score increases steadily thereafter until it reaches zero at a 100% failure rate.

TWO YEARS PRIOR TO FAILURE

The process for the second year prior to failure was repeated and the R-scores appear in the following table.

TABLE 2
R-Score TWO years prior to failure

BFR	SUCCESS		FAILURE		R-SCORE
	18	Percent	20	Percent	
0,05	18	100	10	50	0,19
0,10	18	100	10	50	0,29
0,15	18	100	12	60	0,38
0,20	18	100	13	65	0,47
0,25	18	100	13	65	0,55
0,30	18	100	14	70	0,62
0,35	17	94	14	70	0,68
0,40	16	89	15	75	0,73
0,45	16	89	15	75	0,77
0,50	16	89	15	75	0,80

Although the R-score in this instance is positive it increases steadily as the probability of failure increases. At a BFR of 0,50, a predictive accuracy of 75% is obtained which is similar to the year prior to failure.

The model has practical applicability in predicting failure for companies which are regarded as being at risk. The user will need to establish the BFR either by using subjective judgement or by using the predictor variables presented in Appendix 4. Thereafter the user will need to determine a discriminant score for a particular company under investigation using the pre-determined BFR and the coefficients of the predictor variables presented in Appendix 6. This score can be compared to the Rhodes-score for the relevant BFR from Table 1. If the score obtained is less than the Rhodes-score then the prediction is that the company will fail.

APPENDIX 6
DISCRIMINANT FUNCTION COEFFICIENTS ONE YEAR PRIOR TO FAILURE

BFR	X_1	X_2	X_3	X_4	X_5	X_6
0,05	0,0083	-0,0014	0,0349	-1,4583	-2,8666E-5	-0,0036
0,10	0,0101	-0,0014	0,0430	-1,6615	1,4967E-5	-0,0052
0,15	0,0107	-0,0014	0,0454	-1,6630	1,8299E-5	-0,0066
0,20	0,0108	-0,0014	0,0453	-1,5997	2,7711E-5	-0,0077
0,25	0,0104	-0,0013	0,0440	-1,5099	3,2491E-5	-0,0088
0,30	0,0099	-0,0013	0,0421	-1,4082	3,4151E-5	-0,0096
0,35	0,0091	-0,0012	0,0397	-1,3008	3,3626E-5	-0,0104
0,40	0,0083	-0,0011	0,0370	-1,1912	3,1552E-5	-0,0110
0,45	0,0074	-0,0010	0,0342	-1,0801	2,8383E-5	-0,0114
0,50	0,0065	-0,0010	0,0313	-0,9710	2,4507E-5	-0,0117



**IT'S NOT SO MUCH HOW YOU THROW
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Predicting the future has been a pursuit of mankind from as far back as recorded history allows one to peer. And it is safe to say that it is as popular today as it was important then. Everyone attempts to forecast events. What to wear, is often a decision based on a weather forecast; when to set off on a journey is, more often than not, dependent on an estimate of the traffic flow. The difference between these types of forecast and a fortune teller's prophecy is the level of knowledge with which one starts.

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**APPENDIX 6
DISCRIMINANT FUNCTION COEFFICIENTS ONE YEAR
PRIOR TO FAILURE**

BFR	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
0,05	0,0083	-0,0014	0,0349	-1,4583	-2,8666E-5	-0,0036
0,10	0,0101	-0,0014	0,0430	-1,6615	1,4967E-5	-0,0052
0,15	0,0107	-0,0014	0,0454	-1,6630	1,8299E-5	-0,0066
0,20	0,0108	-0,0014	0,0453	-1,5997	2,7711E-5	-0,0077
0,25	0,0104	-0,0013	0,0440	-1,5099	3,2491E-5	-0,0088
0,30	0,0099	-0,0013	0,0421	-1,4082	3,4151E-5	-0,0096
0,35	0,0091	-0,0012	0,0397	-1,3008	3,3626E-5	-0,0104
0,40	0,0083	-0,0011	0,0370	-1,1912	3,1552E-5	-0,0110
0,45	0,0074	-0,0010	0,0342	-1,0801	2,8383E-5	-0,0114
0,50	0,0065	-0,0010	0,0313	-0,9710	2,4507E-5	-0,0117

SUMMARY

This paper has attempted to construct a two-stage model of corporate failure which embodies all of the relevant variables which influence the success or otherwise of a business organisation. In the first stage the macroeconomic variables which could affect the BFR were determined. At the same time the microeconomic variables which could be used in a failure prediction model were established. In the second stage, the chosen microeconomic variables were modelled with the aid of the Bayes-Fisher discriminant analysis and R-scores obtained for different levels of the BFR for the two years prior to failure.

The model proposed in this paper is a significant departure from the traditional method of failure prediction whereby a single failure prediction score was obtained using only microeconomic variables. It can reasonably be expected that failure will increase in adverse economic conditions. No cognisance of this fact has been incorporated into previous failure prediction models. The model proposed in this paper overcomes this obstacle and the failure prediction score is obtained with prior reference to macroeconomic variables. For this reason a range of failure prediction score is obtained depending on the state of the economy.

In addition, cognisance is made of the fact that the model developed for the year prior to failure may not be applicable for two years prior to failure. For this reason a second model has been developed for the relevant year. No further model is attempted as the non-financial variables isolated for use in the model were not significant in later years.

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Determinante van die Kapitaalstruktuur van Genoteerde Suid-Afrikaanse Nywerheidsmaatskappye: 1970-1990

1 INLEIDING

Talle ondersoeke van wisselende aard en omvang is reeds op internasionale vlak gedoen in 'n poging om determinante van die kapitaalstruktuur te identifiseer. Met hierdie studie is daar gepoog om determinante van die kapitaalstruktuur van genoteerde nywerheidsmaatskappye oor 'n tydperk van een en twintig jaar (1970-1990) in Suid-Afrika te identifiseer. In hoofsaak is daar ondersoek ingestel om te bepaal of die skuldverhouding van 'n onderneming enigszins deur die nywerheidsklassifikasie, grootte, bedryfshefboom, groei, winsgewendheid en sakerisiko verklaar kan word.

Die struktuur van hierdie artikel sien as volg daar uit: die determinante soos aangetref in die literatuur en die maatstawwe wat in die ondersoeke as verteenwoordigend van hierdie determinante gekies is, word bespreek. Vervolgens word die maatstawwe wat in hierdie studie aangewend word, uiteengesit. Verskillende skuldverhoudings is ondersoek. Definisies van hierdie skuldverhoudings volg. Daarna word die metodiek ten opsigte van die insameling van data en die toepassing van statistiese metodes uiteengesit. By die rapportering van resultate word daar op die aard van die verbande tussen die potensiële determinante en die onderskeie skuldverhoudings gelet. Ten slotte volg die samevatting van die resultate.

2 DETERMINANTE VAN DIE KAPITAALSTRUKTUUR: 'N LITERATUUROORSIG

2.1 Nywerheid of bedryfstak as determinant van kapitaalstruktuur

Die aspek wat in ondersoeke rakende kapitaalstruktuur die meeste aandag geniet het, is dié van 'n ooreenkoms tussen nywerheidsklassifikasie en die skuldverhouding.

Bradley, Jarrel & Kim (1984) bevind dat 54% van die deursneevariansie van maatskappye se skuldverhoudings aan nywerheidsklassifikasie toegeskryf kan word. Boquist & Moore (1984) bevind dat hoewel totale skuld tussen nywerhede wissel, rentedraende, skuld nie dieselfde patroon volg nie.

Marsh (1982) maak melding van studies deur Schwartz & Aronson, Gupta, Lev, Scott, Schmidt, Scott & Martin en Ferri & Jones wat op betekenisvolle nywerheidseffekte ten opsigte van die skuldverhouding dui. Bowen, Daley & Huber (1982) kom tot die gevolgtrekking dat die gemiddelde hefboomverhouding betekenisvol tussen nywerhede verskil; dat hierdie gemiddeldes nie fluktuasies oor tyd openbaar wat statisties betekenisvol is nie; maar dat 'n tendens om oor vyf- en tien-jaar periodes in die rigting van die nywerheids-gemiddeld te beweeg, tog bestaan.

Die voor-die-hand-liggende verklaring vir die ooreenkomste binne nywerhede is gesetel in risikofaktore. Bradley *et al.*, (1984) stel voor dat nywerheidsklassifikasie as maatstaf van risiko beskou kan word. In teenstelling hiermee argumenteer Martin & Henderson (1984) dat hoewel die finansieringspatrone tussen nywerhede verskil, slegs 'n klein persentasie betekenisvol van die res verskil.

Nog steun vir ooreenkomste binne en verskille tussen bedryfs-

takke op grond van soortgelyke risikofaktore kom uit oorde van Ferri & Jones (1979) se studie waarvolgens die mate van risiko binne 'n bedryfstak deur die bestendigheid van inkomste bepaal word. Op grond van sy gewysigde rangorde-teorie is Myers (1984) dit eens dat die skuldverhouding van bedryfstak tot bedryfstak behoort te verskil, omdat die batesisiko, oftewel die tipe bates, en die behoeftes aan en vereistes van eksterne finansiering tussen bedryfstakke wissel.

Nog 'n verklaring vir ooreenkomste in die kapitaalstruktuur van maatskappye binne dieselfde bedryfstak, is dié van Stern (*Midland Corporate Finance Journal* (1985)). Hy beweer dat maatskappye binne 'n bedryfstak hoogs kompetend is en dus 'n optimale kapitaalstruktuur nastreef ten einde die algehele koste van kapitaal so laag as moontlik te hou. Ook Chatterjee & Scott (1989) maak op grond van 'n studie van Spence melding van kompetisie as oorsaaklike faktore vir die handhawing van 'n optimale skuldverhouding wat dan tot die verskille in skuldverhoudings tussen bedryfstakke lei.

Op 'n vraag in 'n ondersoek na die finansieringsbeleid van groot Amerikaanse ondernemings, waarop 212 respondente gereageer het, het 53% van hulle bevestig dat bedryfstakstandaarde wel 'n rol speel (Scott & Johnson, 1982). Daar is bevind dat die hefboomverhouding van bedryfstakmededingers die derde belangrikste invloed op hefboomdoelwitte gehad het.

Dit blyk dus asof nywerheidsklassifikasie wel verklaring vir 'n onderneming se skuldverhouding behoort te bied. Vir die doel van hierdie studie is die sektorklassifikasie van die Johannesburgse Effektebeurs gebruik.

2.2 Grootte as determinant van kapitaalstruktuur

In etlike studies is daar ondersoek na die verband tussen grootte en kapitaalstruktuur ingestel. Die 500 grootste maatskappye in Europa is volgens Collins & Sekely (1983) deur Agrawal in 'n sodanige ondersoek ingesluit. Die maatskappye was oor 13 lande en 38 industrieë versprei. Deur regressie- en tweerigting-analise van variansie te gebruik, is daar gepoog om die variasie in aandeelhoudersfondse as persentasie van totale bates te verklaar. Daar is egter geen betekenisvolle getuienis gevind om die teorie van die invloed van maatskappygrootte te staaf nie. Ook Kim & Sorensen (1986) vind dat daar geen verband tussen maatskappygrootte en die omvang van skuld is nie en volgens Kester (1986) is daar geen teoretiese fundering vir die effek van grootte op die skuldverhouding nie.

Die bevindinge dat die skuldverhouding 'n omgekeerde verband met die grootte van die maatskappy openbaar, is in die minderheid. Friend & Hasbrouck (1988) maak melding van 'n studie deur Gupta waarin daar bevind is dat hoe groter die maatskappy, hoe laer is die skuldverhouding. Ook Barton & Gordon (1988) verwerp die hipotesestelling dat maatskappygrootte 'n negatiewe korrelasie met die skuldverhouding toon.

Scott & Martin (1975) het in hul ondersoek na nywerheidsklassifikasie as determinant van die skuldverhouding bevind dat die verskil tussen bedryfstakke deels aan die grootte van die maatskappye binne die betrokke bedryfstakke toegeskryf kan word.

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Taub (1975) is van mening dat daar 'n direkte verband tussen die skuldverhouding en die grootte van die maatskappy behoort te bestaan. Volgens hom behoort die maatskappygrootte die risikoprofiel van die onderneming te beïnvloed. Die verwagting is dus: hoe groter die maatskappy, hoe groter is die bronne om op terug te val indien wisselvalligheid in verdienste sou veroorsaak dat rentebetelings nie bygebring kan word nie.

Titman & Wessels (1988) sluit hierby aan deur te argumenteer dat groot maatskappye gewoonlik meer gediversifiseerd as klein maatskappye is. Die waarskynlikheid van bankrotskap vir groot maatskappye neem af namate diversifikasie toeneem. Hul haal vir Warner & Ang en Chua & McConnell aan wat aangetoon het dat bankrotskap koste 'n proporsioneel groter wordende deel van maatskappywaarde verteenwoordig namate daardie waarde verminder. Die verwagting is dus dat groter maatskappye hoër skuldverhoudings sal toon.

In teenstelling met voorafgaande argument voer dieselfde skrywers aan dat klein maatskappye baie meer onkoste as groot maatskappye dra wanneer aandele uitgereik word. Die argument geld ook vir langtermynskuld, alhoewel in 'n mindere mate. Hieruit volg die afleiding dat kleiner maatskappye dalk hoër skuldverhoudings mag hê.

Titman & Wessels (1988) onderskei egter tussen langtermyn- en korttermynskuld. Daar word aangevoer dat klein maatskappye betekenisvol meer van korttermynskuld gebruik maak. Dit stem ooreen met die argument dat die klein maatskappy nie die hoë transaksiekoste van langtermynskuld of aandeeluitreiking kan dra nie. Die argument word gesteun deur Marsh (1982:126): "Smaller companies tended to rely on short term rather than long term debt". Hy meld dat Gupta en Schmidt bevind het dat groter maatskappye meer langtermynskuld en kleiner maatskappye meer korttermynskuld het en dat hierdie bevindinge in die Verenigde Koninkryk deur Brealey, Hodges & Capron bevestig is.

Marsh (1982) meld verder studies deur Chudson, Bray, Toy *et al.* en Ferri & Jones waarin geen lineêre verband tussen totale skuld en totale bates gevind kon word nie. Ferri & Jones (1979) bevind dat kleiner maatskappye trosgewys in hoë en lae hefboomklasse voorkom, terwyl die groter maatskappye meestal in 'n intermediêre hefboomklas val.

Aan die hand van bovermelde ondersoeke is dit dus duidelik dat die verband tussen grootte en kapitaalstruktuur van wisselende aard is.

Tabel 1 dien as uiteensetting van die maatstawwe vir grootte wat deur die onderskeie skrywers gebruik is:

TABEL 1
Maatstawwe vir grootte

Kester	Verkope
Crutchley & Hansen	Boekwaarde van totale bates (5-jaar gemiddeldes)
Ferri & Jones	Verkope Verkope (4-jaar gemiddeldes) Totale bates Boekwaarde van totale bates (4-jaar gemiddeldes)
Remmers, <i>et al.</i>	Verkope
Scott & Martin	Totale bates
Smith	Netto inkomste/Totale kapitaal
Taub	Boekwaarde van totale bates
Titman & Wessels	Natuurlike logaritme van verkope Bedankings van werknemers ("Quit rate")

Met die oog op die Suid-Afrikaanse ondersoek is daar twee

maatstawwe vir grootte gekies, naamlik jaarlikse verkope en totale bates per balansstaat.

2.3 Bedryfshefboom as determinant van kapitaalstruktuur

Die bedryfshefboom van die maatskappy word gewoonlik in terme van 'n lineêre gelykbreekmodel beskryf (Stowe & Ingene, 1984). In hierdie konteks is die bedryfshefboom 'n funksie van die omvang van vaste koste tot veranderlike koste. Mitchell (1991) definieer die bedryfshefboom in 'n risiko-konteks as die variasie in bedryfsinkomste relatief tot die variasie in verkope. Barton & Gordon (1988) sien die bedryfshefboom as sinoniem met kapitaalintensiteit, oftewel die aanwending van vaste bates. Beide uitgangspunte word deur Ferri & Jones (1979:632) in hul definisie van die bedryfshefboom geakkommodeer: "Operating leverage may be defined as the use of fixed costs in the firm's production scheme, but is generally associated with the employment of fixed assets."

Dotan & Ravid (1985) dui aan dat daar empiriese bewys vir 'n omgekeerde verband tussen die skuldverhouding en die bedryfshefboom bestaan. Ferri & Jones (1979) bevind byvoorbeeld dat die verband tussen die bedryfshefboom, soos deur balansstaatdata gemeet, en die skuldverhouding feitlik perfek negatief monotoon is. Maatskappye met 'n hoë bedryfshefboom val hoofsaaklik in 'n lae skuldverhoudingklas. Die verklaring hiervoor is dat hoe meer vaste bates 'n onderneming in stand moet hou, hoe groter is die potensiaal dat toekomstige inkomste wisselvallig kan wees. Barton & Gordon (1988) stem saam dat verhoogde kapitaalintensiteit verhoogde risiko ten opsigte van toekomstige inkomste tot gevolg behoort te hê. Hulle het verwag om 'n negatiewe verband waar te neem, maar kom tot die gevolgtrekking dat daar geen betekenisvolle verband tussen kapitaalintensiteit en die kapitaalstruktuur bestaan nie.

Mandelker en Rhee (1984) sluit by die tema van verhoogde risiko aan en beweer dat die wisselwerking tussen die finansiële- en bedryfshefboom as stabiliserende faktor ten opsigte van risiko kan dien. In direkte teenstelling hiermee wys Prezas (1987) daarop dat verandering in die bedryfshefboom met verandering in die finansiële hefboom gepaard gaan, en dat die verandering in die meeste gevalle in dieselfde rigting is. Ook Myers (1977) beweer dat kapitaalintensiteit en 'n hoë skuldverhouding hand aan hand gaan.

Batesamestelling het betrekking op die samestelling en tipe bates van die onderneming en behoort die kapitaalstruktuur te beïnvloed. Chatterjee & Scott (1989) praat van die bykomende waarde van 'n bate en verduidelik die begrip aan die hand van 'n voorbeeld van kapitaalintensiewe maatskappye wat na verwagting hoër skuldvlakke sal toon – 'n maatskappy met meer tasbare bates sou dus 'n hoër skuldverhouding hê. Batespesifiteit (Acs, 1991) word gekoppel aan die mate van innovasie eie aan die onderneming. Daar word beweer dat eienskappe van innovasie in samehang met grootte beskou moet word. So is daar bevind dat innovasie in klein ondernemings tot hoër skuldvlakke lei.

Die batesamestelling het dus 'n bepalende invloed op die skuldkapasiteit van die onderneming. Marsh (1982) wys op 'n vroeë studie van Martin & Scott waarin hulle bevind het dat 'n hoë persentasie vaste bates op skuldfinansiering eerder as aandele-uitreiking dui. Volgens Marsh behoort maatskappye met proporsioneel hoë vaste bates meer langtermynskuld te gebruik. Ook Myers (1977) beweer dat kapitaalintensiteit en hoë bedryfshefboomvlakke saam met 'n groot skuld las behoort te gaan. In aansluiting hierby is Harris & Raviv (1991) se siening dat maatskappye se likwidasiewaarde 'n invloed op sy skuldverhoudings behoort uit te oefen. Hoe hoër die likwidasiewaarde, dus hoe meer tasbare bates, hoe hoër behoort die skuldverhouding te wees.

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Dit blyk dat daar getuienis bestaan vir positiewe sowel as negatiewe verbande tussen die bedryfshetboom en die finansiële hetboom. Maatstawwe soos aangetref in die literatuur volg:

TABEL 2
Maatstawwe vir die bedryfshetboom

Barton & Gordon	$\frac{\text{Netto vaste bates}}{\text{Boekwaarde van totale bates}}$ (9-jaar gemiddeldes)
Ferri & Jones	$\frac{\text{Persentasieverandering in inkomste}}{\text{Persentasieverandering in verkope}}$ $\frac{\text{Vaste bates}}{\text{Totale bates}}$ (4-jaar gemiddeldes)
Smith & Markland	$\frac{\text{Bedryfsinkomste}}{\text{Omset}}$

Die twee maatstawwe wat vir die doel van hierdie ondersoek gekies is, is vaste bates as verhouding tot totale bates, en die verskil in inkomste voor rente betaal en voor belasting vir twee opeenvolgende jare uitgedruk as verhouding tot die verskil in verkope vir dieselfde twee jare.

2.4 Groei as determinant van die kapitaalstruktuur

Die belastingskuld op rente betaal, maak van skuldfinansiering met die oog op groei 'n aantreklike moontlikheid. 'n Positiewe verband tussen groei en die skuldverhouding word dus verwag.

Die sogenaamde groeigeleenthede dra by tot die waarde van die onderneming en gevolglik word die skuldkapasiteit ooreenstemmend verhoog (Titman & Wessels, 1988). Die skrywers beweer egter dat die verhoogde waarde nie in terme van boekwaardes van aandeelhouersfondse gereflekteer word nie en dat die positiewe verband waarna verwys word, bloot as gevolg van konstante boekwaardes van aandeelhouersfondse teenoor stygende skuld ontstaan.

'n Ander gesigspunt is dat groei as sulks as 'n doelwit van bestuur beskou kan word en dat die doelwitte van bestuur 'n invloed op die kapitaalstruktuur sal hê (Barton & Gordon, 1987). Hulle bevinding was inderdaad 'n positiewe verband tussen die skuldverhouding en die groei in verkope.

Hierdie verwagte positiewe verband tussen groei in verkope en die skuldverhouding word ook in die breë deur Friend & Hasbrouck (1988) bevestig. Collins & Sekely (1983), op hul beurt, verwys na 'n studie waarin groei in totale bates as maatstaf gebruik is. Die bevinding was egter van dieselfde aard, naamlik dat die skuldverhouding saam met die groei in bates styg.

Kim & Sorensen (1986) se siening is dat ondernemings wat hoë groei toon, minder, eerder as meer, van skuldfinansiering gebruik sal maak, terwyl Titman & Wessels (1988), wat na verskillende komponente van skuld gekyk het, beweer dat die korttermynskuldverhouding 'n positiewe verband met groei mag toon indien ondernemings wat hulself in 'n groeifase bevind, langtermynskuld met korttermynskuld sou vervang.

In die meeste gevalle is daar dus inderdaad 'n positiewe verband tussen groei en die skuldverhouding bevestig. Tabel 3 dien as opsomming van genoemde maatstawwe.

Twee maatstawwe is vir hierdie studie gekies, te wete verkope en inkomste voor rente betaal en voor belasting. Verkope is voorheen algemeen as maatstaf vir groei in soortgelyke studies gebruik. Die motivering vir inkomste voor rente betaal en voor belasting lê juis in die uitskakeling van enige finansiële hetboominvloed.

TABEL 3
Maatstawwe vir groei

Marsh	Verkope
Kester	$\frac{\text{Saamgestelde gemiddelde jaarlikse groei in verkope}}{\text{Inkomste voor rente betaal en voor belasting}}$
Kim & Sorensen	Verkope
Barton & Gordon	Verkope
Friend & Hasbrouck	Verkope
Titman & Wessels	$\frac{\text{Kapitaaluitgawes per kontantvloeiastaat}}{\text{Totale bates}}$ %-verandering in totale bates $\frac{\text{Navorsing en ontwikkeling}}{\text{Verkope}}$

2.5 Winsgewendheid as determinant van die kapitaalstruktuur

Teoreties gesproke behoort winsgewendheid 'n invloed op die kapitaalstruktuur te hê (Brigham & Gapenski, 1991:511). Hoë opbrengste stel die meer winsgewende maatskappye in staat om selffinansiering toe te pas en 'n lae skuldverhouding sal dus kenmerkend van 'n winsgewende onderneming wees. Titman & Wessels (1988:6) beaam hierdie verband: "...the past profitability of a firm, and hence the amount of earnings available to be retained, should be an important determinant of its current capital structure."

'n Negatiewe verband tussen die winsgewendheid van 'n onderneming en die skuldverhouding is in 'n ondersoek deur Barton & Gordon (1988) as die sterkste en mees betekenisvolle uitgelig.

Friend & Hasbrouck (1988) maak melding van ondersoeke deur Gordon (1962) wat 'n negatiewe verband, en later Toy, Stonehill, Remmers & Beekhuizen (1974) wat 'n positiewe verband opgelewer het. Friend & Lang (1988) verwys egter na vroeëre ondersoeke waarin winsgewendheidsmaatstawwe deurgaans 'n omgekeerde verband met die finansiële hetboom getoon het.

Na aanleiding van vorige ondersoeke (met 'n enkele uitsondering) word 'n negatiewe verband tussen winsgewendheid en die kapitaalstruktuur verwag.

Kyk Tabel 4 vir 'n opsomming van maatstawwe voorheen in studies gebruik.

TABEL 4
Maatstawwe vir winsgewendheid

Myers	Verwagte toekomstige waarde van bates
Chen & Shimerda	$\frac{\text{Netto inkomste}}{\text{Totale bates}}$
Kester	$\frac{\text{Inkomste voor rente, belasting, nie-kontantuitgawes}}{\text{Totale bates}}$
Barton & Gordon	$\frac{\text{Netto inkomste}}{\text{Totale bates}}$
Titman & Wessels	$\frac{\text{Bedryfsinkomste}}{\text{Verkope}}$ $\frac{\text{Bedryfsinkomste}}{\text{Totale bates}}$

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Die twee maatstawwe wat gekies is, is inkomste voor rente betaal en voor belasting met verkope en totale bates as skaleringsfaktore onderskeidelik. In albei gevalle is inkomste voor rente betaal en belasting doelbewus gekies om enige hefboominvloed te voorkom.

2.6 Sakerisiko

Risiko is 'n komplekse begrip wat na sistematiese en onsistematiese risiko, sowel as finansiële- en sakerisiko verwys. Vir die doel van die studie word die bydrae van finansiële risiko tot die totale risikoprofiel uitgeskakel, juis omdat laasgenoemde tot 'n groot mate deur die finansiële hefboom veroorsaak word. Volgens Mandelker & Rhee (1984) het Hamada bevind dat ongeveer 25% van sistematiese risiko deur die finansiële hefboom verklaar word. Hoewel stellings soos dié van Dubofsky (1985) dat maatskappye met die meeste skuld die hoogste beta het en dat finansiële risiko die sleuteldeterminant van beta is, wel geregtig is, is dit nie die uitgangspunt wat hier geld nie. Die doel van hierdie studie is om te bepaal wat die oorsaaklike faktore vir die finansiële hefboom is. Daar word dus gepoog om aan te toon in welke mate die sakerisiko die finansiële risiko beïnvloed. In dié verband is Smith & Markland (1981) se definisie van sakerisiko raak: die mate waartoe 'n maatskappy aan omstandighede blootgestel is wat sou kon veroorsaak dat daar op onvoorspelbare wyse van resultate oor die langtermyn afgewyk word.

Barton & Gordon (1987 en 1988) is van mening dat bestuur se risiko-afkerigheid 'n sleuteldeterminant van die kapitaalstruktuur is. Intuïtief is die verband tussen sakerisiko en die skuldverhouding negatief van aard, met ander woorde 'n maatskappy se skuldverhouding sal afneem namate die sakerisiko toeneem. Etlke studies het die aspek ondersoek. Hoewel Ferri & Jones (1979) 'n negatiewe verband verwag het, kon hulle nie (ten spyte van verskeie maatstawwe vir risiko) bewys vind vir 'n verband tussen wisselvalligheid in inkomste en die skuldverhouding nie. Bradley, Jarrel & Kim (1984) het 'n omgekeerde verband tussen die bestendigheid van verdienste en die skuldverhouding gevind. Ook Barton & Gordon (1988), sowel as Friend & Lang (1988), kon hierdie negatiewe verband bevestig.

Die volgende maatstawwe is dié wat in soortgelyke studies gebruik is. Dit is belangrik om daarop te let dat sommige van die maatstawwe wel totale risiko meet en daar dus 'n sydigheid ontstaan deurdat die skuldverhouding 'n bekenisvolle faktor met betrekking tot totale risiko is.

TABEL 5
Maatstawwe vir risiko

Taub	Residu-variensie van verdienste per aandeel oor tyd Gemiddelde verdienste gekwadreer
Ferri & Jones	Koëffisiënt van variasie van verkope Koëffisiënt van variasie van voorbelaste kontantvloei Standaardafwyking van gestandaardiseerde groei in verkope Standaardafwyking van gestandaardiseerde groei in voorbelaste kontantvloei
Marsh	Vaste uitgawes Inkomste voor rente betaal en voor belasting Standaardafwyking van verdienste (10 jaar)
Kim & Sorensen	Koëffisiënt van variasie van inkomste voor rente betaal en voor belasting
Barton & Gordon	Koëffisiënt van variasie van inkomste
Friend & Lang	Standaardafwyking van inkomste voor rente en voor belasting Totale bates
Titman & Wessels	Standaardafwyking van %-verandering in bedryfs-inkomste

By die keuse van 'n maatstaf vir risiko word daar nou in die besonder op sakerisiko gelet. Daarmee word tradisionele maatstawwe vir totale risiko uitgeskakel juis omdat laasgenoemde gedeeltelik deur die finansiële risiko, die skuldverhouding dus, bepaal word.

'n Jaar-tot-jaarsyfer vir die verandering in inkomste voor rente betaal en belasting (waarin daar geen finansiële hefboomfaktor voorkom nie) en 'n soortgelyke syfer, naamlik die verandering van inkomste na belasting (met totale bates as skaleringsfaktor in albei gevalle) is gebruik. In laasgenoemde maatstaf is die rentelas wel in berekening gebring, wat in terme van die finansiële risiko, tot 'n mate van sydigheid aanleiding gee.

3. DEFINISIES

Ses maatstawwe is as aanduiders van skuld in die nywerheidssektor oor die tydperk 1970-1990 gekies: totale skuldverhouding, langtermynskuldverhouding, netto langtermynskuldverhouding, bedryfslasteverhouding, rentedraende skuldverhouding en rentedekking.

3.1 Totale skuldverhouding

Die totale skuldverhouding word gedefinieer as die som van langtermynlenings en bedryfslaste tot totale bates.

3.2 Langtermynskuldverhouding

Die langtermynskuldverhouding verteenwoordig slegs die langtermynlenings uitgedruk as breukdeel van totale bates.

3.3 Netto langtermynskuldverhouding

Die motivering vir hierdie maatstaf word gevind in die sogenaamde vertikale metode by die opstel van die balansstaat. Die verhouding is as volg bereken: langtermynlenings uitgedruk as breukdeel van die verskil tussen totale bates en bedryfslaste.

Hierdie beginsel word ook in die studie van Barton & Gordon (1988) aangetref. Trouens, dit is die enigste studie waarin die betrokke beginsel in die maatstaf vir skuld voorgekom het. Wel in 'n ander vorm, kom die beginsel ook in Bradley, Jarrel & Kim (1984) se studie voor waar die finansiële hefboomverhouding bepaal word deur die gemiddelde vlak van langtermynskuld teen boekwaarde in verhouding tot die gemiddelde vlak van langtermynskuld plus die markwaarde van ekwiteit.

3.4 Bedryfslasteverhouding

Hierdie skuldverhouding is korttermyn van aard en is bloot die verhouding van bedryfslaste tot totale bates.

3.5 Rentedraende skuldverhouding

Die som van die oortrokke-banksyfer, sowel as die kort- en langtermynlenings in verhouding tot totale bates vorm die rentedraende skuldverhouding.

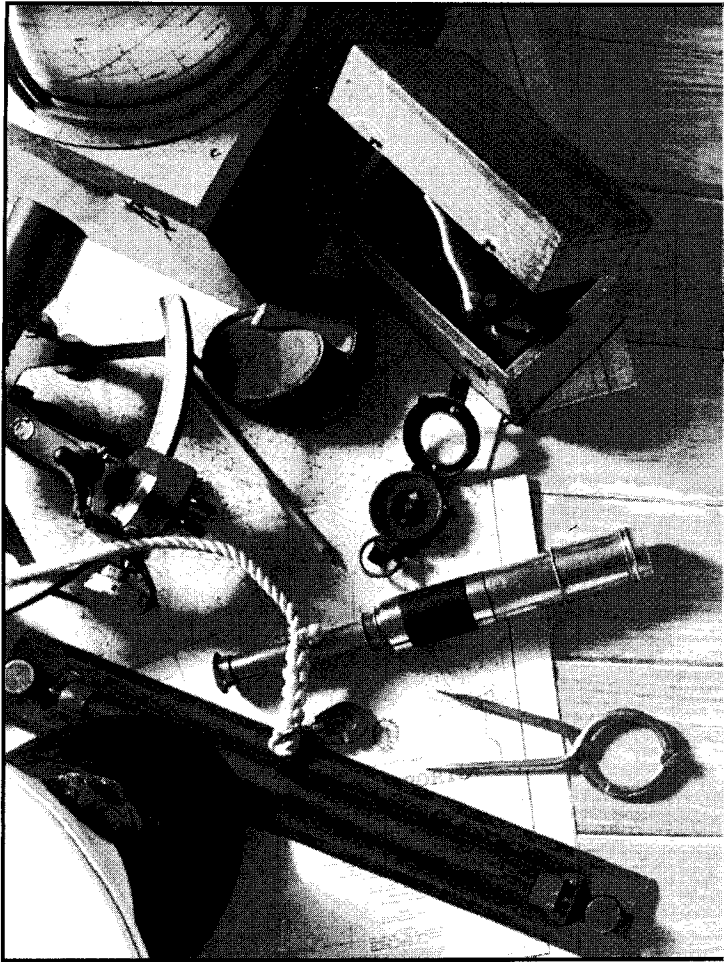
3.6 Rentedekking

Rentedekking word as volg bereken: inkomste voor belasting plus rente betaal, gedeel deur rente betaal.

3.7 Samevatting

Drie items wat dikwels as deel van die "finansieringskant" van die balansstaat voorkom, word nie deur bogenoemde maatstawwe aangespreek nie. Hulle is voorkeuraandele, uitgestelde belasting en minderheidsbelang.

Wat die eerste twee items betref, is daar bereken dat vir die tydperk van die ondersoek die syfers gemiddeld slegs 'n klein persentasie van finansiering verteenwoordig, 1% en 4% on-



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derskeidelik. Minderheidsbelang verteenwoordig wel 'n hoër persentasie, naamlik 12%. Die syfer is vir die doel van die studie nie in ag geneem nie, juis omdat dit 'n gryns area tussen skuld en aandeelhouing verteenwoordig.

4. METODOLOGIE

4.1 Data

Alle genoteerde Suid-Afrikaanse nywerheidsmaatskappye, met die uitsondering van maatskappye in die ontwikkelingskapitaal-sektor, is in die ondersoek ingesluit. Die aantal maatskappye wissel vanaf 109 in 1970 tot 312 in 1990. Die maatskappye is oor 19 sektore versprei. Maatskappye wat gedenoteer is, kom nie voor nie. Van die 312 1990-maatskappye was 109 dus reeds in 1970 genoteer. Die data is van die Universiteit van Stellenbosch Bestuurskool se databank verkry.

Om dubbeltelling te vermy, is die data van 'n piramied- en/of beheermaatskappy waarvan die enigste bate dié van 'n belegging in 'n filiaalmaatskappy en waarvan die inkomste hoofsaaklik of uitsluitlik van die filiaal afkomstig is, uit die ondersoek verwyder.

'n Mate van sydigheid ten opsigte van oorlewing lê in die studie opgesluit deurdat maatskappye wat in die loop van die tydperk van die studie gedenoteer is, nie ingesluit is nie. Die data van 'n maatskappy behoort dus vir die jaar van notering en elke jaar daarna tot en met 1990 ingesluit te wees. In enkele gevalle was die 1990-syfers nie beskikbaar nie, aangesien die jaarverslae nog nie ontvang was nie.

4.2 Ontbrekende waardes en uitskieters

Soos reeds gemeld, is daar maatskappye waarvan die 1990-data ontbreek. Ook met betrekking tot die omsetveranderlike is daar ontbrekende waardes. Dit hou direk verband met wetgewing ten opsigte van die verpligte openbaarmaking

van die betrokke syfer wat in 1974 van krag geword het. Die betrokke waarnemings is dan bloot buite rekening gelaat. Vanweë die verkennende aard van die ondersoek, is geen poging aangewend om uitskieters uit die data te verwyder nie.

4.3 Voorlopige toetse

Aanvanklik is daar beoog om analise van kovariansie te doen in 'n poging om die effek van tyd en sektor te verwyder. Om analise van kovariansie te kon doen, moes die aanname dat die regressiekoëffisiënte vir die verskillende jare en sektore homogeen is, getoets word (Dunn & Clark, 1974). 'n Toets vir elk van die nege onafhanklike veranderlikes in kombinasie met elk van die ses afhanklike veranderlikes is uitgevoer. Daar is inderdaad in die meerderheid van gevalle bevind dat die regressielyne nie parallel is nie en dat betekenisvolle verskille tussen sommige sektore en sommige jare bestaan.

Aangesien die doel van die studie is om beste verklarings vir die verskillende skuldverhoudings te kan bied, kon hierdie non-homogeniteite wat deur die voorlopige analise uitgewys is nie sonder meer geïgnoreer word nie. Wat tyd betref, kon geen getuieis gevind word dat betekenisvolle tydverskille in die periode 1970-1985 voorkom nie. Gevolglik is daar besluit om die ondersoektydperk in twee periodes te verdeel: 1970-1985 en 1986-1990 (voortaan periode A en B onderskeidelik). Wat sektorale verskille betref, is 'n konserwatiewe benadering gevolg deur per sektor te analiseer.

4.4 Stapsgewyse meervoudige regressie

Vervolgens het die analise etlike meervoudige regressie-modelle behels. Met twee tydperiodes, neëntien sektore en ses afhanklike veranderlikes is 'n somtotaal van 228 stapsgewyse regressielopies uitgevoer. Al nege onafhanklike veranderlikes is in elke model ingesluit. 'n Korrelasiematriks om verbande tussen die onafhanklike veranderlikes toe te lig, verskyn in Tabel 6.

TABEL 6
Korrelasiematriks: Onafhanklike veranderlikes

	SALES	TA	FATA	DEDS	EBIT	EBITSA	EBITTA	DETA	DPTA
SALES	1,000								
TA	0,930	1,000							
FATA	0,075	0,166	1,000						
DEDS	-0,004	-0,001	0,037	1,000					
EBIT	0,913	0,971	0,145	-0,003	1,000				
EBITSA	-0,065	0,031	0,103	0,001	0,073	1,000			
EBITTA	-0,019	-0,022	-0,147	-0,011	0,051	0,573	1,000		
DETA	0,018	0,009	-0,041	-0,001	0,036	0,193	0,385	1,000	
DPTA	0,018	0,015	-0,075	-0,003	0,034	0,206	0,383	0,895	1,000

Deur 'n proses van stapsgewyse regressie word die veranderlike wat die beste verklaring bied, eerste in die model opgeneem. Vervolgens word daar uit die oorblywende onafhanklike veranderlikes daardie veranderlike geselekteer wat die beste verklaring vir die onverklaarde variasie in die afhanklike veranderlike bied. Die proses is by die 10%-betekenispeil getermineer wanneer geeneen van die uitgeslote veranderlikes statisties betekenisvol tot die verklaring van die residuele variasie bydra nie. Dit kan gebeur dat 'n veranderlike wat oorspronklik as betekenisvol in die model opgeneem is by die finale rapportering sy betekenisvolheid kon verloor het.

In terme van die werkswyse hier uiteengesit, is dit belangrik om te beklemtoon dat modelseleksie aan die rekenaar oorgelaat is. Geen poging is aangewend om regressievergelykings se spesifikasies te verbeter of om te toets of te korreger

vir outokorrelasie, multikolineariteit of heteroskedastisiteit nie. Die omvang van die probleem en die feit dat die numeriese waardes van die geskatte koëffisiënte in hierdie stadium onbelangrik is, het sodanige werkswyse gemotiveer.

5. RESULTATE

5.1 Inleiding

Daar is gepoog om aan die hand van sekere veranderlikes wat as verteenwoordigende maatstawwe van maontlike determinante gekies is, te toon dat die onderskeie skuldverhoudings aan hierdie gekose veranderlikes gekoppel kan word.

Deur die voorlopige toetse is daar inderdaad vasgestel dat nywerheidsklassifikasie 'n determinant van die skuldverhou-



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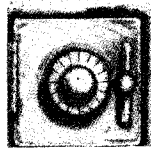
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ding is as die indeling volgens sektor as sinoniem met nywerheidsklassifikasie beskou word. Die oorblywende determinante is dan die volgende: grootte, bedryfshefboom, groei, winsgewendheid en sakerisiko.

In enkele gevalle kon geeneen van die gekose maatstawwe betekenisvolle verklaring vir die variasie in die skuldverhouding bied nie. Vir 'n opsomming hiervan kyk Tabel 7.

TABEL 7
Geen betekenisvolle verklarings gevind

Totale skuldverhouding	: Farmaseuties en medies (B) Tabak en vuurhoutjies (B)
Langtermynskuldverhouding:	Klerasie, skoeisel en tekstiel (B) Motors (B)
Korttermynskuldverhouding	: Staal en verwante bedrywe (A)
Rentedekking	: Elektronika, elektris en batterye (B) Farmaseuties en medies (B) Tabak en vuurhoutjies (B)

5.2 Aard van die verbande

Aan die hand van die twee gekose maatstawwe vir die sogenaamde determinante word die aard van die verbande vervolgens bespreek. (Kyk Table 8 vir benamings van veranderlikes.)

5.2.1 Grootte

Met verkope en totale bates as die maatstawwe van grootte kon geen vaste patroon geïdentifiseer word nie. Positiewe sowel as negatiewe verbande kom in 'n klein aantal sektore voor.

Die sterkste aanduiding is die positiewe verbande tussen totale bates en die langtermynskuldverhouding wat in die eerste periode in sewe van die sektore voorkom. Hierdie verband bestaan egter nie in die tweede periode nie. In vyf sektore toon verandering in totale bates dieselfde teken as die netto langtermynskuldverhouding en die rentedraende skuldverhouding. Oor die twee periodes oorvleuel vier van die vyf sektore.

Daarenteen is daar vyf sektore in die eerste periode wat 'n omgekeerde verband tussen verkope en die rentedraende skuldverhouding toon.

5.2.2 Bedryfshefboom

Dit is veral die verhouding vaste bates tot totale bates wat as verklaring vir die beweging in die langtermynskuld- en die bedryfslasteverhouding dien. Die verband met die twee verhoudings is positief en negatief onderskeidelik. Eersgenoemde kom in elf van die neëntien sektore in die eerste periode voor, maar slegs in ses sektore in die tweede periode. Die verwantskap met die bedryfslasteverhouding bly dieselfde in twaalf en tien sektore in die eerste en tweede periode onderskeidelik.

5.2.3 Groei

'n Positiewe verband tussen groei in inkomste voor rente betaal en voor belasting en 'n skuldverhouding kon in hoogstens vier sektore bevestig word en wel in die geval van die totale skuldverhouding (periode A). Negatiewe verbande het egter in meer gevalle aan die lig gekom: in vyf sektore (periode B) met die langtermynskuldverhouding; in ses sektore (periode A) met die netto langtermynskuldverhouding; en in agt sektore met die rentedraende skuldverhouding.

5.2.4 Winsgewendheid

Teen die verwagting in toon die winsgewendheidsmaatstawwe nie deurgaans dieselfde verwantskap met die onderskeie afhanklike veranderlikes nie. Hierdie verbande van verskillende

aard vir maatstawwe van dieselfde determinant word aan die beweging van verkope en totale bates in verskillende rigtings toegeskryf. Daar is gekontroleer of die omgekeerde tekens aan multikolineariteit toegeskryf kan word. In 34 uit 36 gevalle waar teenoorgestelde tekens vir EBITSA en EBITTA voorgekom het, is die moontlikheid van multikolineariteit as oorsaak, verwerp.

Die teenstrydigheid word deur die verwantskap met die bedryfslasteverhouding uitgewys: in die tweede periode toon tien sektore 'n negatiewe verband met EBITSA en tien sektore 'n positiewe verband met EBITTA. Sewe van die sektore oorvleuel, met ander woorde, in sewe van die sektore toon EBITSA 'n negatiewe verband met die bedryfslasteverhouding en in dieselfde sewe sektore toon EBITTA 'n positiewe verband met dieselfde skuldverhouding.

Die sterkste getuie is die negatiewe verband tussen EBITSA en die totale skuldverhouding wat min of meer stabiel bly oor die twee periodes, ten opsigte van twaalf en tien sektore onderskeidelik, asook die negatiewe verband met die bedryfslasteverhouding in veertien van die neëntien sektore in periode A.

Daarteenoor tree winsgewendheid, gemeet deur EBITTA, as aanduiding van rentedekking na vore in twaalf en elf sektore vir die twee periodes onderskeidelik. Slegs sewe van die sektore oorvleuel.

5.2.5 Sakerisiko

Weer eens het die twee gekose maatstawwe as aanduiders van wisselvalligheid in inkomste nie dieselfde patrone openbaar nie. Verder was die sektore waarin die faktore gefigureer het in die minderheid. Slegs in die geval van rentedekking was DETA in sewe sektore 'n betekenisvolle faktor. Origens is daar geen bewys dat hierdie maatstawwe in die algemeen 'n noemenswaardige invloed op enige van die skuldverhoudings het nie.

6. SAMEVATTING

Te midde van die diversiteit van die resultate is daar tog vir bykans elk van die ses skuldverhoudings beduidende determinante wat vir 'n aantal sektore as betekenisvol figureer.

In die geval van die totale skuldverhouding is dit die winsgewendheidsmaatstaf, EBITSA, wat in die eerste periode in twaalf van die neëntien sektore as beduidende veranderlike geselekteer word. In die tweede periode word dieselfde verskynsel in tien sektore aangetref. Die verband is van negatiewe aard; 'n minder winsgewende onderneming behoort dus 'n relatief hoër skuldverhouding te hê.

Die bedryfshefboomveranderlike, FATA, toon in elf sektore in die eerste periode 'n beduidende positiewe verband met die langtermynskuldverhouding. Dieselfde ooreenkoms word in die tweede periode in slegs ses sektore aangetref.

Wat die bedryfslasteverhouding betref, is daar twee veranderlikes, FATA en EBITSA as maatstawwe van die bedryfshefboom en winsgewendheid onderskeidelik, wat in die meerderheid van sektore as beduidende veranderlike geselekteer is. Die verband is op twee na van omgekeerde aard.

Die winsgewendheidsmaatstaf, EBITTA, toon in die eerste periode in elf sektore 'n negatiewe verband met die rentedraende skuldverhouding en 'n positiewe verband met rentedekking in twaalf sektore vir dieselfde tydperk. In laasgenoemde geval kom dieselfde verskynsel ook in elf sektore in die tweede periode voor.

Hierdie resultate word in Tabel 8 meer volledig uiteengesit. Dit is duidelik dat winsgewendheid en die bedryfshefboom as die mees opvallende determinante deur die ondersoek geïdentifiseer is.

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Daar word oor die algemeen oor die ondersoektydperk 'n toename in die totale skuldverhouding, 'n afname in die langtermynskuldverhouding en 'n toename in die sogenaamde bedryfslasteverhouding waargeneem. Die toename in die totale skuldverhouding word meestal met 'n afname in winsgewendheid geassosieer terwyl die verlaging in die langter-

mynskuldverhouding aan 'n afname in vaste bates, met ander woorde 'n gebrek aan bykomende investering, toegeskryf word. Die toename in die bedryfslasteverhouding word aan twee faktore gekoppel, naamlik 'n afname in vaste bates, oftewel die bedryfshofboom, en 'n afname in winsgewendheid.

TABEL 8
Aantal sektore waar onafhanklike veranderlikes as beduidend geselekteer is

		LTLCLTA		LTLTA		LTLTACL		CLTA		IBDTA		TIE	
		+	-	+	-	+	-	+	-	+	-	+	-
SALES:	A	2	2	1	3	1	1	4	0	2	5	0	1
	B	2	0	3	3	1	2	4	1	1	2	0	4
TA:	A	4	2	7	0	5	1	0	4	5	1	2	2
	B	0	4	0	0	4	3	1	4	3	1	2	0
FATA:	A	1	6	11	2	8	4	1	12	7	3	2	2
	B	2	8	6	1	6	2	0	10	6	4	1	4
DEDS:	A	2	1	2	4	1	3	2	0	1	1	0	2
	B	1	3	2	0	2	0	2	2	2	3	0	0
EBIT:	A	4	4	3	4	3	6	2	3	2	8	0	3
	B	2	1	0	5	1	3	2	1	1	4	1	0
EBITSA:	A	0	12	2	6	2	6	0	14	1	3	8	3
	B	1	10	5	2	1	5	1	10	4	5	4	1
EBITTA:	A	4	6	3	5	2	8	6	3	0	11	12	0
	B	3	5	2	5	2	4	10	4	3	8	11	0
DETA:	A	4	0	5	0	4	0	1	1	5	0	1	7
	B	1	0	3	1	3	1	2	0	2	1	0	2
DPTA:	A	0	3	0	2	1	3	0	4	1	3	1	0
	B	2	2	1	4	1	5	1	3	1	4	2	1

Afhanklike veranderlikes

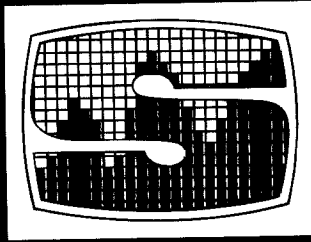
- LTLCLTA - Totale skuldverhouding
- LTLTA - Langtermynskuldverhouding
- LTLTACL - Netto langtermynskuldverhouding
- CLTA - Bedryfslasteverhouding
- IBDTA - Rentedraende skuldverhouding
- TIE - Rentedekking

Onafhanklike veranderlikes

- SALES - Verkope
- TA - Totale bates
- FATA - Vaste bates/Totale bates
- DEDS - Verandering in inkomste voor rente betaal en voor belasting/Verandering in verkope
- EBIT - Inkomste voor rente betaal en voor belasting
- EBITSA - Inkomste voor rente betaal en voor belasting betaal/Verkope
- EBITTA - Inkomste voor rente betaal en voor belasting/Totale bates
- DETA - Verandering in (Inkomste voor rente betaal en belasting/Totale bates)
- DPTA - Verandering in (Inkomste na belasting/Totale bates)

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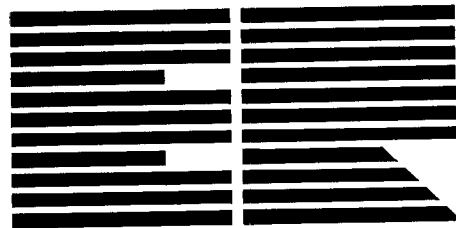
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Number 38 – Summer 1993/94

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The Investment Analysts Journal

Number 38 – Summer 1993/94

Die Beleggings-ontleders Tydskrif

Nommer 38 – Somer 1993/94

This issue in brief

A Two-stage Model for the prediction of corporate failure in South Africa

An accurate evaluation of business failure should be of concern to management and investment analysts. Were it possible to predict failure with a certain degree of confidence, steps could be taken to rectify the negative consequences thereof.

The objective of this research is to undertake an investigation of micro- and macroeconomic variables that are freely available to researchers and which may be used in a failure prediction model. The intention is to obtain a comprehensive, yet simple model which can be used as an overall predictor of PENDING failure.

Determinante van die Kapitaalstruktuur van Genoteerde Suid-Afrikaanse Nywerheidsmaatskappye: 1970-1990

This paper examines the relationships between capital structure and a number of independent variables representative of so-called determinants of capital structure. The determinants are derived from empirical studies that have been conducted internationally.

The aim is to investigate the influence of industry classification, size, operating leverage, growth and profitability of a company on the use of debt. In order to enhance the explanatory power of the exercise, different measures of debt are established, e.g. total debt, long-term debt, current liabilities and interest bearing debt. Multiple regression analysis is used to determine the nature of the relationships.

An Analysis of the Price/Earnings Ratio of the Industrial Sector of the JSE

This paper attempts to identify the significant hypothesised determinants of the aggregate Price/Earnings multiple of the industrial index of the JSE. Four variables, the payout ratio, return on equity, the debt/equity ratio and the average growth in dividends are identified as having a statistically significant association with the aggregate Price/Earnings ratio. A regression model is derived from the analysis. The model is useful both as a tool for forecasting future earnings in the industrial sector and for its interpretive power.

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Inhoud

The P/E Ratio and the Cost of Equity Capital

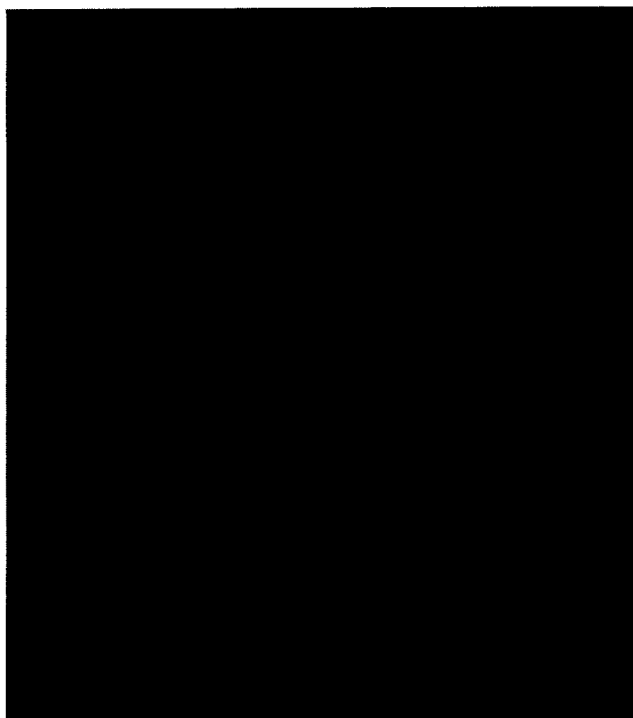
The cost of equity capital is an elusive measure that is not well understood. The paper aims to clarify a common misconception: namely that this cost is given by the reciprocal of the price/earnings ratio (earnings yield) of the firm. The relationship between the P/E ratio and the firm's cost of equity capital is presented. The factors underlying the P/E ratio at which the firm sells, and hence the determinants of the share price, are discussed.

Cash flow ratios – Investment Basics XXVIII

The incorporation of cash flow ratios into the analysis process has been rather slow and is very much overdue. Current literature has not provided an abundance of current ratios to be used. Companies should be encouraged to include cash flow ratios in their five or ten-year statistical summaries. Ratios in isolation are of little value. By studying cash flow ratios over a longer period, the reader should be able to form an idea as to different norms for different companies and/or industries.

The following firms have, in addition to our advertisers, assisted in the financing of this issue of the journal and thanks are due to them for their kindness.

Bo en behalwe ons adverteerders, het die onderstaande maatskappye hulp verleen met die finansiering van hierdie uitgifte van die tydskrif en hulle word bedank vir hulle vriendelikheid.



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The Investment Analysts Journal

Thirty-eighth issue – Summer 1993/94

There was always danger in setting a date for a general election before agreement had first been reached on a new and final constitution. The danger was that disagreement would fill the time between the setting of the election date and the election date itself making it necessary to postpone the planned voting or to go ahead with it in a context of heightened recrimination and violence. That is what we are witnessing at present. Our last editorial referred to the possibility of a Transitional Executive Council (TEC) being instituted by the end of June 1993. Now we will be lucky if such a body is in place by the end of October. The life of the contemplated TEC, squeezed between continued political bickering and 27 April 1994, is shrinking by the day.

The negotiations situation, however, is not as confused as it might appear to be. Although superficially storm in the form of dispute and conflict are the 'order' of the political day, and violence is escalating, beneath the surface calmer waters prevail. The impression of dispute and conflict is created especially by Inkatha but it is being helped in this by the other members of the Cosag alliance, a strange conglomeration of parties whose cohesion derives solely from their mutual dislike of the ANC and mistrust of the government. 'The enemy of my enemy is my friend' has never been a philosophy for the formulation of any durable policy or strategy.

Its lack of political cohesion, however, is not the only problem with Cosag. Within its separate parties contradictions and inconsistencies also abound which must justify both suspicion and mistrust. Take Inkatha as an example. If the surveys of popular opinion that have been published are any guide, it remains largely a Zulu-based organisation which is losing ground even within its main constituency. It has no mass following outside that provided by Zulus but even amongst them it is contracting because of demographic shifts. Its support is largely derived from an older generation not surprisingly more committed to tribal values. Amongst the youth, its support is shrinking, and the youth today constitute the great majority of all African communities. What Inkatha is gaining in a white switching from the National Party, most importantly in Natal, is being more than offset by losses amongst young people to the ANC. There is a possibility that Inkatha would even lose an election in Natal were one to be held today. A referendum on the new constitution (an issue) rather than a general election (a matter of party political support) would obviously suit its position best in the political tug-o-war that is developing.

The right-wing parties of the Afrikaner Volksfront are no less bedevilled by inconsistencies and anomalies. There is little shared philosophically speaking by the Afrikaans Volksunie and the HNP, or by the CP and the AWB, other than the sentiments of extended family and general agreement that a territorial underpinning of Afrikaner national life is essential to any claims to sovereignty. More importantly, there is no agreement as to where the volkstaat should be, each group (those in Northern Natal and those in the Northern Transvaal, those in the OFS and those in the Western Transvaal) wanting it to incorporate the region immediately surrounding their own farms. What is overlooked, even by General Constand Viljoen, is that the Afrikaner has changed socio-economically. In these terms, Afrikaners have long ceased to be predominantly farmers or poor whites. Forty-five years of NP rule have seen them

Die Beleggingsontleders Tydskrif

Agt-en-dertigste uitgawe – Somer 1993/94

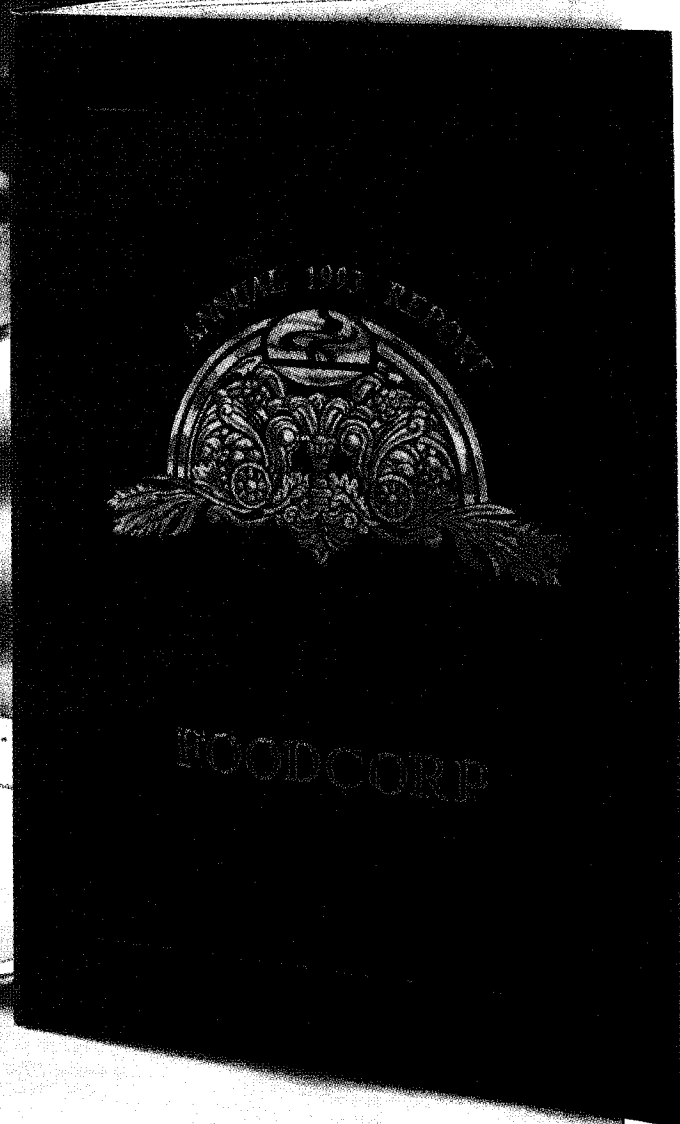
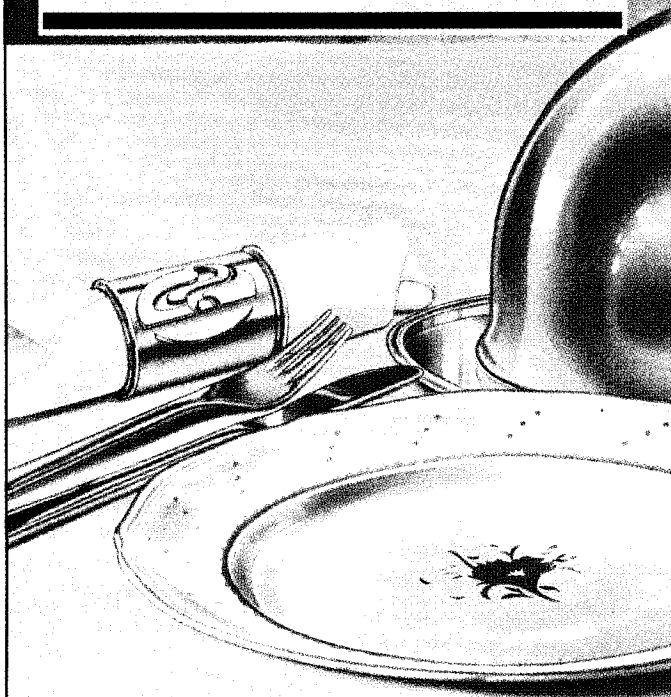
Daar was altyd gevaar daarin om 'n verkiesingsdatum vas te stel voordat 'n ooreenkoms eers bereik is aangaande 'n nuwe en finale grondwet. Die gevaar was dat die tyd tussen die bepaling van 'n verkiesingsdatum en die verkiesing self gevul sou wees met wedersydse verskille wat dit nodig mag maak om die beplande stemming uit te stel of om daarmee voort te gaan te midde van toenemende wedersydse verwyte en geweld. Dit is wat ons tans waarneem. Ons vorige redaksionele kommentaar het verwys na die moontlikheid om 'n Uitvoerende Oorgangsraad in te stel teen die einde van Junie 1993. Nou sal ons gelukkig wees as so 'n liggaam teen die einde van Oktober in plek is. Die leeftyd van hierdie beplande oorgangsgesag, ingeperk tussen voortgesette politieke rusies en 27 April 1994, krimp by die dag.

Die onderhandelingsituasie is egter nie so chaoties as wat dit blyk te wees nie. Alhoewel dit op die oppervlakte lyk asof storms in die vorm van dispute en konflik aan die orde van die politieke dag is, en geweld steeds toeneem, bestaan daar kalmer water onder die oppervlakte. Die indruk van dispuut en konflik word veral deur Inkatha geskep, wat hierin gehelp word deur die ander lede van die Cosag alliansie, 'n vreemde konglomerasie van partye wat kohesie vind uitsluitlik op grond van hul onderlinge afkeer van die ANC en wantroue in die regering. "Die vyand van my vyand is my vriend" was nog nooit 'n filosofie op grond waarvan 'n duursame beleid of strategie geformuleer kon word nie.

Gebrek aan politieke kohesie is egter nie die enigste probleem binne Cosag nie. Tussen die verskillende partye is daar ook teensprake en inkonsekwentheid teenwoordig wat tot suspisie en wantroue moet lei. Neem Inkatha as 'n voorbeeld. As opnames van populêre opinies wat gepubliseer is enigsins as 'n gids kan dien, bly Inkatha hoofsaaklik 'n Zoeloe-gebaseerde organisasie wat besig is om grond te verloor selfs onder sy eie ondersteuners. Inkatha het geen breë gevolg nie buiten dit wat deur Zoeloes verskaf word, maar selfs onder hulle is dit besig om te krimp as gevolg van demografiese verskuiwings. Sy steun is hoofsaaklik afkomstig van 'n ouer generasie wat nie verbasend nie 'n verbintenis het met tradisionele stamwaardes. Onder die jeug is Inkatha se ondersteuning besig om te krimp en vandag maak die jeug die oorgrote meerderheid van alle Swart gemeenskappe uit. Wat Inkatha besig is om te wen in terme van blankes wat oorskakel vanaf die Nasionale Party, veral in Natal, word meer as prysgegee deur verliese na die ANC onder jong mense. Daar bestaan die waarskynlikheid dat Inkatha selfs 'n verkiesing in Natal sal verloor as een vandag gehou sou word. 'n Referendum aangaande 'n nuwe konstitusie ('n kwessie), liever as 'n algemene verkiesing ('n saak van party-politieke steun) sal duidelik Inkatha se posisie die beste pas in die politieke toutrekkery wat besig is om te ontwikkel.

Die regse partye van die Afrikaner Volksfront word nie minder beduiwel deur inkonsekwentheid en anomalieë nie. Filosofies gesproke is daar baie min in gemeen tussen die Afrikaanse Volksunie en die HNP, of tussen die KP en die AWB, ander dan die sentimente van 'n uitgebreide familie en algemene ineenstemming dat 'n gebiedsbasis nodig is om Afrikaner nasionale lewe se aanspraak op soewereiniteit op te baseer. Meer belangrik nog, daar bestaan geen ooreenstemming waar die volkstaat behoort te wees nie, elke groep (daardie in Noord-

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graduate into business and the professions, into teaching and the civil service, as well as into the police and the SADF. Their readiness to abandon their farms or their firms, or to resign their jobs and to sacrifice their pensions in order to move to some remote place where Afrikaners would be a majority, must be seriously questioned. Sadly, Afrikaner nationalism sought sovereignty through the capture of the State without putting in place the kind of institutions that can only be secured in a country where a majority has existed or has been contrived and where democracy has been able to function. It was a top-down rather than a bottom-up approach to the national sovereignty matter, and it failed. Now the NP having seen, or having been made to see the light, has transformed itself into a non-racial party with a very substantial backing amongst coloureds and Asians as well as amongst whites, and even amongst some blacks. It may not stand much chance of winning the next election, but it does retain the mass support that should still make it a credible partner for the ANC in any transitional powersharing administration and a serious contender for future power.

This brings us back to what is happening beneath the political surface rather than superficially. Between them, the ANC and the NP command the support of the great majority of all South Africans. They are now largely agreed as to what is required in the way of constitutional as well as of economic immediate change. Only the extremes of feelings at the lowest levels of their respective constituencies prevent a more public acknowledgement of the identity of views amongst their respective leaders. Good sense dictates that they do not, however, push ahead in total disregard of the sentiments of smaller parties. They must take along as many of these as they can into the new South Africa. It is for this reason that the smaller parties are being given so much opportunity to create the impression of superficial political dissension at Kempton Park and elsewhere.

But time is running out for the smaller parties. For the two big ones, getting on with the job of constitutional change is becoming an urgent imperative and not least because of the importance of such change to the economy. Sanctions must be lifted. The country's relationship with the IMF and the World Bank must be normalised. The present period of stagnation must be ended. A return to higher levels of growth, both in real GDP and employment terms, must be achieved. The only problem is that some important political problems still remain unresolved. It has not helped the cause of getting agreement now about the future constitution (not just the interim one that will apply immediately after April next year but the final constitution that will come into effect once the Constitutional Assembly has completed its work) that Inkatha has come to assume the leadership of caution and good sense on a particular issue. It would be tragedy if, in brushing Inkatha aside because of its obstructionism with respect to other things, the bigger parties were to end up agreeing too hastily to interim arrangements which resulted in the end in the wrong kind of final constitution being adopted by the country.

THE EDITOR

Natal en daardie in Noord-Transvaal, daardie in die OVS en daardie in Wes-Transvaal) wil dit inkorporeer in die gebied onmiddellik rondom hul eie plase. Wat oor die hoof gesien word, selfs deur Generaal Constand Viljoen, is dat die Afrikaner op sosio-ekonomiese vlak verander het. Op hierdie gebied het Afrikaners lankal opgehou om oorwegend boere of armblankes te wees. Vyf en veertig jaar van NP regering het hul gesien gradueer na die sakelewe en die professies, na opleiding en die staatsdiens, asook na die polisie en die SAW. Hulle gewilligheid om hulle plase en firmas agter te laat, of om hulle werk te bedank en hulle pensioen op te offer om na 'n afgeleë plek te beweeg waar Afrikaners in 'n meerderheid sou wees, moet ernstig bevraagteken word. Jammerlik, het Afrikaner nasionalisme gesoek om soewereiniteit te verkry deur die kaping van die staat sonder om daardie soort institusies te vestig wat slegs beveilig kan word in 'n land waar 'n meerderheid bestaan het of waar 'n demokrasie gefunksioneer het. Dit was 'n poging om nasionale soewereiniteit van bo-af na onder, eerder as van onder na bo af te dwing, en dit het misluk. Noudat die NP die lig gesien het, of gedwing is om die lig te sien, het dit getransformeer na 'n nie-rassige party met 'n substansiële gevolg onder Kleurlinge en Asiërs, asook onder blankes, en selfs onder Swartes. Die NP mag nie 'n kans staan om die volgende verkiesing te wen nie, maar dit behou nog die soort ondersteuning wat dit 'n geloofwaardige vennoot vir die ANC in enige oorgangsmagsdelingsadministrasie maak en dit bly 'n ernstige aanspraakmaker op toekomstige mag.

Dit bring ons terug by wat onder die politieke oppervlakte, eerder dan op die oppervlakte self, gebeur. Tussen hulle beheer die ANC en die NP die steun van die oorgrote meerderheid van alle Suid-Afrikaners. Hulle stem nou hoofsaaklik ooreen oor wat nodig is op die pad van konstitusionele, sowel as ekonomiese verandering. Slegs die ekstreme gevoelens onder die laagste vlakke van hulle onderskeie ondersteuners verhoed 'n meer openlike openbare erkenning van die ooreenkoms van sienings tussen die onderskeie leiers. Goeie oordeel dikteer egter dat hulle nie sal vorentoe beur en die sentimente van die kleiner partye totaal sal verontagsaam nie. Hulle moet soveel moontlik saamneem na die nuwe Suid-Afrika. Dit is om hierdie rede dat daar aan die kleiner partye soveel geleentheid gebied word om die indruk van oppervlakkige politieke verskille by Kempton Park en ander plekke te skep.

Maar die tyd is besig om uit te loop vir die kleiner partye. Vir die twee groot partye het dit dringend nodig geword om aan te gaan met die taak van konstitusionele verandering, veral vanweë die belangrikheid hiervan vir veranderinge in die ekonomie. Sanksies moet opgehef word. Die land se verhoudinge met die IMF en die Wêreldbank moet genormaliseer word. Die huidige periode van stagnasie moet beëindig word. Hoër vlakke van ekonomiese groei, beide in terme van BBP en indiensname, moet bereik word. Die enigste probleem is dat sekere belangrike politieke probleme nog nie opgelos is nie. Dit het nie die saak van die bereiking van 'n ooreenkoms omtrent die toekomstige grondwet gehelp (nie slegs die interim een wat van toepassing sal wees onmiddellik na April volgende jaar nie, maar die finale grondwet wat in effek sal kom nadat die Oorgangsraad sy taak afgehandel het) dat Inkatha die leierskap van versigtigheid en gesonde verstand aangaande 'n bepaalde kwessie oorgeneem het nie. Dit sal 'n tragedie wees as, deur Inkatha opsy te skuif as gevolg van sy weerstand met betrekking tot ander dinge, die groter partye te haastig sal wees om die interim reëlings aan te gaan met die gevolg dat die verkeerde tipe finale grondwet uiteindelik deur die land aanvaar sou word.

DIE REDAKTEUR

A Two-stage Model for the prediction of corporate failure in South Africa

INTRODUCTION

According to Altman (1983), the foremost writer on the subject, the unsuccessful company can be classified as failed, insolvent or bankrupt. Failure implies "that the realised rate of return on invested capital with allowances for risk considerations, is significantly and continually lower than prevailing rates on similar investments". (Altman, 1983, p6). Altman maintains that insolvency is more specific than failure and refers to the situation where a firm cannot meet its current obligations thereby signifying a lack of liquidity. This position could either be temporary or permanent although once it is permanent, the firm may be regarded as bankrupt.

Argenti (1976), on the other hand, contends that the most definitive words are insolvency, liquidation, receivership and bankruptcy. A company becomes insolvent when it cannot pay its debts as they fall due or when its net asset value is negative. Should this be the case, the company will be placed in the hands of a Receiver who will decide whether the company should continue to trade or whether it should be placed in liquidation. Finally, Argenti contents that only individuals file for bankruptcy.

In the South African context, de la Rey (1981, p11), has defined corporate failure as follows:

Any business:

1. of which the equity became negative.
2. forced to discontinue operations because of the fact that it had committed an act of insolvency and was, as a result thereof, put under judicial management.
3. which could not show a profit for two out of three years.
4. that was unable to pay its preference dividend on time.
5. that was unable to declare an ordinary dividend for that year.
6. that was unable to honour its loan commitments on time according to a contractual agreement.
7. that reduced the nominal value of its share capital to bring it into line with the assets it represents.

Prior research has shown that companies fail primarily due to managerial incompetence. (See Campsey and Brigham, 1984, p665; Moyer, McGuigan and Kretlow, 1984, p717; Argenti 1976, p122).

Ineffective or poor management leads to mistakes in formulating a strategic plan and/or in its implementation and ultimately to the demise of the company. Accordingly the main body of research has focussed on the firm-specific, financial factors (microeconomic) which contribute to business failure.

As Altman (1983, p83) points out, however,

"the importance of microeconomic issues and the attendant large number of analytical studies have obscured the relevance and influence of macroeconomic influences on the business failure phenomenon".

It is appropriate therefore that the scope of the research be extended to incorporate [into a failure prediction model] the macroeconomic variables which affect business failure.

In essence, the success or otherwise of any business is influenced by two major sets of factors. Firstly, performance is influenced by a variety of internal factors which are firm-specific and which management is generally able to control. These may be classified as microeconomic variables and consist of both financial and non-financial variables. The financial variables are specifically those ratios which can be extracted from

a company's financial statements, as these are the only financial reports to which researchers have access. The non-financial variables could also reflect the financial state of the business. There are a variety of these factors, some of which may be obtained from the financial accounts of a company.

Secondly, performance is influenced by a number of macroeconomic factors which are external to the firm and which in most instances are beyond the control of management. Overall economic conditions have a direct bearing on the activities of individual firms for during periods of economic recession, money and capital market conditions are significant factors in the financial well-being of a firm. Participants in these markets may be unwilling to extend credit to those firms which are mismanaged or which are financially unstable. This could lead to failure and ultimately liquidation.

This paper seeks to combine the two sets of macro- and microeconomic factors in a simple, yet comprehensive, model of corporate failure. As will be seen, the factors cannot be combined in a single stage when evaluating failure and a two-stage model is proposed.

PRIOR RESEARCH

1. The microeconomic variables.

(a) *The firm-specific financial variables.*

A large body of research has been concerned with the establishment of failure prediction models based on conventional financial ratios extracted from the relevant company's financial statements. See Altman, (1984), for a comprehensive review of the literature starting with Beaver, (1966). The more recent publications on failure prediction models centre on the efficacy of the statistical techniques used in establishing the model. See Deakin (1972), Eisenbeis (1977), Ohlson (1980), Zavgren (1985), Goudie (1987) and in the South African context, Court and Radloff (1990).

More recently, Hing-Ling Lau (1987) departed from the use of a dichotomous dependent variable (failed/non-failed) to an ordinal dependent variable which could assume any one of five states of increasing severity. Using multinomial logistic regression analysis, Hing-Ling Lau determined the probability that a firm will enter one of these states and hence produced a measure of the firm's financial position on a continuous scale. This method highlighted prefailure distress as well as ultimate failure.

Limited research has been undertaken into the firm-specific financial factors which contribute to corporate failure in South Africa: the most notable published work being that of Strebel and Andrews (1977), de la Rey (1981), Court and Radloff (1990) and Olivier (1992).

(b) *The firm-specific non-financial variables.*

Some research has been conducted into the firm-specific non-financial variables which could indicate failure.

Although Ahlson (1980) did not specifically address the need to include non-financial variables in a failure prediction model, he found that undue delay in presenting the audited financial statements of US companies could bias the predictive ability of a model. He concluded that the use of company financial statements whose publication date had been delayed, influenced the classification accuracy of the specific model.

Listed on the Johannesburg Stock Exchange for the past 45 years, SA Bias Holdings operates through its listed subsidiaries, SA Bias Industries Limited (Sab Ind) and Merhold Limited.



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SA Bias Industries is South Africa's largest manufacturer and distributor of accessories and trimmings to the clothing, footwear and allied industries. Its growth strategy is based on maintaining its market share in South Africa, widening its role as a supplier to other industries in South Africa and expanding its manufacturing and distributing base abroad as a supplier of trimmings to the clothing and footwear industries worldwide.



Merhold Limited

Merhold is the investment arm of the SA Bias Group. It has strategic interests in commercial banking, funds management, corporate finance, investment and export trading operations. It has commercial investments in motor spares, fragrances, logistic support services, fluid handling, data communications, photo film distribution, audio-visual distribution, steel and food operations.

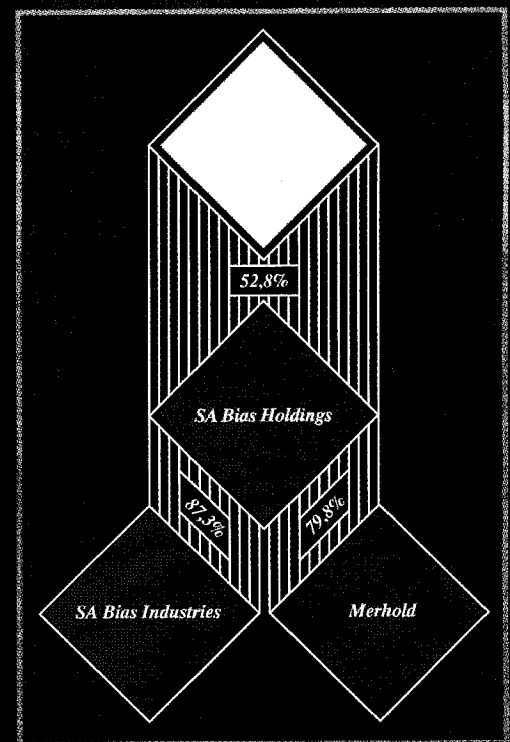
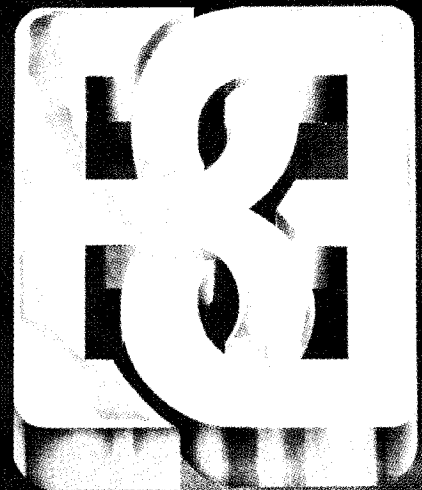
Strategic Investments

Consolidated Fund Managers (Pty) Limited	40%
Merhold Kirsh Capital Limited	50%
Mertrade (Pty) Limited	50%
The New Republic Bank Limited	42%

Commercial Investments

Autoquip Group Limited	29%
Campbell & Thiselton SA (Pty) Limited	40%
CGS Instrumentation	25%
Datatec (Pty) Limited	21%
Log-Tek Holdings Limited	17%
Mesheape Industries (Pty) Limited	40%
Nutritional Foods (Pty) Limited	50%
Photo Trading Corporation (Pty) Limited	25%
Tandem (Pty) Limited	10%
Woodrow Group Limited	33%

THE SA BIAS GROUP



SA Bias House, 72 Delfers Street, Johannesburg
PO Box 1164, Johannesburg 2000
Telephone 337-5340 Fax 337-6773

Lawrence (1983) specifically investigated the significance of a delay in publishing the audited financial statements of American companies. Although not seeking to incorporate this variable into a failure prediction model, he concluded that by ignoring this variable in the year before failure, statistical bias was introduced into the model.

Whitted and Zimmer (1984) investigated the effect of reporting delays on the Sydney Stock Exchange. They found that reporting delays were statistically significant for the two years prior to failure. On the other hand, the inclusion of this variable in a failure prediction model did not result in any significant improvement in its predictive ability.

Peel, Peel and Pope (1986) were the first to incorporate the non-financial variables which could contribute to corporate failure together with conventional financial ratios in a failure prediction model. The significance of eight financial and non-financial independent variables was tested against a sample of thirty-four failed and forty-four non-failed companies using conditional logit analysis at a 5% level of significance. In the main, the research indicated that the addition of non-financial variables to a conventional failure prediction model leads to a marked improvement, both in terms of explanatory and of predictive ability, in the model. In particular, the lag in publishing the financial statements was identified as a significant predictor when combined with conventional financial ratios.

Keasey and Watson (1988) investigated the extent to which reporting delays affected small companies in the UK. Although they concede that the size of companies affects their "propensity to submit accounts", they conclude that it is possible to develop cost effective monitoring procedures for small companies when predicting failure.

Merks (1986) evaluated the significance of certain non-financial variables using South African data for the period 1972 to 1986. He found that three variables: changes in director shareholdings, the lag in publishing financial statements and shareholder approval for directors to increase gearing could be significant contributors in a model using multiple regression.

Court (1992) applied the variables used by Peel *et al* (1986) to the South African context. He concluded that certain non-financial variables are significant predictors of corporate failure and in fact showed greater predictive ability than a model containing only financial ratios. When these variables were combined with the financial ratios in a failure prediction model, the accuracy of the model improved from 66,7% to 100% in the year prior to failure.

2. The macroeconomic variables.

Very little research has been conducted into the macroeconomic factors which contribute to business failure. The first paper of any note was that of Rose, Andrews and Giroux (1982) who maintain that failure is more likely to occur in an economic downturn. In a lagged regression model based on the United States economy, they found that six variables were significant predictors of failure and explained 91% of the variance in the business failure rate (BFR).

Altman (1983) also investigated the aggregate effect of various economic variables on the BFR in the USA using failure statistics compiled by Dun and Bradstreet over the period 1951–1978. Altman expected the explanatory variables to have a coincident association with the BFR which in some instances could be lagged. He accordingly observed the structure, amount and the significance of the various lagged periods coefficients by using the percentage changes in the variables (where appropriate) to re-

move the exponential trend effect over time. The research indicated that four variables contributed cumulatively to a greater propensity to fail: these were changes in real gross domestic product, the Standard and Poor index, the money supply and new business incorporations.

Altman did not attempt to relate these variables to the firm-specific variables which contribute to corporate failure.

He felt that in so much as the firm-specific financial ratios can be assigned specifically to the dichotomous dependent variable, the macro-variables related to both the failed and non-failed firms and are represented by a continuous variable. For this reason, he made no attempt to establish a more comprehensive model for the prediction of corporate failure.

Goudie (1987) realised the need to incorporate the macroeconomic variables in a model of corporate failure if its predictive ability was to be enhanced. As such, he focussed on what he believed were the two central issues in the prediction of corporate failure. Firstly that there be a maximum period of forewarning of impending failure and secondly that the projective efficiency of the model be enhanced with reference to future macroeconomic developments. Goudie therefore linked the traditional multivariate discriminant model with the multisectorial model of the UK economy developed at Cambridge University.

Goudie began with a general evaluation of the financial ratios which affect corporate failure in the UK. In order to extend the period of forewarning of failure, Goudie attempted to project the individual company's financial performance by estimating the cash flow for each company for the following year. From this information, the company's pro-forma accounts were constructed and the failure prediction score calculated for each company for the following year. Firms were thereafter classified as either "financially sound" or "in severe financial difficulty". Finally, Goudie sought to integrate the firm-specific model with a dynamic model of the UK economy developed at Cambridge University.

This research is an advance on Altman's work in that it is able to incorporate the macroeconomic variables which impinge on the business failure rate. On the other hand it lacks statistical precision although it establishes a framework for further investigation.

Court and Barr (1989) applied Altman's work in the South African context. They chose seven categories of economic variables when investigating the BFR and applied a factor analysis to the chosen variables in order to investigate their interrelationship. Four factors were found to have a bearing on the BFR. Four variables were accordingly chosen to represent these factors and their significance was examined using stepwise regression analysis.

Ultimately, visits by foreigners lagged for two months (representing socio-economic conditions) and total advances from the banking sector lagged for four months (representing money market conditional), were significant predictors of the BFR at a 10% level.

RESEARCH METHODOLOGY

This paper attempts to establish a failure prediction model using both macro- and microeconomic variables. This cannot be achieved in a single regression model and a two-stage model is developed. In the first stage the significant macro- and microeconomic variables in predicting business failure are established. In the second stage, all the relevant information is combined into a model which will establish a range of failure prediction scores.



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STAGE ONE

When assessing the macroeconomic environment, the dependent variable is the BFR which is observed on a monthly basis. Certain macroeconomic variables were selected to represent the independent variables and their interrelationship examined using factor analysis. Based on the results of the factor analysis, specific variables were chosen to represent the factors and, due to the sequential nature of these variables, the significance of these variables in their lagged form was examined using a polynomial distribution lag. Finally the lagged variables were tested for significance using regression analysis and the BFR was estimated on a monthly basis.

At the same time a sample of microeconomic variables was arbitrarily selected to represent the independent variables in the prediction of failure. Factor analysis was again used to investigate their interrelationship and to assist in the reduction of the predictor variables. The significance of the financial and non-financial variables was then examined using multivariate discriminant analysis.

STAGE TWO

In the second step, a Bayes-Fisher discriminant analysis (Huang and Li, 1991) was performed on the significant microeconomic variables in order to obtain a failure prediction score for different levels of the BFR. In this way a range of failure scores allied to the BFR was obtained.

In the Bayes-Fisher discrimination method knowledge of the probability density functions of the populations, failed or non-failed companies, is not required but use is made of the BFR estimated previously as the prior probabilities of the populations.

In particular, assume that we have two random samples from the two populations consisting of the three financial variables and three non-financial variables. If the means, covariance matrices and prior probabilities of the two populations are denoted by μ_i , v_i and p_i for ($i = 1, 2$), respectively and x denotes a vector of the financial and non-financial variables then the Bayes-Fisher discriminant function is given by:

$$l(x) = 2p_1 p_2 x^T (p_1 v_1 + p_2 v_2)^{-1} (\mu_1 - \mu_2)$$

with the failure score (Rhodes-score) determined by:

$$\text{Rhodes-score} = p_2 l(\mu_1) + p_1 l(\mu_2)$$

THE RESULTS

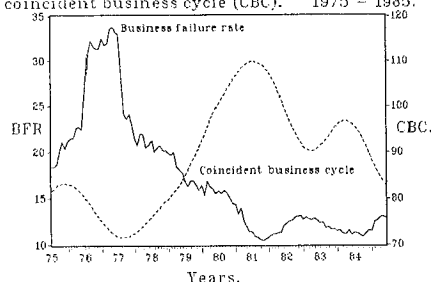
1. The macroeconomic variables.

The BFR was obtained as follows. The monthly liquidations and deregistrations was obtained from the Registrar of Companies. The total of these was then divided by the number of registered companies at the end of the period and adjusted in order to obtain the business failure rate per 10 000 companies.

A graphical representation of the BFR and the coincident business cycle in South Africa over the period 1975 to 1985 appears in Figure 1. The period chosen was regarded as being typical of an economic cycle.

From Figure 1 it can be seen that the BFR peaks during 1977 and drops to a low in 1982. Thereafter, until the end of 1985, the trend appears to be upward although at a significantly lower rate than in 1977. The figure supports the contention of Rose *et al* (1982, p21) that the BFR and the business cycle are negatively correlated.

Figure 1: The business failure rate (BFR) and the coincident business cycle (CBC), 1975 - 1985.



APPENDIX 1

SUMMARY OF THE ECONOMIC VARIABLES USED IN THE INVESTIGATION OF THE BUSINESS FAILURE RATE.

CATEGORY	ECONOMIC VARIABLE
Economic growth	Gross domestic product Corporate profits
Money market activity	Money supply Real rate of interest Total advances from banks
Capital market	Share prices activity Share transactions Bank debt
Price level changes	Consumer price index Production price index
Socio-economic conditions	Gold price Terms of trade
Social-political conditions	Visits by foreigners Ratio of emigrants to immigrants Exchange rate

Fifteen economic variables, which appear in Appendix 1, were selected to represent the independent variables and their interrelationship examined using factor analysis. After rotating the variables in a varimax manner, four factors emerged with eigenvalues greater than one. These factors explained approximately ninety percent of the variance in the data set. The results of the factor analysis appear in Appendix 2.

APPENDIX 2

SORTED ROTATED FACTOR LOADINGS (PATTERN)

	Loading
Factor 1	
Money Supply	0,88
Total advances	0,84
Consumer price index	0,84
Emigrants/immigrants	-0,81
Factor 2	
Exchange rate	0,95
Terms of rate	0,89
Real rate of interest	0,81
Index of corporated profits	-0,63
Factor 3	
Value of share transactions	0,98
Share price transactions	0,93
Gold price	0,87
Bank debt	0,55
Factor 4	
Tourists	-0,79
Production price index	0,80

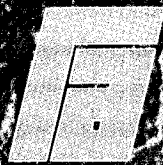
SAVE
THE
RIVERINE
RABBIT

There has to be a happy medium between the need for industrial development and the desire to protect our natural resources: a middle ground where conservation and consumption can co-exist in harmony.

YES...

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Factor one can be characterised as a money market activity, factor two related to the general level of economic activity, factor three reflects capital market activity, while factor four represents the political environment. The four variables chosen to represent the four factors were:

- (i) total advances from the banking sector;
- (ii) the index of corporate profits;
- (iii) the value of share market transactions;
- (iv) the number of tourists visiting South Africa.

In order to establish the lagged structure of the four variables, a polynomial distributed lagged structure was incorporated into the regression analysis. The lag distribution schedule of the chosen factors is given in Appendix 3.

**APPENDIX 3
LAG DISTRIBUTION SCHEDULES OF SELECTED VARIABLES**

Lag Distribution of TOTR3	Lag	Coef	S.E.	T-Stat
	0	0.01317	0.03940	0.33422
	1	-0.02259	0.02205	-1.02466
*	2	-0.04984	0.00940	-5.29932
*	3	-0.06858	0.00839	-8.17020
*	4	-0.07880	0.01447	-5.44604
*	5	-0.08052	0.01867	-4.31334
*	6	-0.07373	0.01993	-3.70028
*	7	-0.05842	0.01817	-3.21564
*	8	-0.03461	0.01375	-2.51788
*	9	-0.00229	0.00898	-0.25454
*	10	0.03855	0.01335	2.88679
*	11	0.08789	0.02685	3.27336
0	Sum	-0.32977	0.01340	-24.6176

Lag Distribution of CPR3	Lag	Coef	S.E.	T-Stat
	0	9.38315	4.69078	2.00034
	1	2.25505	2.58119	0.87365
*	2	-3.27885	1.01570	-3.22499
*	3	-7.21856	0.94165	-7.66584
*	4	-9.56407	1.72167	-5.55511
*	5	-10.3154	2.23187	-4.62186
*	6	-9.47249	2.37190	-3.99363
*	7	-7.03541	2.13514	-3.29506
*	8	-3.00412	1.55348	-1.93380
*	9	2.62136	0.89189	2.93911
*	10	9.84103	1.51131	6.51159
*	11	18.6549	3.22964	5.77616
0	Sum	-7.13338	2.51416	-2.83729

Lag Distribution of VOSR3	Lag	Coef	S.E.	T-Stat
	0	0.00258	0.00547	0.47223
*	1	0.00034	0.00268	0.12498
*	2	-0.00148	0.00079	-1.88129
*	3	-0.00286	0.00151	-1.88692
*	4	-0.00380	0.00252	-1.50603
*	5	-0.00431	0.00301	-1.43296
*	6	-0.00439	0.00293	-1.49744
*	7	-0.00403	0.00229	-1.75733
*	8	-0.00324	0.00119	-2.73332
*	9	-0.00202	0.00118	-1.71103
*	10	-0.00036	0.00341	-0.10492
*	11	0.00174	0.00637	0.27233
0	Sum	-0.02183	0.00654	-3.33709

Lag Distribution of VTR3	Lag	Coef	S.E.	T-Stat
*	0	-0.16266	0.06190	-2.62781
*	1	-0.12858	0.03152	-4.07901
*	2	-0.09754	0.00879	-11.0957
*	3	-0.06954	0.01321	-5.26574
*	4	-0.04459	0.02462	-1.81082
*	5	-0.02268	0.03039	-0.74622
*	6	-0.00381	0.03011	-0.12668
*	7	0.01201	0.02378	0.50494
*	8	0.02478	0.01176	2.10731
*	9	0.03452	0.00971	3.55364
*	10	0.04120	0.03364	1.22498
*	11	0.04485	0.06463	0.69394
0	Sum	-0.37204	0.08606	-4.32318

The results of the initial regression analysis using the Auto-regressive one technique (ARI) showed that the index of corporate profits and the value of share market transactions are not significant predictors of the BFR and they were eliminated from the investigation. In the final analysis, total advances from the banking sector was significant at the 6% level while visits by foreigners was highly significant. The results of the regression analysis are presented in Appendix 4.

**APPENDIX 4
LEAST SQUARES REGRESSION ANALYSIS ON THE TWO SIGNIFICANT LAGGED VARIABLES INCORPORATING AUTO-REGRESSION.**

Variable	Coefficient	Std. error	T-stat	2-Tail Sig
Const	21,019	4,177	5,03	0,00
TOTR3(-4)	-0,914	0,102	-1,89	0,06
VTR3(-2)	-0,351	0,077	-4,59	0,00
AR(1)	0,960	0,039	24,80	0,00
R-squared	0,982	Mean of dep.var.	17,232	
Adj R-squared	0,981	S.D. of dep. var.	6,812	
S.E. of regression	0,940	Sum of squared resid.	88,376	
Durbin-Watson stat	1,532	F-statistic	1769,172	
Log likelihood	-139,105			

2. The microeconomic variables

Twenty-one variables were arbitrarily selected to represent the microeconomic variables which could be used in the prediction of corporate failure. As discussed, a factor analysis was initially conducted on these variables in order to assist in the selection of the variables with the best predictive ability.

After the variables had been rotated in a varimax manner, six factors emerged with eigenvalues greater than one. The first three factors reflected specific financial ratios while the last three pointed to non-financial variables. These factors explained eighty-eight percent of the variance in the data set. The results of the factor analysis appear in Appendix 5.

**APPENDIX 5
SORTED ROTATED FACTOR LOADINGS**

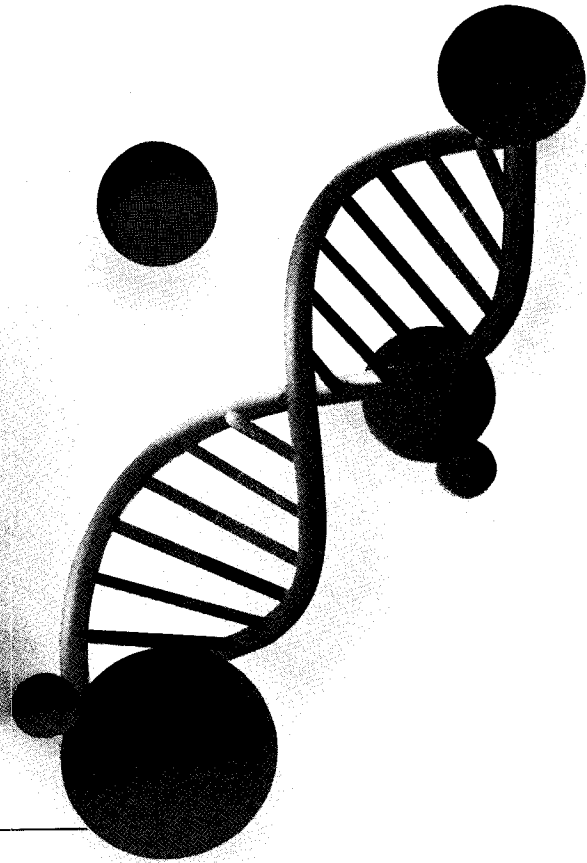
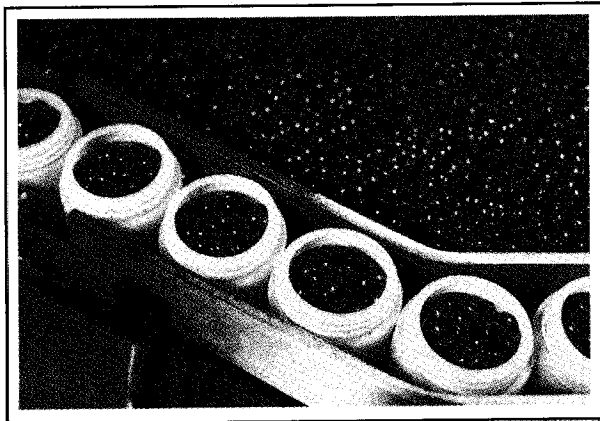
	Loading
Factor 1	
Profit before interest after tax/Total assets	0,955
Retained earnings/Total assets	0,946
Profit after interest and tax/Total assets	0,934
Profit after interest but before tax/Total assets	0,818
Operating profit/Operating assets	0,818
Profit before tax/Total current liabilities	0,783
Factor 2	
Current assets/Total debt	0,968
Total current assets/Total current liabilities	0,940
Profit after tax/Total long term debt	0,654
Factor 3	
Total debt/Total assets	-0,780
Total owner's interest/Total funds	0,780
Profit before interest and tax/Interest paid	0,743
Factor 4	
Director resignations and appointments	0,948
Director resignations and appointments/ Number of directors	0,948
Factor 5	
One year lag in director shareholding	0,987
Director shareholding	0,978
Factor 6	
Change in delay in published financial statements	0,824
Delay in published financial statements	0,546
Total current liabilities/Total funds	-0,543

Health Care for the Nation

Then

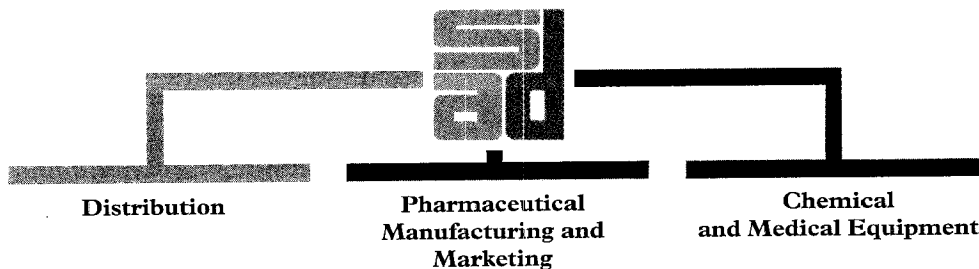


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A Two-stage Model for the prediction of corporate failure in South Africa

Factor one represents a profitability ratio and accounted for thirty-nine percent of the variance in the data. Factor two, which represents a liquidity ratio, contributed fourteen percent of the variability while factor three, which represents a solvency ratio explained twelve percent of the variability in the data.

Factor four which is a reflection of changes to the board of directors accounts for ten percent of the variance explained. Factor five represents director share activity and accounts for seven percent of the variance, while factor six represents the publication of the audited accounts and explains six percent of the variance. Factor six also contains a financial variable (Total current liabilities to total funds).

In the final analysis, the following variables were chosen to represent the six factors in the regression model.

- (i) Profit before interest after tax/Total assets. (X_1)
- (ii) Current assets/Total debt. (X_2)
- (iii) Owners equity/Total capital employed. (X_3)
- (iv) Director appointments and resignations/Number of directors in the year prior to failure. (X_4)
- (v) Director shareholdings two years prior to failure. (X_5)
- (vi) The delay in publishing the financial statements in the year prior to failure. (X_6)

The significance of these variables was then examined using discriminant analysis and the final discriminant model given by

$$Y = 0,00646X_1 - 0,00096X_2 + 0,03217X_3 - 0,97098X_4 + 0,00003X_5 - 0,01169X_6 \quad (\text{see Court and Radloff, 1990})$$

STAGE TWO: THE BAYES-FISHER ANALYSIS

The Bayes-Fisher discriminant analysis was applied to the selected microeconomic variables for the two years prior to failure. The R-score obtained for different levels of the BFR in the year prior to failure is presented in the following table.

TABLE 1

The Rhodes-Score in the year prior to failure with different BFR assumptions up to a 50% failure rate.

BFR	SUCCESS		FAILURE		R-SCORE
	18	Percent	20	Percent	
0,05	18	100	8	40	-1,54
0,10	18	100	8	40	-1,67
0,15	18	100	8	40	-1,67
0,20	18	100	8	40	-1,64
0,25	18	100	10	50	-1,59
0,30	18	100	10	50	-1,53
0,35	18	100	11	55	-1,47
0,40	18	100	13	65	-1,41
0,45	17	94	15	75	-1,34
0,50	17	94	15	75	-1,28

The R-score peaks between the 10% and 15% interval of BFR. From Figure 1, it is apparent that the probability of failure does not drop below 10% indicating that the R-scores for 5% and 10% are unreliable as these should be less than the R-score at 5%. At these levels of the BFR only eight companies out of the possible twenty were correctly classified as a failed company. On the other hand, such a low BFR would be conducive to the majority of companies being successful.

At a BFR level of 50%, the R-score is -1,28 which would be the score if the conventional discriminant analysis were used to establish a failure prediction score. At this level the predic-

tive accuracy is 75% which is lower than the predictive accuracy of the conventional single-stage model using logistic regression analysis. The calculated R-score increases steadily thereafter until it reaches zero at a 100% failure rate.

TWO YEARS PRIOR TO FAILURE

The process for the second year prior to failure was repeated and the R-scores appear in the following table.

TABLE 2
R-Score TWO years prior to failure

BFR	SUCCESS		FAILURE		R-SCORE
	18	Percent	20	Percent	
0,05	18	100	10	50	0,19
0,10	18	100	10	50	0,29
0,15	18	100	12	60	0,38
0,20	18	100	13	65	0,47
0,25	18	100	13	65	0,55
0,30	18	100	14	70	0,62
0,35	17	94	14	70	0,68
0,40	16	89	15	75	0,73
0,45	16	89	15	75	0,77
0,50	16	89	15	75	0,80

Although the R-score in this instance is positive it increases steadily as the probability of failure increases. At a BFR of 0,50, a predictive accuracy of 75% is obtained which is similar to the year prior to failure.

The model has practical applicability in predicting failure for companies which are regarded as being at risk. The user will need to establish the BFR either by using subjective judgement or by using the predictor variables presented in Appendix 4. Thereafter the user will need to determine a discriminant score for a particular company under investigation using the pre-determined BFR and the coefficients of the predictor variables presented in Appendix 6. This score can be compared to the Rhodes-score for the relevant BFR from Table 1. If the score obtained is less than the Rhodes-score then the prediction is that the company will fail.

APPENDIX 6
DISCRIMINANT FUNCTION COEFFICIENTS ONE YEAR PRIOR TO FAILURE

BFR	X_1	X_2	X_3	X_4	X_5	X_6
0,05	0,0083	-0,0014	0,0349	-1,4583	-2,8666E-5	-0,0036
0,10	0,0101	-0,0014	0,0430	-1,6615	1,4967E-5	-0,0052
0,15	0,0107	-0,0014	0,0454	-1,6630	1,8299E-5	-0,0066
0,20	0,0108	-0,0014	0,0453	-1,5997	2,7711E-5	-0,0077
0,25	0,0104	-0,0013	0,0440	-1,5099	3,2491E-5	-0,0088
0,30	0,0099	-0,0013	0,0421	-1,4082	3,4151E-5	-0,0096
0,35	0,0091	-0,0012	0,0397	-1,3008	3,3626E-5	-0,0104
0,40	0,0083	-0,0011	0,0370	-1,1912	3,1552E-5	-0,0110
0,45	0,0074	-0,0010	0,0342	-1,0801	2,8383E-5	-0,0114
0,50	0,0065	-0,0010	0,0313	-0,9710	2,4507E-5	-0,0117



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**APPENDIX 6
DISCRIMINANT FUNCTION COEFFICIENTS ONE YEAR
PRIOR TO FAILURE**

BFR	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
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0,50	0,0065	-0,0010	0,0313	-0,9710	2,4507E-5	-0,0117

SUMMARY

This paper has attempted to construct a two-stage model of corporate failure which embodies all of the relevant variables which influence the success or otherwise of a business organisation. In the first stage the macroeconomic variables which could affect the BFR were determined. At the same time the microeconomic variables which could be used in a failure prediction model were established. In the second stage, the chosen microeconomic variables were modelled with the aid of the Bayes-Fisher discriminant analysis and R-scores obtained for different levels of the BFR for the two years prior to failure.

The model proposed in this paper is a significant departure from the traditional method of failure prediction whereby a single failure prediction score was obtained using only microeconomic variables. It can reasonably be expected that failure will increase in adverse economic conditions. No cognisance of this fact has been incorporated into previous failure prediction models. The model proposed in this paper overcomes this obstacle and the failure prediction score is obtained with prior reference to macroeconomic variables. For this reason a range of failure prediction score is obtained depending on the state of the economy.

In addition, cognisance is made of the fact that the model developed for the year prior to failure may not be applicable for two years prior to failure. For this reason a second model has been developed for the relevant year. No further model is attempted as the non-financial variables isolated for use in the model were not significant in later years.

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Determinante van die Kapitaalstruktuur van Genoteerde Suid-Afrikaanse Nywerheidsmaatskappye: 1970-1990

1 INLEIDING

Talle ondersoekte van wisselende aard en omvang is reeds op internasionale vlak gedoen in 'n poging om determinante van die kapitaalstruktuur te identifiseer. Met hierdie studie is daar gepoog om determinante van die kapitaalstruktuur van genoteerde nywerheidsmaatskappye oor 'n tydperk van een en twintig jaar (1970-1990) in Suid-Afrika te identifiseer. In hoofsaak is daar ondersoek ingestel om te bepaal of die skuldverhouding van 'n onderneming enigszins deur die nywerheidsklassifikasie, grootte, bedryfshefboom, groei, winsgewendheid en sakerisiko verklaar kan word.

Die struktuur van hierdie artikel sien as volg daar uit: die determinante soos aangetref in die literatuur en die maatstawwe wat in die ondersoekte as verteenwoordigend van hierdie determinante gekies is, word bespreek. Vervolgens word die maatstawwe wat in hierdie studie aangewend word, uiteengesit. Verskillende skuldverhoudings is ondersoek. Definisies van hierdie skuldverhoudings volg. Daarna word die metodiek ten opsigte van die insameling van data en die toepassing van statistiese metodes uiteengesit. By die rapportering van resultate word daar op die aard van die verbande tussen die potensiële determinante en die onderskeie skuldverhoudings gelet. Ten slotte volg die samevatting van die resultate.

2 DETERMINANTE VAN DIE KAPITAALSTRUKTUUR: 'N LITERATUUROORSIG

2.1 Nywerheid of bedryfstak as determinant van kapitaalstruktuur

Die aspek wat in ondersoekte rakende kapitaalstruktuur die meeste aandag geniet het, is dié van 'n ooreenkoms tussen nywerheidsklassifikasie en die skuldverhouding.

Bradley, Jarrel & Kim (1984) bevind dat 54% van die deursneevariansie van maatskappye se skuldverhoudings aan nywerheidsklassifikasie toegeskryf kan word. Boquist & Moore (1984) bevind dat hoewel totale skuld tussen nywerhede wissel, rentedraende, skuld nie dieselfde patroon volg nie.

Marsh (1982) maak melding van studies deur Schwartz & Aronson, Gupta, Lev, Scott, Schmidt, Scott & Martin en Ferri & Jones wat op betekenisvolle nywerheidseffekte ten opsigte van die skuldverhouding dui. Bowen, Daley & Huber (1982) kom tot die gevolgtrekking dat die gemiddelde hefboomverhouding betekenisvol tussen nywerhede verskil; dat hierdie gemiddeldes nie fluktuasies oor tyd openbaar wat statisties betekenisvol is nie; maar dat 'n tendens om oor vyf- en tien-jaar periodes in die rigting van die nywerheids-gemiddeld te beweeg, tog bestaan.

Die voor-die-hand-liggende verklaring vir die ooreenkomste binne nywerhede is gesetel in risikofaktore. Bradley *et al.*, (1984) stel voor dat nywerheidsklassifikasie as maatstaf van risiko beskou kan word. In teenstelling hiermee argumenteer Martin & Henderson (1984) dat hoewel die finansieringspatrone tussen nywerhede verskil, slegs 'n klein persentasie betekenisvol van die res verskil.

Nog steun vir ooreenkomste binne en verskille tussen bedryfs-

take op grond van soortgelyke risikofaktore kom uit oorde van Ferri & Jones (1979) se studie waarvolgens die mate van risiko binne 'n bedryfstak deur die bestendigheid van inkomste bepaal word. Op grond van sy gewysigde rangorde-teorie is Myers (1984) dit eens dat die skuldverhouding van bedryfstak tot bedryfstak behoort te verskil, omdat die baterisiko, oftewel die tipe bates, en die behoeftes aan en vereistes van eksterne finansiering tussen bedryfstakke wissel.

Nog 'n verklaring vir ooreenkomste in die kapitaalstruktuur van maatskappye binne dieselfde bedryfstak, is dié van Stern (*Midland Corporate Finance Journal* (1985)). Hy beweer dat maatskappye binne 'n bedryfstak hoogs kompetender is en dus 'n optimale kapitaalstruktuur nastreef ten einde die algehele koste van kapitaal so laag as moontlik te hou. Ook Chatterjee & Scott (1989) maak op grond van 'n studie van Spence melding van kompetisie as oorsaaklike faktore vir die handhawing van 'n optimale skuldverhouding wat dan tot die verskille in skuldverhoudings tussen bedryfstakke lei.

Op 'n vraag in 'n ondersoek na die finansieringsbeleid van groot Amerikaanse ondernemings, waarop 212 respondente gereageer het, het 53% van hulle bevestig dat bedryfstakstandaarde wel 'n rol speel (Scott & Johnson, 1982). Daar is bevind dat die hefboomverhouding van bedryfstakmededingers die derde belangrikste invloed op hefboomdoelwitte gehad het.

Dit blyk dus asof nywerheidsklassifikasie wel verklaring vir 'n onderneming se skuldverhouding behoort te bied. Vir die doel van hierdie studie is die sektorklassifikasie van die Johannesburgse Effektebeurs gebruik.

2.2 Grootte as determinant van kapitaalstruktuur

In etlike studies is daar ondersoek na die verband tussen grootte en kapitaalstruktuur ingestel. Die 500 grootste maatskappye in Europa is volgens Collins & Sekely (1983) deur Agrawal in 'n sodanige ondersoek ingesluit. Die maatskappye was oor 13 lande en 38 industrieë versprei. Deur regressie- en tweerigting-analise van variansie te gebruik, is daar gepoog om die variasie in aandeelhoudersfondse as persentasie van totale bates te verklaar. Daar is egter geen betekenisvolle getuienis gevind om die teorie van die invloed van maatskappygrootte te staaf nie. Ook Kim & Sorensen (1986) vind dat daar geen verband tussen maatskappygrootte en die omvang van skuld is nie en volgens Kester (1986) is daar geen teoretiese fundering vir die effek van grootte op die skuldverhouding nie.

Die bevindinge dat die skuldverhouding 'n omgekeerde verband met die grootte van die maatskappy openbaar, is in die minderheid. Friend & Hasbrouck (1988) maak melding van 'n studie deur Gupta waarin daar bevind is dat hoe groter die maatskappy, hoe laer is die skuldverhouding. Ook Barton & Gordon (1988) verwerp die hipotesestelling dat maatskappygrootte 'n negatiewe korrelasie met die skuldverhouding toon.

Scott & Martin (1975) het in hul ondersoek na nywerheidsklassifikasie as determinant van die skuldverhouding bevind dat die verskil tussen bedryfstakke deels aan die grootte van die maatskappye binne die betrokke bedryfstakke toegeskryf kan word.

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Taub (1975) is van mening dat daar 'n direkte verband tussen die skuldverhouding en die grootte van die maatskappy behoort te bestaan. Volgens hom behoort die maatskappygrootte die risikoprofiel van die onderneming te beïnvloed. Die verwagting is dus: hoe groter die maatskappy, hoe groter is die bronne om op terug te val indien wisselvalligheid in verdienste sou veroorsaak dat rentebetelings nie bygebring kan word nie.

Titman & Wessels (1988) sluit hierby aan deur te argumenteer dat groot maatskappye gewoonlik meer gediversifiseer as klein maatskappye is. Die waarskynlikheid van bankrotskap vir groot maatskappye neem af namate diversifikasie toeneem. Hul haal vir Warner & Ang en Chua & McConnell aan wat aangetoon het dat bankrotskap koste 'n proporsioneel groter wordende deel van maatskappywaarde verteenwoordig namate daardie waarde verminder. Die verwagting is dus dat groter maatskappye hoër skuldverhoudings sal toon.

In teenstelling met voorafgaande argument voer dieselfde skrywers aan dat klein maatskappye baie meer onkoste as groot maatskappye dra wanneer aandele uitgereik word. Die argument geld ook vir langtermynskuld, alhoewel in 'n mindere mate. Hieruit volg die afleiding dat kleiner maatskappye dalk hoër skuldverhoudings mag hê.

Titman & Wessels (1988) onderskei egter tussen langtermyn- en korttermynskuld. Daar word aangevoer dat klein maatskappye betekenisvol meer van korttermynskuld gebruik maak. Dit stem ooreen met die argument dat die klein maatskappy nie die hoë transaksiekoste van langtermynskuld of aandeeluitreiking kan dra nie. Die argument word gesteun deur Marsh (1982:126): "Smaller companies tended to rely on short term rather than long term debt". Hy meld dat Gupta en Schmidt bevind het dat groter maatskappye meer langtermynskuld en kleiner maatskappye meer korttermynskuld het en dat hierdie bevindinge in die Verenigde Koninkryk deur Brealey, Hodges & Capron bevestig is.

Marsh (1982) meld verder studies deur Chudson, Bray, Toy *et al.* en Ferri & Jones waarin geen lineêre verband tussen totale skuld en totale bates gevind kon word nie. Ferri & Jones (1979) bevind dat kleiner maatskappye trosgewys in hoë en lae hefboomklasse voorkom, terwyl die groter maatskappye meestal in 'n intermediaêre hefboomklas val.

Aan die hand van bovermelde ondersoek is dit dus duidelik dat die verband tussen grootte en kapitaalstruktuur van wisselende aard is.

Tabel 1 dien as uiteensetting van die maatstawwe vir grootte wat deur die onderskeie skrywers gebruik is:

TABEL 1
Maatstawwe vir grootte

Kester	Verkope
Crutchley & Hansen	Boekwaarde van totale bates (5-jaar gemiddeldes)
Ferri & Jones	Verkope Verkope (4-jaar gemiddeldes) Totale bates Boekwaarde van totale bates (4-jaar gemiddeldes)
Remmers, <i>et al.</i>	Verkope
Scott & Martin	Totale bates
Smith	Netto inkomste/Totale kapitaal
Taub	Boekwaarde van totale bates
Titman & Wessels	Natuurlike logaritme van verkope Bedankings van werknemers ("Quit rate")

Met die oog op die Suid-Afrikaanse ondersoek is daar twee

maatstawwe vir grootte gekies, naamlik jaarlikse verkope en totale bates per balansstaat.

2.3 Bedryfshefboom as determinant van kapitaalstruktuur

Die bedryfshefboom van die maatskappy word gewoonlik in terme van 'n lineêre gelykbreekmodel beskryf (Stowe & Ingene, 1984). In hierdie konteks is die bedryfshefboom 'n funksie van die omvang van vaste koste tot veranderlike koste. Mitchell (1991) definieer die bedryfshefboom in 'n risiko-konteks as die variasie in bedryfsinkomste relatief tot die variasie in verkope. Barton & Gordon (1988) sien die bedryfshefboom as sinoniem met kapitaalintensiteit, oftewel die aanwending van vaste bates. Beide uitgangspunte word deur Ferri & Jones (1979:632) in hul definisie van die bedryfshefboom geakkommodeer: "Operating leverage may be defined as the use of fixed costs in the firm's production scheme, but is generally associated with the employment of fixed assets."

Dotan & Ravid (1985) dui aan dat daar empiriese bewys vir 'n omgekeerde verband tussen die skuldverhouding en die bedryfshefboom bestaan. Ferri & Jones (1979) bevind byvoorbeeld dat die verband tussen die bedryfshefboom, soos deur balansstaatdata gemeet, en die skuldverhouding feitlik perfek negatief monotoon is. Maatskappye met 'n hoë bedryfshefboom val hoofsaaklik in 'n lae skuldverhoudingklas. Die verklaring hiervoor is dat hoe meer vaste bates 'n onderneming in stand moet hou, hoe groter is die potensiaal dat toekomstige inkomste wisselvallig kan wees. Barton & Gordon (1988) stem saam dat verhoogde kapitaalintensiteit verhoogde risiko ten opsigte van toekomstige inkomste tot gevolg behoort te hê. Hulle het verwag om 'n negatiewe verband waar te neem, maar kom tot die gevolgtrekking dat daar geen betekenisvolle verband tussen kapitaalintensiteit en die kapitaalstruktuur bestaan nie.

Mandelker en Rhee (1984) sluit by die tema van verhoogde risiko aan en beweer dat die wisselwerking tussen die finansiële- en bedryfshefboom as stabiliserende faktor ten opsigte van risiko kan dien. In direkte teenstelling hiermee wys Prezas (1987) daarop dat verandering in die bedryfshefboom met verandering in die finansiële hefboom gepaard gaan, en dat die verandering in die meeste gevalle in dieselfde rigting is. Ook Myers (1977) beweer dat kapitaalintensiteit en 'n hoë skuldverhouding hand aan hand gaan.

Batesamestelling het betrekking op die samestelling en tipe bates van die onderneming en behoort die kapitaalstruktuur te beïnvloed. Chatterjee & Scott (1989) praat van die bykomende waarde van 'n bate en verduidelik die begrip aan die hand van 'n voorbeeld van kapitaalintensiewe maatskappye wat na verwagting hoër skuldvlakke sal toon – 'n maatskappy met meer tasbare bates sou dus 'n hoër skuldverhouding hê. Batespesifiteit (Acs, 1991) word gekoppel aan die mate van innovasie eie aan die onderneming. Daar word beweer dat eienskappe van innovasie in samehang met grootte beskou moet word. So is daar bevind dat innovasie in klein ondernemings tot hoër skuldvlakke lei.

Die batesamestelling het dus 'n bepalende invloed op die skuldkapasiteit van die onderneming. Marsh (1982) wys op 'n vroeë studie van Martin & Scott waarin hulle bevind het dat 'n hoë persentasie vaste bates op skuldfinansiering eerder as aandele-uitreiking dui. Volgens Marsh behoort maatskappye met proporsioneel hoë vaste bates meer langtermynskuld te gebruik. Ook Myers (1977) beweer dat kapitaalintensiteit en hoë bedryfshefboomvlakke saam met 'n groot skuldklas behoort te gaan. In aansluiting hierby is Harris & Raviv (1991) se siening dat maatskappye se likwidasiewaarde 'n invloed op sy skuldverhoudings behoort uit te oefen. Hoe hoër die likwidasiewaarde, dus hoe meer tasbare bates, hoe hoër behoort die skuldverhouding te wees.

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Dit blyk dat daar getuienis bestaan vir positiewe sowel as negatiewe verbande tussen die bedryfshefboom en die finansiële hefboom. Maatstawwe soos aangetref in die literatuur volg:

TABEL 2
Maatstawwe vir die bedryfshefboom

Barton & Gordon	$\frac{\text{Netto vaste bates}}{\text{Boekwaarde van totale bates}}$ (9-jaar gemiddeldes)
Ferri & Jones	$\frac{\text{Persentasieverandering in inkomste}}{\text{Persentasieverandering in verkope}}$ $\frac{\text{Vaste bates}}{\text{Totale bates}}$ (4-jaar gemiddeldes)
Smith & Markland	$\frac{\text{Bedryfsinkomste}}{\text{Omset}}$

Die twee maatstawwe wat vir die doel van hierdie ondersoek gekies is, is vaste bates as verhouding tot totale bates, en die verskil in inkomste voor rente betaal en voor belasting vir twee opeenvolgende jare uitgedruk as verhouding tot die verskil in verkope vir dieselfde twee jare.

2.4 Groei as determinant van die kapitaalstruktuur

Die belastingskuld op rente betaal, maak van skuldfinansiering met die oog op groei 'n aantreklike moontlikheid. 'n Positiewe verband tussen groei en die skuldverhouding word dus verwag.

Die sogenaamde groeigeleenthede dra by tot die waarde van die onderneming en gevolglik word die skuldkapasiteit ooreenstemmend verhoog (Titman & Wessels, 1988). Die skrywers beweer egter dat die verhoogde waarde nie in terme van boekwaardes van aandeelhoudersfondse gereflekteer word nie en dat die positiewe verband waarna verwys word, bloot as gevolg van konstante boekwaardes van aandeelhoudersfondse teenoor stygende skuld ontstaan.

'n Ander gesigspunt is dat groei as sulks as 'n doelwit van bestuur beskou kan word en dat die doelwitte van bestuur 'n invloed op die kapitaalstruktuur sal hê (Barton & Gordon, 1987). Hulle bevinding was inderdaad 'n positiewe verband tussen die skuldverhouding en die groei in verkope.

Hierdie verwagte positiewe verband tussen groei in verkope en die skuldverhouding word ook in die breë deur Friend & Hasbrouck (1988) bevestig. Collins & Sekely (1983), op hul beurt, verwys na 'n studie waarin groei in totale bates as maatstaf gebruik is. Die bevinding was egter van dieselfde aard, naamlik dat die skuldverhouding saam met die groei in bates styg.

Kim & Sorensen (1986) se siening is dat ondernemings wat hoë groei toon, minder, eerder as meer, van skuldfinansiering gebruik sal maak, terwyl Titman & Wessels (1988), wat na verskillende komponente van skuld gekyk het, beweer dat die korttermynskuldverhouding 'n positiewe verband met groei mag toon indien ondernemings wat hulself in 'n groeifase bevind, langtermynskuld met korttermynskuld sou vervang.

In die meeste gevalle is daar dus inderdaad 'n positiewe verband tussen groei en die skuldverhouding bevestig. Tabel 3 dien as opsomming van genoemde maatstawwe.

Twee maatstawwe is vir hierdie studie gekies, te wete verkope en inkomste voor rente betaal en voor belasting. Verkope is voorheen algemeen as maatstaf vir groei in soortgelyke studies gebruik. Die motivering vir inkomste voor rente betaal en voor belasting lê juis in die uitskakeling van enige finansiële hefboominvloed.

TABEL 3
Maatstawwe vir groei

Marsh	Verkope
Kester	Saamgestelde gemiddelde jaarlikse groei in verkope
Kim & Sorensen	Inkomste voor rente betaal en voor belasting
Barton & Gordon	Verkope
Friend & Hasbrouck	Verkope
Titman & Wessels	$\frac{\text{Kapitaaluitgawes per kontantvloeiastaat}}{\text{Totale bates}}$ %-verandering in totale bates $\frac{\text{Navorsing en ontwikkeling}}{\text{Verkope}}$

2.5 Winsgewendheid as determinant van die kapitaalstruktuur

Teoreties gesproke behoort winsgewendheid 'n invloed op die kapitaalstruktuur te hê (Brigham & Gapenski, 1991:511). Hoë opbrengste stel die meer winsgewende maatskappye in staat om selffinansiering toe te pas en 'n lae skuldverhouding sal dus kenmerkend van 'n winsgewende onderneming wees. Titman & Wessels (1988:6) beaam hierdie verband: "...the past profitability of a firm, and hence the amount of earnings available to be retained, should be an important determinant of its current capital structure."

'n Negatiewe verband tussen die winsgewendheid van 'n onderneming en die skuldverhouding is in 'n ondersoek deur Barton & Gordon (1988) as die sterkste en mees betekenisvolle uitgeklee.

Friend & Hasbrouck (1988) maak melding van ondersoeke deur Gordon (1962) wat 'n negatiewe verband, en later Toy, Stonehill, Femmers & Beekhuizen (1974) wat 'n positiewe verband opgelewer het. Friend & Lang (1988) verwys egter na vroeëre ondersoeke waarin winsgewendheidsmaatstawwe deurgaans 'n omgekeerde verband met die finansiële hefboom getoon het.

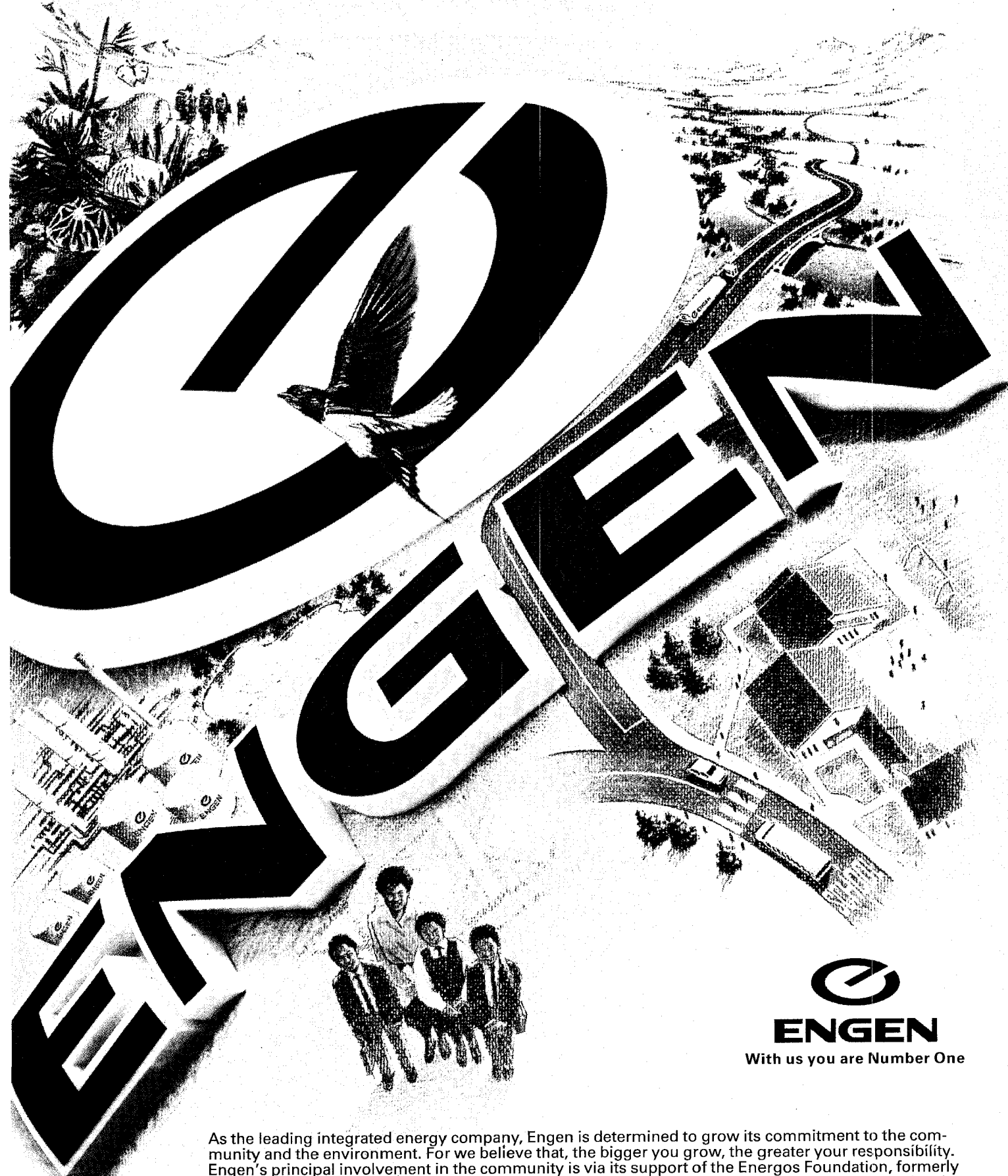
Na aanleiding van vorige ondersoeke (met 'n enkele uitsondering) word 'n negatiewe verband tussen winsgewendheid en die kapitaalstruktuur verwag.

Kyk Tabel 4 vir 'n opsomming van maatstawwe voorheen in studies gebruik.

TABEL 4
Maatstawwe vir winsgewendheid

Myers	Verwagte toekomstige waarde van bates
Chen & Shimerda	$\frac{\text{Netto inkomste}}{\text{Totale bates}}$
Kester	$\frac{\text{Inkomste voor rente, belasting, nie-kontantuitgawes}}{\text{Totale bates}}$
Barton & Gordon	$\frac{\text{Netto inkomste}}{\text{Totale bates}}$
Titman & Wessels	$\frac{\text{Bedryfsinkomste}}{\text{Verkope}}$ $\frac{\text{Bedryfsinkomste}}{\text{Totale bates}}$

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Die twee maatstawwe wat gekies is, is inkomste voor rente betaal en voor belasting met verkope en totale bates as skaleringsfaktore onderskeidelik. In albei gevalle is inkomste voor rente betaal en belasting doelbewus gekies om enige hefboominvloed te voorkom.

2.6 Sakerisiko

Risiko is 'n komplekse begrip wat na sistematiese en onsistematiese risiko, sowel as finansiële- en sakerisiko verwys. Vir die doel van die studie word die bydrae van finansiële risiko tot die totale risikoprofiel uitgeskakel, juis omdat laasgenoemde tot 'n groot mate deur die finansiële hefboom veroorsaak word. Volgens Mandelker & Rhee (1984) het Hamada bevind dat ongeveer 25% van sistematiese risiko deur die finansiële hefboom verklaar word. Hoewel stellings soos dié van Dubofsky (1985) dat maatskappye met die meeste skuld die hoogste beta het en dat finansiële risiko die sleuteldeterminant van beta is, wel geregtig is, is dit nie die uitgangspunt wat hier geld nie. Die doel van hierdie studie is om te bepaal wat die oorsaaklike faktore vir die finansiële hefboom is. Daar word dus gepoog om aan te toon in welke mate die sakerisiko die finansiële risiko beïnvloed. In dié verband is Smith & Markland (1981) se definisie van sakerisiko raak: die mate waartoe 'n maatskappy aan omstandighede blootgestel is wat sou kon veroorsaak dat daar op onvoorspelbare wyse van resultate oor die langtermyn afgewyk word.

Barton & Gordon (1987 en 1988) is van mening dat bestuur se risiko-afkerigheid 'n sleuteldeterminant van die kapitaalstruktuur is. Intuïtief is die verband tussen sakerisiko en die skuldverhouding negatief van aard, met ander woorde 'n maatskappy se skuldverhouding sal afneem namate die sakerisiko toeneem. Etlke studies het die aspek ondersoek. Hoewel Ferri & Jones (1979) 'n negatiewe verband verwag het, kon hulle nie (ten spyte van verskeie maatstawwe vir risiko) bewys vind vir 'n verband tussen wisselvalligheid in inkomste en die skuldverhouding nie. Bradley, Jarrel & Kim (1984) het 'n omgekeerde verband tussen die bestendigheid van verdienste en die skuldverhouding gevind. Ook Barton & Gordon (1988), sowel as Friend & Lang (1988), kon hierdie negatiewe verband bevestig.

Die volgende maatstawwe is dié wat in soortgelyke studies gebruik is. Dit is belangrik om daarop te let dat sommige van die maatstawwe wel totale risiko meet en daar dus 'n sydigheid ontstaan deurdat die skuldverhouding 'n bekenisvolle faktor met betrekking tot totale risiko is.

TABEL 5
Maatstawwe vir risiko

Taub	Residu-variëansie van verdienste per aandeel oor tyd Gemiddelde verdienste gekwadreer
Ferri & Jones	Koëffisiënt van variëansie van verkope Koëffisiënt van variëansie van voorbelaste kontantvloei Standaardafwyking van gestandaardiseerde groei in verkope Standaardafwyking van gestandaardiseerde groei in voorbelaste kontantvloei
Marsh	Vaste uitgawes Inkomste voor rente betaal en voor belasting Standaardafwyking van verdienste (10 jaar)
Kim & Sorensen	Koëffisiënt van variëansie van inkomste voor rente betaal en voor belasting
Barton & Gordon	Koëffisiënt van variëansie van inkomste
Friend & Lang	Standaardafwyking van inkomste voor rente en voor belasting Totale bates
Titman & Wessels	Standaardafwyking van %-verandering in bedryfs-inkomste

By die keuse van 'n maatstaf vir risiko word daar nou in die besonder op sakerisiko gelet. Daarmee word tradisionele maatstawwe vir totale risiko uitgeskakel juis omdat laasgenoemde gedeeltelik deur die finansiële risiko, die skuldverhouding dus, bepaal word.

'n Jaar-tot-jaarsyfer vir die verandering in inkomste voor rente betaal en belasting (waarin daar geen finansiële hefboomfaktor voorkom nie) en 'n soortgelyke syfer, naamlik die verandering van inkomste na belasting (met totale bates as skaleringsfaktor in albei gevalle) is gebruik. In laasgenoemde maatstaf is die rentelas wel in berekening gebring, wat in terme van die finansiële risiko, tot 'n mate van sydigheid aanleiding gee.

3. DEFINISIES

Ses maatstawwe is as aanduiders van skuld in die nywerheidssektor oor die tydperk 1970-1990 gekies: totale skuldverhouding, langtermynskuldverhouding, netto langtermynskuldverhouding, bedryfslasteverhouding, rentedraende skuldverhouding en rentedekking.

3.1 Totale skuldverhouding

Die totale skuldverhouding word gedefinieer as die som van langtermynlenings en bedryfslaste tot totale bates.

3.2 Langtermynskuldverhouding

Die langtermynskuldverhouding verteenwoordig slegs die langtermynlenings uitgedruk as breukdeel van totale bates.

3.3 Netto langtermynskuldverhouding

Die motivering vir hierdie maatstaf word gevind in die sogenaamde vertikale metode by die opstel van die balansstaat. Die verhouding is as volg bereken: langtermynlenings uitgedruk as breukdeel van die verskil tussen totale bates en bedryfslaste.

Hierdie beginsel word ook in die studie van Barton & Gordon (1988) aangehaal. Trouens, dit is die enigste studie waarin die betrokke beginsel in die maatstaf vir skuld voorgekom het. Wel in 'n ander vorm, kom die beginsel ook in Bradley, Jarrel & Kim (1984) se studie voor waar die finansiële hefboomverhouding bepaal word deur die gemiddelde vlak van langtermynskuld teen boekwaarde in verhouding tot die gemiddelde vlak van langtermynskuld plus die markwaarde van ekwiteit.

3.4 Bedryfslasteverhouding

Hierdie skuldverhouding is korttermyn van aard en is bloot die verhouding van bedryfslaste tot totale bates.

3.5 Rentedraende skuldverhouding

Die som van die oortrokke-banksyfer, sowel as die kort- en langtermynlenings in verhouding tot totale bates vorm die rentedraende skuldverhouding.

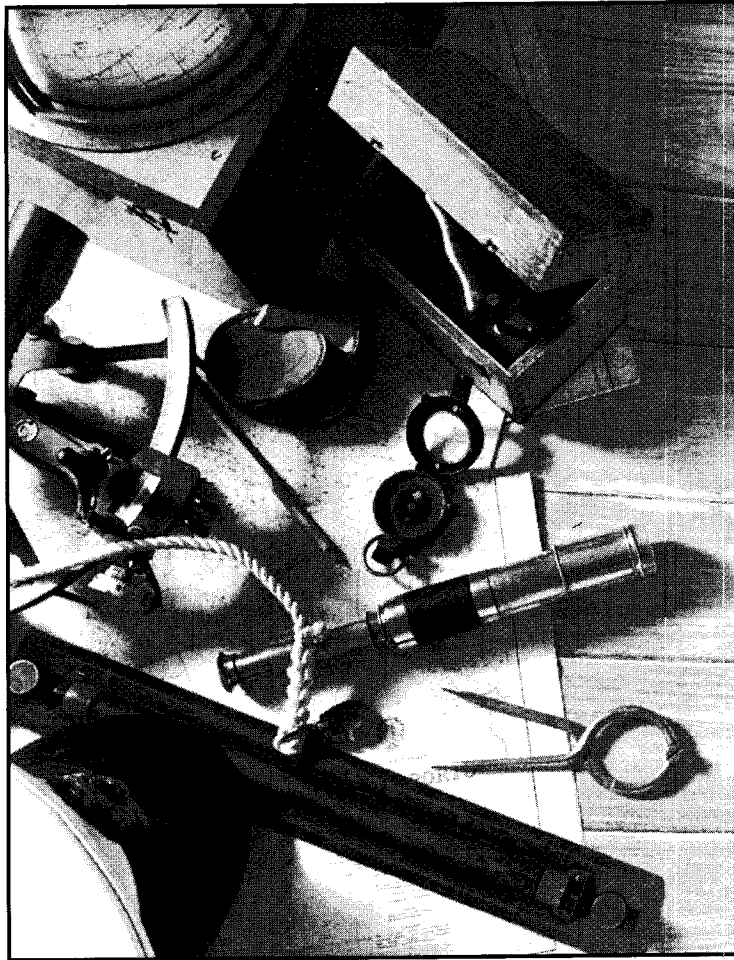
3.6 Rentedekking

Rentedekking word as volg bereken: inkomste voor belasting plus rente betaal, gedeel deur rente betaal.

3.7 Samevatting

Drie items wat dikwels as deel van die "finansieringskant" van die balansstaat voorkom, word nie deur bogenoemde maatstawwe aangespreek nie. Hulle is voorkeuraandele, uitgestelde belasting en minderheidsbelang.

Wat die eerste twee items betref, is daar bereken dat vir die tydperk van die ondersoek die syfers gemiddeld slegs 'n klein persentasie van finansiering verteenwoordig, 1% en 4% on-



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derskeidelik. Minderheidsbelang verteenwoordig wel 'n hoër persentasie, naamlik 12%. Die syfer is vir die doel van die studie nie in ag geneem nie, juis omdat dit 'n gryns area tussen skuld en aandeelhouing verteenwoordig.

4. METODOLOGIE

4.1 Data

Alle genoteerde Suid-Afrikaanse nywerheidsmaatskappye, met die uitsondering van maatskappye in die ontwikkelingskapitaal-sektor, is in die ondersoek ingesluit. Die aantal maatskappye wissel vanaf 109 in 1970 tot 312 in 1990. Die maatskappye is oor 19 sektore versprei. Maatskappye wat gedenoteer is, kom nie voor nie. Van die 312 1990-maatskappye was 109 dus reeds in 1970 genoteer. Die data is van die Universiteit van Stellenbosch Bestuurskool se databank verkry.

Om dubbeltelling te vermy, is die data van 'n piramied- en/of beheermaatskappy waarvan die enigste bate dié van 'n belegging in 'n filiaalmaatskappy en waarvan die inkomste hoofsaaklik of uitsluitlik van die filiaal afkomstig is, uit die ondersoek verwyder.

'n Mate van sydigheid ten opsigte van oorlewing lê in die studie opgesluit deurdat maatskappye wat in die loop van die tydperk van die studie gedenoteer is, nie ingesluit is nie. Die data van 'n maatskappy behoort dus vir die jaar van notering en elke jaar daarna tot en met 1990 ingesluit te wees. In enkele gevalle was die 1990-syfers nie beskikbaar nie, aangesien die jaarverslae nog nie ontvang was nie.

4.2 Ontbrekende waardes en uitskieters

Soos reeds gemeld, is daar maatskappye waarvan die 1990-data ontbreek. Ook met betrekking tot die omsetveranderlike is daar ontbrekende waardes. Dit hou direk verband met wetgewing ten opsigte van die verpligte openbaarmaking

van die betrokke syfer wat in 1974 van krag geword het. Die betrokke waarnemings is dan bloot buite rekening gelaat. Vanweë die verkennende aard van die ondersoek, is geen poging aangewend om uitskieters uit die data te verwyder nie.

4.3 Voorlopige toetse

Aanvanklik is daar beoog om analise van kovariansie te doen in 'n poging om die effek van tyd en sektor te verwyder. Om analise van kovariansie te kon doen, moes die aanname dat die regressiekoëffisiënte vir die verskillende jare en sektore homogeen is, getoets word (Dunn & Clark, 1974). 'n Toets vir elk van die nege onafhanklike veranderlikes in kombinasie met elk van die ses afhanklike veranderlikes is uitgevoer. Daar is inderdaad in die meerderheid van gevalle bevind dat die regressielyne nie parallel is nie en dat betekenisvolle verskille tussen sommige sektore en sommige jare bestaan.

Aangesien die doel van die studie is om beste verklarings vir die verskillende skuldverhoudings te kan bied, kon hierdie non-homogeniteite wat deur die voorlopige analise uitgewys is nie sonder meer geïgnoreer word nie. Wat tyd betref, kon geen getuienis gevind word dat betekenisvolle tydverskille in die periode 1970-1985 voorkom nie. Gevolglik is daar besluit om die ondersoektydperk in twee periodes te verdeel: 1970-1985 en 1986-1990 (voortaan periode A en B onderskeidelik). Wat sektorale verskille betref, is 'n konserwatiewe benadering gevolg deur per sektor te analiseer.

4.4 Stapsgewyse meervoudige regressie

Vervolgens het die analise etlike meervoudige regressiemodelle behels. Met twee tydperiodes, neëntien sektore en ses afhanklike veranderlikes is 'n somtotaal van 228 stapsgewyse regressielopies uitgevoer. Al nege onafhanklike veranderlikes is in elke model ingesluit. 'n Korrelasie-matriks om verbande tussen die onafhanklike veranderlikes toe te lig, verskyn in Tabel 6.

TABEL 6
Korrelasie-matriks: Onafhanklike veranderlikes

	SALES	TA	FATA	DEDS	EBIT	EBITSA	EBITTA	DETA	DPTA
SALES	1,000								
TA	0,930	1,000							
FATA	0,075	0,166	1,000						
DEDS	-0,004	-0,001	0,037	1,000					
EBIT	0,913	0,971	0,145	-0,003	1,000				
EBITSA	-0,065	0,031	0,103	0,001	0,073	1,000			
EBITTA	-0,019	-0,022	-0,147	-0,011	0,051	0,573	1,000		
DETA	0,018	0,009	-0,041	-0,001	0,036	0,193	0,385	1,000	
DPTA	0,018	0,015	-0,075	-0,003	0,034	0,206	0,383	0,895	1,000

Deur 'n proses van stapsgewyse regressie word die veranderlike wat die beste verklaring bied, eerste in die model opgeneem. Vervolgens word daar uit die oorblywende onafhanklike veranderlikes daardie veranderlike geselekteer wat die beste verklaring vir die onverklaarde variasie in die afhanklike veranderlike bied. Die proses is by die 10%-betekenispeil getermineer wanneer geeneen van die uitgeslote veranderlikes statisties betekenisvol tot die verklaring van die residuele variasie bydra nie. Dit kan gebeur dat 'n veranderlike wat oorspronklik as betekenisvol in die model opgeneem is by die finale rapportering sy betekenisvolheid kon verloor het.

In terme van die werkswyse hier uiteengesit, is dit belangrik om te beklemtoon dat modelseleksie aan die rekenaar oorgelaat is. Geen poging is aangewend om regressievergelings se spesifikasies te verbeter of om te toets of te korrigeer

vir outokorrelasie, multikolineariteit of heteroskedastisiteit nie. Die omvang van die probleem en die feit dat die numeriese waardes van die geskatte koëffisiënte in hierdie stadium onbelangrik is, het sodanige werkswyse gemotiveer.

5. RESULTATE

5.1 Inleiding

Daar is gepoog om aan die hand van sekere veranderlikes wat as verteenwoordigende maatstawwe van maontlike determinante gekies is, te toon dat die onderskeie skuldverhoudings aan hierdie gekose veranderlikes gekoppel kan word.

Deur die voorlopige toetse is daar inderdaad vasgestel dat nywerheidsklassifikasie 'n determinant van die skuldverhou-



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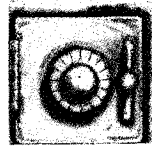
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ding is as die indeling volgens sektor as sinoniem met nywerheidsklassifikasie beskou word. Die oorblywende determinante is dan die volgende: grootte, bedryfshefboom, groei, winsgewendheid en sakerisiko.

In enkele gevalle kon geeneen van die gekose maatstawwe betekenisvolle verklaring vir die variasie in die skuldverhouding bied nie. Vir 'n opsomming hiervan kyk Tabel 7.

TABEL 7
Geen betekenisvolle verklarings gevind

Totale skuldverhouding	: Farmaseuties en medies (B) Tabak en vuurhoutjies (B)
Langtermynskuldverhouding:	Klerasie, skoeisel en tekstiel (B) Motors (B)
Korttermynskuldverhouding	: Staal en verwante bedrywe (A)
Rentedekking	: Elektronika, elektries en batterye (B) Farmaseuties en medies (B) Tabak en vuurhoutjies (B)

5.2 Aard van die verbande

Aan die hand van die twee gekose maatstawwe vir die sogenaamde determinante word die aard van die verbande vervolgens bespreek. (Kyk Table 8 vir benamings van veranderlikes.)

5.2.1 Grootte

Met verkope en totale bates as die maatstawwe van grootte kon geen vaste patroon geïdentifiseer word nie. Positiewe sowel as negatiewe verbande kom in 'n klein aantal sektore voor.

Die sterkste aanduiding is die positiewe verbande tussen totale bates en die langtermynskuldverhouding wat in die eerste periode in sewe van die sektore voorkom. Hierdie verband bestaan egter nie in die tweede periode nie. In vyf sektore toon verandering in totale bates dieselfde teken as die netto langtermynskuldverhouding en die rentedraende skuldverhouding. Oor die twee periodes oorvleuel vier van die vyf sektore.

Daarenteen is daar vyf sektore in die eerste periode wat 'n omgekeerde verband tussen verkope en die rentedraende skuldverhouding toon.

5.2.2 Bedryfshefboom

Dit is veral die verhouding vaste bates tot totale bates wat as verklaring vir die beweging in die langtermynskuld- en die bedryfslasteverhouding dien. Die verband met die twee verhoudings is positief en negatief onderskeidelik. Eersgenoemde kom in elf van die neëntien sektore in die eerste periode voor, maar slegs in ses sektore in die tweede periode. Die verwantskap met die bedryfslasteverhouding bly dieselfde in twaalf en tien sektore in die eerste en tweede periode onderskeidelik.

5.2.3 Groei

'n Positiewe verband tussen groei in inkomste voor rente betaal en voor belasting en 'n skuldverhouding kon in hoogstens vier sektore bevestig word en wel in die geval van die totale skuldverhouding (periode A). Negatiewe verbande het egter in meer gevalle aan die lig gekom: in vyf sektore (periode B) met die langtermynskuldverhouding; in ses sektore (periode A) met die netto langtermynskuldverhouding; en in agt sektore met die rentedraende skuldverhouding.

5.2.4 Winsgewendheid

Teen die verwagting in toon die winsgewendheidsmaatstawwe nie deurgaans dieselfde verwantskap met die onderskeie afhanklike veranderlikes nie. Hierdie verbande van verskillende

aard vir maatstawwe van dieselfde determinant word aan die beweging van verkope en totale bates in verskillende rigtings toegeskryf. Daar is gekontroleer of die omgekeerde tekens aan multikolineariteit toegeskryf kan word. In 34 uit 36 gevalle waar teenoorgestelde tekens vir EBITSA en EBITTA voorgekom het, is die moontlikheid van multikolineariteit as oorsaak, verwerp.

Die teenstrydigheid word deur die verwantskap met die bedryfslasteverhouding uitgewys: in die tweede periode toon tien sektore 'n negatiewe verband met EBITSA en tien sektore 'n positiewe verband met EBITTA. Sewe van die sektore oorvleuel, met ander woorde, in sewe van die sektore toon EBITSA 'n negatiewe verband met die bedryfslasteverhouding en in dieselfde sewe sektore toon EBITTA 'n positiewe verband met dieselfde skuldverhouding.

Die sterkste getuies is die negatiewe verband tussen EBITSA en die totale skuldverhouding wat min of meer stabiel bly oor die twee periodes, ten opsigte van twaalf en tien sektore onderskeidelik, asook die negatiewe verband met die bedryfslasteverhouding in veertien van die neëntien sektore in periode A.

Daarteenoor tree winsgewendheid, gemeet deur EBITTA, as aanduiding van rentedekking na vore in twaalf en elf sektore vir die twee periodes onderskeidelik. Slegs sewe van die sektore oorvleuel.

5.2.5 Sakerisiko

Weer eens het die twee gekose maatstawwe as aanduiders van wisselvalligheid in inkomste nie dieselfde patrone openbaar nie. Verder was die sektore waarin die faktore gefigureer het in die minderheid. Slegs in die geval van rentedekking was DETA in sewe sektore 'n betekenisvolle faktor. Origens is daar geen bewys dat hierdie maatstawwe in die algemeen 'n noemenswaardige invloed op enige van die skuldverhoudings het nie.

6. SAMEVATTING

Te midde van die diversiteit van die resultate is daar tog vir bykans elk van die ses skuldverhoudings beduidende determinante wat vir 'n aantal sektore as betekenisvol figureer.

In die geval van die totale skuldverhouding is dit die winsgewendheidsmaatstaf, EBITSA, wat in die eerste periode in twaalf van die neëntien sektore as beduidende veranderlike geselekteer word. In die tweede periode word dieselfde verskynsel in tien sektore aangetref. Die verband is van negatiewe aard; 'n minder winsgewende onderneming behoort dus 'n relatief hoër skuldverhouding te hê.

Die bedryfshefboomveranderlike, FATA, toon in elf sektore in die eerste periode 'n beduidende positiewe verband met die langtermynskuldverhouding. Dieselfde ooreenkoms word in die tweede periode in slegs ses sektore aangetref.

Wat die bedryfslasteverhouding betref, is daar twee veranderlikes, FATA en EBITSA as maatstawwe van die bedryfshefboom en winsgewendheid onderskeidelik, wat in die meerderheid van sektore as beduidende veranderlike geselekteer is. Die verband is op twee na van omgekeerde aard.

Die winsgewendheidsmaatstaf, EBITTA, toon in die eerste periode in elf sektore 'n negatiewe verband met die rentedraende skuldverhouding en 'n positiewe verband met rentedekking in twaalf sektore vir dieselfde tydperk. In laasgenoemde geval kom dieselfde verskynsel ook in elf sektore in die tweede periode voor.

Hierdie resultate word in Tabel 8 meer volledig uiteengesit. Dit is duidelik dat winsgewendheid en die bedryfshefboom as die mees opvallende determinante deur die ondersoek geïdentifiseer is.

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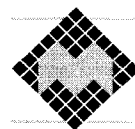
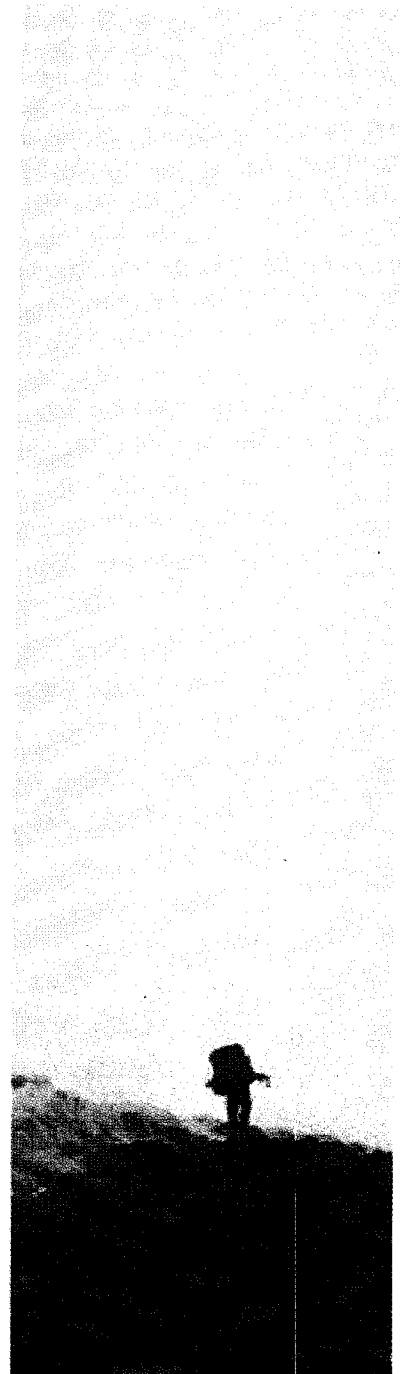
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Daar word oor die algemeen oor die ondersoektydperk 'n toename in die totale skuldverhouding, 'n afname in die langtermynskuldverhouding en 'n toename in die sogenaamde bedryfslasteverhouding waargeneem. Die toename in die totale skuldverhouding word meestal met 'n afname in winsgewendheid geassosieer terwyl die verlaging in die langter-

mynskuldverhouding aan 'n afname in vaste bates, met ander woorde 'n gebrek aan bykomende investering, toegeskryf word. Die toename in die bedryfslasteverhouding word aan twee faktore gekoppel, naamlik 'n afname in vaste bates, oftewel die bedryfshetboom, en 'n afname in winsgewendheid.

TABEL 8
Aantal sektore waar onafhanklike veranderlikes as beduidend geselekteer is

		LTLCLTA		LTLTA		LTLTACL		CLTA		IBDTA		TIE	
		+	-	+	-	+	-	+	-	+	-	+	-
SALES:	A	2	2	1	3	1	1	4	0	2	5	0	1
	B	2	0	3	3	1	2	4	1	1	2	0	4
TA:	A	4	2	7	0	5	1	0	4	5	1	2	2
	B	0	4	0	0	4	3	1	4	3	1	2	0
FATA:	A	1	6	11	2	8	4	1	12	7	3	2	2
	B	2	8	6	1	6	2	0	10	6	4	1	4
DEDS:	A	2	1	2	4	1	3	2	0	1	1	0	2
	B	1	3	2	0	2	0	2	2	2	3	0	0
EBIT:	A	4	4	3	4	3	6	2	3	2	8	0	3
	B	2	1	0	5	1	3	2	1	1	4	1	0
EBITSA:	A	0	12	2	6	2	6	0	14	1	3	8	3
	B	1	10	5	2	1	5	1	10	4	5	4	1
EBITTA:	A	4	6	3	5	2	8	6	3	0	11	12	0
	B	3	5	2	5	2	4	10	4	3	8	11	0
DETA:	A	4	0	5	0	4	0	1	1	5	0	1	7
	B	1	0	3	1	3	1	2	0	2	1	0	2
DPTA:	A	0	3	0	2	1	3	0	4	1	3	1	0
	B	2	2	1	4	1	5	1	3	1	4	2	1

Afhanklike veranderlikes

- LTLCLTA – Totale skuldverhouding
- LTLTA – Langtermynskuldverhouding
- LTLTACL – Netto langtermynskuldverhouding
- CLTA – Bedryfslasteverhouding
- IBDTA – Rentedraende skuldverhouding
- TIE – Rentedekking

Onafhanklike veranderlikes

- SALES – Verkope
- TA – Totale bates
- FATA – Vaste bates/Totale bates
- DEDS – Verandering in inkomste voor rente betaal en voor belasting/Verandering in verkope
- EBIT – Inkomste voor rente betaal en voor belasting
- EBITSA – Inkomste voor rente betaal en voor belasting betaal/Verkope
- EBITTA – Inkomste voor rente betaal en voor belasting/Totale bates
- DETA – Verandering in (Inkomste voor rente betaal en belasting/Totale bates)
- DPTA – Verandering in (Inkomste na belasting/Totale bates)

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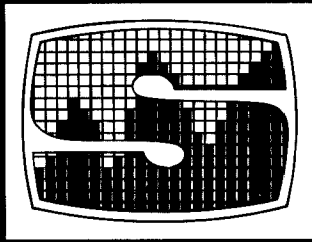
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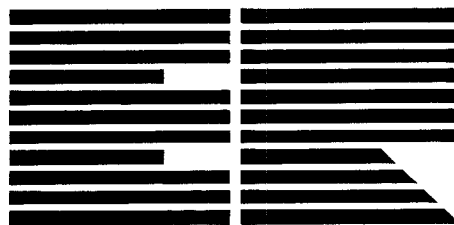
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An Analysis of the Price/Earnings Ratio of the Industrial Sector of the JSE

1. INTRODUCTION

Passive portfolio management results in portfolio performance which matches the performance of the market on a risk adjusted basis. Performance which exceeds that of the market requires active portfolio management. This can take the form of engaging in market timing, security selection or both.

The importance of this research lies in the area of market timing. To the extent that the hypothesised determinants of the aggregate Price/Earnings ("PE") ratio explain its movements, a model based on these determinants will enable one to predict a PE ratio. This predicted value, together with an estimate of future earnings, will indicate whether the equity market is likely to rise or fall, and in this way serves as a timing indicator.

Successful market timing requires the foresight to be fully invested in risky assets such as equities when the market is rising, and to be invested in fewer risky assets when the market is falling. Such action will increase the portfolio value in a rising market and preserve portfolio value in a falling market.

The scope of this study is limited in that the aggregate PE ratio is not a true 'market aggregate'. First, it covers the industrial sector of the Johannesburg Stock Exchange (JSE) only and not the entire market. Secondly, it is based on a sample of the industrial sector (the Industrial Index constituents) and not on the entire Industrial sector. Justification for the first limitation is that the other major sectors, Mining and Financial, are essentially different and to some extent contra-cyclical. In these circumstances, interpretation of movements in the 'Market' is difficult. The choice of the Industrial Index is therefore a compromise between a true market aggregate and an aggregate which is easy to interpret. The second limitation can be justified on the grounds of efficiency. The Index constituents are selected and weighted in such a manner that eighty percent of the sector capitalisation is represented by the Index.

2. THE CONCEPT OF THE PE RATIO

The PE ratio has been described as the manner in which investors 'collectively capitalise profits' (Peavy & Goodman, 1985, p60). It therefore represents a market consensus of the value of the earnings of a company, an industry or the aggregate market. An alternative term for the PE ratio used by Reilly (1986) is that of Earnings Multiple. The PE ratio is also frequently referred to in its inverted form, the Earnings Yield.

The PE ratio is determined by dividing the current share price (P_0) by the reported attributable earnings over the prior 12 months (E_0), or the anticipated earnings over the next 12 months (E_1). The former is referred to as the 'historical' or 'reported' PE ratio, while the latter is referred to as the 'prospective' or 'forward' PE ratio. The two are related by the earnings growth factor (g).

This can be depicted as follows:

$$\text{Historical PE} = \frac{P_0}{E_0} \quad (1A)$$

$$\text{Prospective PE} = \frac{P_0}{E_1} \quad (1B)$$

$$\text{or} = \frac{P_0}{E_0(1+g)} \quad (1C)$$

$$\text{Therefore, Prospective PE} = \text{Historical PE} \times \frac{1}{(1+g)} \quad (1D)$$

In accordance with Generally Accepted Accounting Practice (AC 104), earnings per share (attributable earnings) excludes extraordinary items and profits attributable to minorities and preference shareholders, and takes account of the weighted number of shares in issue during the period.

The PE ratio reported by the JSE is the historical PE ratio, with the price (P_0) equal to the closing price of the share. The value used for earnings (E_0) is the earning per share for the past 12 months, updated on a rolling 6-monthly basis. In addition to adjusting the published earnings per share for a financial period not equal to 12 months or an interim period not equal to 6 months, the JSE adjusts for such items as prior year taxation.

The historical PE ratio of the Industrial Index is calculated by dividing the sum of the market capitalisation of the constituents, by the sum of the earnings reported by the constituents.

The PE ratio for a company may be used to value the shares of that company in the following manner:

- Step 1: Estimate the future earnings per share (E_1)
- Step 2: Estimate the prospective PE ratio (P_0/E_1)
- Step 3: The product of E_1 and P_0/E_1 gives the estimated share price (P_0)

The question which Sharpe (1981, p376) raises is: 'How can such procedures be related to the determinants of value?' Step 1, above, is common to most valuation procedures, since the value of any going concern is a function of its ability to generate earnings. The problem relates to Step 2 – how does one estimate a prospective PE ratio?

3. THE PE RATIO AND THE DETERMINANTS OF VALUE

A widely accepted share valuation model is one first proposed by Williams (1938), which is based on the present value of expected future dividends. Numerous variations have been developed subsequently, the differences based primarily on assumptions relating to the nature of expected dividend growth. For example, there are models which deal with zero growth, constant normal growth and transitory supernormal growth. The model used in this analysis is the constant normal growth model:

$$P_0 = \frac{D_1}{k-g} \quad (2)$$

Where: P_0 = current share price
 D_1 = expected dividend over next 12 months
 g = expected growth in dividends. (N.B. For a constant dividend payout ratio, the expected dividend growth will equal the expected earnings growth, hence the use of the same symbol (g).)
 k = required return, with $k > g$

While the assumption of constant normal growth is clearly unrealistic for most individual companies, it is less so if one is dealing with the dividend growth of an entire sector. Cohen et al (1985, p387) explain this as follows: 'If one is trying to evaluate common stocks in aggregate . . . it is reasonable to assume that growth will extend over a long time period at a constant rate. Although there will be cyclical variations in the growth rate, there will be an underlying trend rate which can be estimated'.

Dividing Equation (2) by the expected earnings per share over the next 12 months (E_1) results in the following:

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k-g} = \frac{POR}{k-g} \quad (3)$$

where: $\frac{D_1}{E_1} = POR$, the payout ratio

Since $\frac{P_0}{E_1}$ = the prospective PE ratio, it is clear that the

prospective PE ratio is a reflection of the market consensus on three fundamental determinants of value, namely:

- the payout ratio (POR)
- the required return (k) and
- the expected dividend growth (g)

In this way, what was earlier referred to as the collective capitalisation of profits can be seen to be directly related to the fundamental determinants of value:

$$PE = f(POR, k, g) \quad (4)$$

4. DETERMINANTS OF THE PE RATIO

4.1 The Expected Payout Ratio (POR)

The expected payout ratio is determined by the company's dividend policy. The dividend policy is required to balance the sometimes conflicting demands of maintaining a favourable payout record, retaining funds for expansion and replacement and maintaining an acceptable dividend cover.

Peavy & Goodman (1985, pp60-61) have shown that the aggregate payout ratio is stable over time, with a distinct downward trend in recent years. This decline in recent years is consistent with the expectation that more funds need to be retained in an inflationary environment merely to maintain current operating capacity.

4.2 The Required Return (k)

It is generally accepted that the required return on any investment has three components:

4.2.1 Real Risk Free Rate (RRF)

The real risk free rate is a function of demand and supply of investment funds. Brigham (1985, p67) explains the demand factor as 'the rate of return borrowers can expect to earn on their real assets' and the supply factor as 'consumers/savers' time preferences for current versus future consumption.'

4.2.2 Inflation Premium (I)

The inflation premium is the rate over and above the real risk-free rate required by investors to compensate them for the expected erosion of the purchasing power of their funds.

4.2.3 Risk Premium (RP)

There are two approaches for determining the risk premium. The traditional approach is based on total risk, and is a function of business risk (measured as the variability of operating profits), financial risk (measured, inter alia, by financial gearing and interest cover), and liquidity risk (a measure of the marketability of the shares).

The alternative approach is based on Modern Portfolio Theory which separates total risk into systematic and unsystematic risk. This distinction is made because the unsystematic risk, being unique to a particular company, is capable of being diversified away and hence carries no reward. Systematic risk cannot be diversified away and is therefore the only risk for which an efficient market will provide a commensurate return.

Both approaches suffer from the inherent weakness that the risk premium is calculated from historic data and may not reflect current risk.

4.3 Dividend Growth (g)

In deriving equation (3) above, a constant payout ratio was assumed so that growth in dividends per share approximates growth in earnings per share. Cohen et al note (1985, p406), 'Perhaps the most troublesome aspect of empirical research in this field is that "the markets consensus of growth expectations" cannot be measured directly.' Several methods for measuring growth exist, but most studies have derived future growth from historical growth.

Murphy (1966), however, found that there is a weak correlation between the rate of growth in earnings per share over successive periods for individual companies.

An alternative approach is to examine the sources of growth as illustrated below:

$$EPS = ROE \times BV \quad (5)$$

Where EPS = Earnings per share
 ROE = Return on equity for period
 BV = Bookvalue of equity (per share) at the beginning of the period.

A useful framework for analysing changes in ROE is the du Pont framework:

$$ROE = \frac{EPS}{BV} = \frac{EPS}{TPS} \times \frac{TPS}{TA} \times \frac{TA}{BV}$$

Where: TPS = Turnover per share
 TA = Total Assets

It can now be seen that growth in earnings per share is the result of any one (or more) of the following:

- increased profit margins;
- increased asset turnover;
- increased financial gearing;

and, if one considers sources of sustainable growth in the book value of equity:

- retained earnings.

The internally sustainable growth rate of a company is another measure of growth. If the return on equity is to be maintained, the internal growth rate can be determined as follows:

$$g(i) = ROE \times (1 - POR) \quad (7)$$

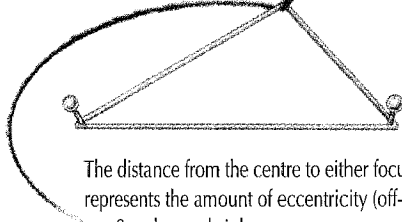
Where $g(i)$ = the internally sustainable growth rate.

If the return on equity is calculated on the book value of equity per share at the end of the year, the appropriate formula is:

$$g(i) = 1 - \frac{1}{1 - ROE(1 - POR)} \quad (8)$$

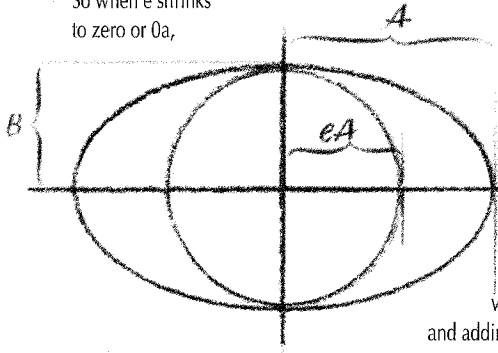
The ellipse has excellent flexibility. By moving the focus point on the perfect circle and adding a second point to it we have a broader,

flatter view which introduces a myriad of possibilities and alternate strategies. We can practically illustrate the simple logical elegance and flexibility of an ellipse with a pencil, a piece of string and two pins.



The distance from the centre to either focus is some fraction of A: eA . The symbol e represents the amount of eccentricity (off-centredness).

So when e shrinks to zero or $0a$,



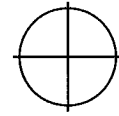
no eccentricity, the result is a perfectly rounded figure: a circle. But when e increases, the ellipse becomes increasingly eccentric while maintaining logic and adding flexibility.

The perfect circle ellipse with a graphic central focus represents Investec.

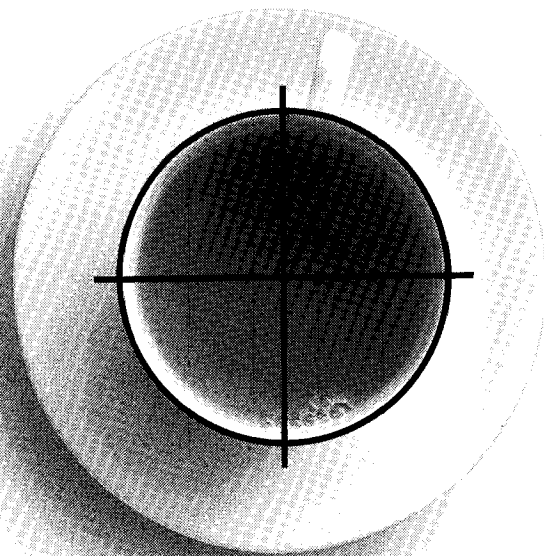
Using the central focus as a starting point, we expand our thought processes by extending the ellipse, with integrity, energy and imagination.

Investec is a Merchant Banking organisation that is resourceful, logical and creative with entrepreneurial vision.

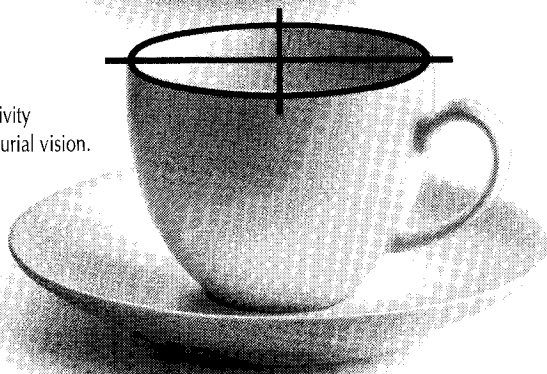
THE INTELLECTUAL VALUE OF THE INVESTEC LOGO



Crystal clear vision, discipline and correct focus – extremely valuable assets.



Imagination and creativity – the art of entrepreneurial vision.



History, and our own experience, has taught us that everything need not be exactly as we see it, nor is the obvious solution always the correct one.

The value of an idea or a thought process is not simply whether it appears to be right or wrong, but whether it is the best solution for our clients.



THE SPIRIT OF ENTREPRENEURIAL BANKING

It must be emphasised that $g(i)$ is not an unconditional forecast of growth, but an indication of internally sustainable growth.

It is also possible to calculate an implicit growth rate, contained in the PE ratio of a share at any one time. It is possible to calculate this rate provided one can estimate acceptable values for the other variables, viz the required return and the expected payout ratio. This technique was used by Cragg and Malkiel (1968) in their comparison of implicit growth rates and forecasts made by financial analysts.

5. PRIOR RESEARCH

Two studies conducted in the United States are of particular interest since both were based on an aggregate PE ratio. The first was written by Reilly, Griggs and Wong in 1983, the second by Peavy and Goodman in 1985. Both studies attempt to predict the S & P's 400 P/E ratio, but they make use of different explanatory variables. Table 1 sets out the specific variables used in each study. It should be apparent that whilst the hypothetical explanatory variables are common to both, selecting proxies for these variables and measuring them is a judgemental exercise.

Table 1: COMPARATIVE APPROACHES USED BY REILLY (ET AL) AND PEAVY AND GOODMAN

	REILLY (et al)	PEAVY AND GOODMAN
DEPENDENT VARIABLE: PE	End of Quarter S&P's 400 index/Seasonally adjusted annualised earnings of previous quarter.	Year end S&P's 400 published P/E ratio.
INDEPENDENT VARIABLES: POR	Actual payout ratio of S&P's 400 over the past 12 months.	As for Reilly et al.
RRF	Yield on Moody's AAA corporate bonds adjusted for the inflation rate.	Difference between 91 day Treasury Bills and inflation rate. (Annual average.)
I	Annualised rate of change of the CPI for the quarter.	CPI. (Annual average.)
RP Business	Coefficient of Variation of EPS (S&P's 400) during past 20 quarters.	Coefficient of Variation of EPS (S&P's 400). Period?
RP Financial Risk	Debt/Equity series published by FTC for all industrials.	N/A
	Corporate 'failure rate' published by US Dept of Commerce.	N/A
	Current Ratios of non-financial corporations published by Federal Reserve.	N/A
RP General Measure of Risk	Difference in yield on Moody's AAA and BBB corporate bonds.	N/A
	Ratio of yield on Moody's AAA and BBB corporate bonds.	
g	Actual growth in EPS (S&P's 400) during successive periods: - 1 year average - 3 year average - 5 year average.	Concept of internal sustainable growth: ROE x (1 - POR) for the current year. ROE is further analysed into Profit Margin, Asset Turnover and Financial Gearing.
PERIOD REVIEWED	1962-1980	1966-1981
RAW DATA MANIPULATION	All data expressed in terms of percentage change.	No manipulation. Coincident only.
	Model run in two basic forms: Independent variables lagged and coincidental.	

Although both studies attempted to establish the significance of the hypothesised determinants of (substantially) the same PE ratio, there was consensus on only one predictor variable – the expected inflation rate.

Beaver & Morse (1978) grouped shares into portfolios and attempted to identify the determinants of PE ratios. The writers concluded that persistent PE differences between the portfolios were the result of an accounting effect on reported earnings, and unrelated to differences in dividend growth or differences in risk.

A South African study by Simler (1974) differed from the above in that it regressed the individual PE ratios of 22 companies in the Clothing and Textile sector of the JSE at a point in time, against hypothesised explanatory variables. This static approach made variables such as the inflation rate and the risk free rate meaningless and these were excluded. Simler concluded that PE ratios were positively correlated with the magnitude of shares traded (his proxy for liquidity risk).

This study follows the general approach of Reilly et al and Peavy and Goodman.

6. METHODOLOGY

The Industrial sector index represents approximately 80% of the market capitalisation for the sector and the resulting PE ratio was taken as representative of the true aggregate. The aggregate financial ratios (the independent variables) were calculated in two stages:

- Adding the total assets, shareholders' equity, profits and dividends of the individual index constituents to produce aggregate financial data.
- Calculating the Industrial sector ratios from the aggregate financial data. (Note: this was done by simply adding the constituents financial data, thus achieving a natural weighting according to the value of total assets, shareholders' equity, profits and dividends.)

The time period used in this analysis was the period beginning January 1960 to February 1992.

6.1 Defining and Quantifying the Variables

Dependent Variable: PE Ratio

The PE ratio for each observation is calculated as the average over 12 months, based on the month-end Earnings yield of the Industrial sector index. An average was chosen rather than the quarterly or annual point measures used in other studies, on the grounds that an average would be more representative of PE ratios prevailing throughout the 12-month period.

Independent Variables:

6.1.1 Required Return

The yield to maturity of long term RSA stocks was used as a measure of the nominal risk-free rate. The conversion from nominal to real was necessary because of the high levels of inflation in South Africa and was achieved by deducting the inflation premium, the traditional proxy for which is the percentage change in the Consumer Price Index (CPI).

Of the two approaches to measuring the risk premium, viz. the traditional total risk and the systematic risk of Modern Portfolio Theory, the first alternative was not used in this study due to the limitations of the financial data available. Specifically, the data for measuring business risk, net operating income before interest, was not available.

In spite of the difficulties experienced in measuring beta coefficients (e.g. Bethlehem (1984, p 392)) these have nevertheless been included as proxies for systematic risk.

One other measure of risk is also used: the coefficient of variation (CV) of Industrial sector returns.

6.1.2 Expected Payout Ratio

Given the relative stability of the payout ratio, the best indicator of its expected value is the aggregate payout ratio during the year.

6.1.3 Expected Growth

Previous studies made use of two proxies for measuring the expected growth, viz. internally sustainable growth and historical growth. Equation 7 defines internally sustainable growth. Return on Equity, one of the components in the equation, was further sub-divided into:

- Return on total assets (ROA)
- Financial Gearing (G)

A more complete analysis of return on total assets into the two remaining du Pont components (profit margin and asset turnover) is not possible because certain companies do not disclose the value of their turnover.

Reilly et al's (1983) approach to estimate the expected growth in dividends was used as an alternative to the internally sustainable growth concept. Growth was estimated in 3 ways: calculating the average historical growth over the past year (g(1)), past three years (g(3)) and past five years (g(5)). In each case, notional dividends were calculated from the Industrial sector monthly Dividend Yield and Index as follows:

$$\text{Notional dividend}_{(t=1)} = \frac{DY_{(t)} \times \text{Index}_{(t)}}{12} \quad (9)$$

6.2 Regression Procedure

Recall from equation (4) that the basic regression equation takes the form:

$$PE = f(\text{POR}, k, g)$$

In an effort to improve the sensitivity of the data equation (4) was modified as

follows:

$$\Delta PE = f(\Delta \text{POR}, \Delta k, \Delta g)$$

where Δ indicates the % change in each of the variables over the preceding 12 months.

The use of the various proxy variables, discussed above, produced the following equation:

$$\Delta PE = f(\Delta \text{POR}; \Delta \text{CPI}; \Delta \beta; \Delta \text{CV}; \Delta g(1); \Delta \text{ROE}; \Delta \text{ROA}; \Delta g(1); \Delta g(3); \Delta g(5))$$

A robust regression technique was used to determine a weighting for each observation in the data in an effort to smooth the data and minimise the effect of outliers.

A stepwise inclusion procedure (similar to that used by Simler (1974) and Peavy and Goodman (1985)) was applied to the weighted data. Stepwise regression has the advantage of minimising the problem of multicollinearity and maximising the adjusted co-efficient of determination (R^2) of the model. The use of time-series data is likely to introduce autocorrelation in the random component and the Durbin-Watson (DW) statistic was used to test for autocorrelation.

7. RESULTS

Table 2 below shows the correlation matrix for the data:

TABLE 2
Correlation Matrix

Correlation Matrix	Real Risk-free Return	Inflation Premium	Beta Coef.	Variance	Coef. of Determ'n	Payout Ratio	Return on Equity
Real Risk-free Return	1,00						
Inflation Premium	-0,02	1,00					
Beta Coefficient	-0,03	-0,19	1,00				
Variance	0,12	0,01	0,06	1,00			
Coefficient of Determination	-0,31	-0,09	0,23	0,15	1,00		
Payout Ratio	0,04	-0,05	-0,04	0,21	0,02	1,00	
Return on Equity	-0,21	0,26	-0,04	-0,29	0,05	-0,39	1,00
Sustainable Growth Rate	-0,18	0,25	-0,01	-0,30	0,02	-0,60	0,96
Debt/Equity	0,07	0,27	0,21	0,10	-0,01	-0,09	-0,04
Return on Assets	-0,10	0,14	-0,10	-0,29	-0,08	-0,16	0,43
G(1)	0,01	-0,47	0,21	-0,11	0,06	-0,03	0,13
G(3)	0,20	0,20	0,13	0,18	0,07	0,15	-0,13
G(5)	0,07	0,09	0,18	0,28	-0,03	0,15	-0,18
PE Ratio	-0,12	0,10	-0,05	-0,12	0,05	0,25	0,29

Correlation Matrix	Sustainable Growth Rate	Debt/Equity	Return on Assets	G(1)	G(3)	G(5)	PE Ratio
Sustainable Growth Rate	1,00						
Debt/Equity	0,00	1,00					
Return on Assets	0,40	-0,09	1,00				
G(1)	0,15	-0,08	0,08	1,00			
G(3)	-0,13	0,14	-0,08	0,08	1,00		
G(5)	-0,16	0,13	-0,13	0,10	0,23	1,00	
PE Ratio	0,18	-0,21	0,17	-0,25	0,31	-0,40	1,00

As can be seen from the table, most of the associations between the variables are weak in nature. At a 90% confidence level the following independent variables are significantly associated with the PE ratio:

- POR The payout ratio is positively associated with the PE ratio with a correlation coefficient of 0,25. Whilst it could be argued that a low payout ratio coupled with high internal growth would be "attractive" to investors, it is also arguable that companies paying out a higher proportion of earnings might be even more attractive. A positive correlation coefficient is therefore conceivable.
- ROE Return on equity is positively correlated to the PE ratio with a correlation coefficient of 0,29. One would expect a positive association between these variables.
- Gearing Financial gearing does not quite meet the 90% confidence level specified in the significance test. However, gearing shows an inverse correlation with the PE multiple. As risk is added through financial gearing so the PE multiple declines.
- g(1), g(3), g(5) All three proxies of growth are significantly correlated with the PE multiple. However, g(1) and g(5) show an inverse association which is inconsistent with the theory. For this reason, only g(3) was included in the final regression model.

The results of the stepwise regression analysis are shown below:

Variable	Parameter Estimate	t Value
Intercept	0,041	2,52
POR	0,533	2,65
ROE	1,055	3,48
Gearing	-1,367	-1,67
g3	0,012	2,74
F-Ratio		6,190
Root Mean Square Error		0,081
R ²		0,383
Adjusted R ²		0,321

The results are thus statistically significant and make intuitive sense. The results should be interpreted as follows:

- A 10% increase in the annual payout ratio will have the effect of increasing the PE multiple on the industrial index by 5,3%.
- A 10% increase in ROE will have the effect of increasing the PE multiple by 10,6%.
- A 10% increase in gearing will decrease the PE multiple by 13,7%.
- A 10% increase in the average dividend growth rate over the past 3 years will increase the PE multiple by 1,2%.
- Even if there are no changes in any of the above independent variables, the PE multiple on the industrial index will increase on average by 4% each year.

8. CONCLUSION

This research attempts to identify the significant hypothesised determinants of the aggregate PE multiple of the industrial index. Four variables are identified as having a statistically significant association with the PE multiple, using 30 years of financial data. The regression model produced is a useful tool for forecasting future earnings in the industrial sector of the JSE and can be used as a market timing indicator. However, the results are probably of more use for their interpretive power rather than their forecasting power.

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The P/E Ratio and the Cost of Equity Capital

The cost of equity capital is an elusive measure that is not well understood. A common error made is to assume that the cost of equity is given by the earnings yield of a share (which is the reciprocal of its price/earnings (P/E) ratio).¹ This paper aims to show why this is not so. It also seeks to discuss the factors which underlie the P/E ratio at which the firm sells, and hence the determinants of its share price.

The P/E ratio of a firm is defined as the ratio between its current share price (its market value per share) and its future earnings per share (EPS) for the next 12 months. (P/E ratios quoted in the press are calculated using the most recent historical earnings. Investors are, however, more concerned with prices relative to future earnings.)

Many firms focus their strategic planning on maximising growth in EPS, believing this will also maximise the company's P/E ratio and hence its share value. However, the connection between growth in EPS and high P/E ratios may be tenuous (Clarke, Wilson, Daines and Nadauld [1988, p.11]), since:

- strong growth in earnings does not always translate into high P/E ratios
- firms with similar growth rates often don't sell at the same P/E ratio
- cyclical companies may experience an increase in their P/E ratios along with a decline in EPS, suggesting that the market determines value on long-term expectations rather than short-term performance.

Thus, the traditional focus on EPS growth does not adequately explain how shares are priced, nor does it provide a solid foundation for developing a strategy aimed at increasing shareholder value. There are several other problems associated with the use of EPS:

1. Measured EPS is a function of the method of depreciation used in the income statement.
2. Earnings figures do not adequately reflect risk. Relevant risk is determined both by a firm's investments as well as by the financing decisions made to support these investments. Increasing use of debt financing, provided the returns obtained by the firm exceed the cost of debt, will lever up the EPS, but will simultaneously increase the riskiness of the firm.
3. Earnings do not take into account the working capital and fixed investments needed for anticipated sales growth.
4. The EPS approach ignores the importance of dividend policy. If a company didn't pay dividends but retained earnings while investing shareholders' funds at rates below the minimum acceptable market rate, the value of the company would decrease.

The above arguments are not meant to suggest the growth in EPS is not important. The implication is that EPS is only part of the picture. Items which complete the picture include the market's assessment of management talent, profitable investment opportunities and competitive risk. These are captured in the firm's price earnings multiple. It is thus necessary to examine the factors which affect the P/E ratio.

1. This was in fact shown to be false, except under very special circumstances, by Miller and Modigliani as early as 1961 in their classic paper on dividends, growth and valuation. Nevertheless the myth continues to this day among many managers.

Now the return provided by a share may be defined as the sum of the dividend it pays and the capital gain which it provides. For an investor with a one period horizon, the expected return (or cost of equity capital) is thus given by:

$$r = [D_1 + (P_1 - P_0)] / P_0$$

where P_0 is the current share price
 P_1 the share price one period hence
 D_1 the dividend to be paid in the coming period

We would anticipate that all shares in the same risk class would offer the same expected return.

It is easy to demonstrate that for an investor with an infinite time horizon, the value of a share is the present value of all future dividends expected to be paid by the firm, discounted at the investor's required rate of return, r .

If one assumes a constant growth in dividends over time, the valuation model collapses to the well known Gordon model:

$$P_0 = D_1 / (r - g)$$

The growth rate g , for a firm which is not raising any new external capital, is given by the retention ratio times the return on equity of the reinvested capital, i.e.:

$$g = bk$$

where k is the actual return on equity of the retained earnings and b is the firm's retention ratio.

Now assume that we have a firm that pays 100% of its earnings in dividends. Thus $b=0$, and therefore $g=0$ in the above equation. The share price, using the Gordon model with g set equal to zero is:

$$P_0 = D_1 / r = EPS_1 / r$$

In the perpetuity situation described above, the firm's market value per share is obtained by simply capitalising its EPS at its cost of equity capital.

Thus the P/E ratio of the firm is the reciprocal of the discount rate,

$$P/E = P_0 / EPS_1 = 1/r$$

and hence the shareholders' required rate of return equals the firm's earnings yield:

$$r = EPS_1 / P_0$$

Thus in the case of a company that remains unchanged in size because it is paying out 100% of its earnings in dividends and raising no new capital, (or one that is expanding such that its rate of return on the new investments just equals its cost of capital), one can argue that book value should equal market value since the market is unlikely to pay a premium if management is unable to find any new high return investments. Hence the firm's earnings yield (EPS_1 / P_0) will equal both its cost of capital and its ROE (EPS_1 / BV_0 , where BV_0 is the book value of the firm's equity at the present time). (It is of course necessary to assume that the firm is re-investing an amount equal to its depreciation charge in order to keep the earning power of its fixed assets in place.)

Now consider a no growth firm whose share price is R100, and which is expected to pay a dividend (equal to 100% of its earnings) of R10 for ever. It is presented with an investment opportunity one year from the present time which will cost R10 and will yield R1 per year for ever. (This example is drawn from Brealey and Myers, 1984).



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The NPV per share generated by the new investment in year 1 is zero:

$$NPV = -10 + 1/0,1 = -10 + 10 = 0$$

Thus the project does not contribute to the firm's value, and hence there should be no change in share price. The reduction caused by the loss of the year 1 dividend exactly equals the increase in value caused by raising all dividends from year

2 onwards by R1 to R11.

Now consider the impact on the above firm when the new investment yields returns which are either higher or lower than 10% – the firm's cost of capital. From Table 1 it can be seen that the earnings-price ratio overestimates *r* when the project has a negative NPV and underestimates it when the project has a positive NPV.

TABLE 1
Effect on share price of investing and additional R10 in year 1 at different rates of return.

PROJECT RATE OF RETURN	INCREMENTAL CASH FLOW, C	PROJECT NPV IN YEAR 1 ^a	PROJECT'S IMPACT ON SHARE PRICE IN YEAR 0 ^b	SHARE PRICE IN YEAR 0, P ₀	EPS ₁ / P ₀	r
5%	R0,50	-R 5,00	-R4,55	R 95,45	10,5%	10%
10%	1,00	0	0	100,00	10%	10%
15%	1,50	+ 5,00	+ 4,55	104,55	9,6%	10%
20%	2,00	+ 10,00	+ 9,09	109,09	9,2%	10%

^a Project costs (10,00 (EPS₁)). NPV = -10 + C/r, where r = 10%

^b NPV is calculated at year 1. To find the impact on P₀, discount for 1 year at r = 10%

The earnings yield equals the market capitalisation rate only if the net present value of the new project is zero. If we designate the NPV (at time zero) of any new projects which the firm may undertake NPVGO, (the net present value of the growth opportunities), the present value of the firm becomes:

$$P_0 = EPS_1 / r + NPVGO$$

NPVGO will represent the value created above the cost of the projects. In our example by using period one's dividend to fund the project, we have allowed for the cost of the project in the first term of the equation, and thus the second term captures only the excess value created.

This equation can be re-written as:

$$P/E \text{ ratio} = P_0 / EPS_1 = 1/r + NPVGO / EPS_1$$

Thus an investor in a growth firm is buying not only the current income in perpetuity but also the firm's growth opportunities. Therefore the firm's P/E ratio is:

- a) positively related to the NPV of the firm's growth opportunities
- b) negatively related to the discount rate which in turn is positively related to the firm's risk or variability
[Consider 2 firms, each expected to earn R1/share forever. If one firm's earnings are far less certain, a rational investor will pay less for a share in that firm. Hence its P/E will be lower.]

Also, in an efficient market, the P/E ratio will, because it is determined using accounting earnings, depend on the particular accounting methodology used by the firm. For example, consider two identical firms, one using LIFO and the other FIFO inventory valuation methods. Assume that their earnings per share are:

Firm A: LIFO EPS R1/share
Firm B: FIFO EPS R2/share

If the market is efficient they will be identically priced (say at R10/share) if their economic earnings are equal, despite the differences in their accounting earnings. Thus the P/E of A will be 10 and that of B=5. The firm using the more conservative accounting practice has the higher P/E ratio.

Thus for growth companies, which are able to generate higher returns than their cost of capital, the cost of capital is not the sole determinant of the P/E's at which their shares sell.

Other factors influencing P/E's may include:

- (a) the size of new high growth investments available to the company
- (b) the length of time for which high returns can be expected to continue
- (c) the difference between the expected returns and the cost of capital.

If all three are large, the market value of the future growth component of the value of the firm will be large, and it is this, and not the fact that the company's cost of capital is low, that will lead to high P/E ratios.

High P/E's (and their reciprocals, low earnings yields) are therefore a function of growth prospects! It is *not* rational to presume that the fact that companies have such prospects results in investors requiring lower and lower returns from such companies!

Firms with safe earnings and hence low costs of equity, will also display relatively high P/E's. There is thus no direct association between the P/E of a share and its capitalisation rate.

Finally one may consider the case where a proportion of the earnings are retained by the firm:

$$P_0 = D_1 / (r - g) = (1 - b) EPS_1 / (r - g)$$

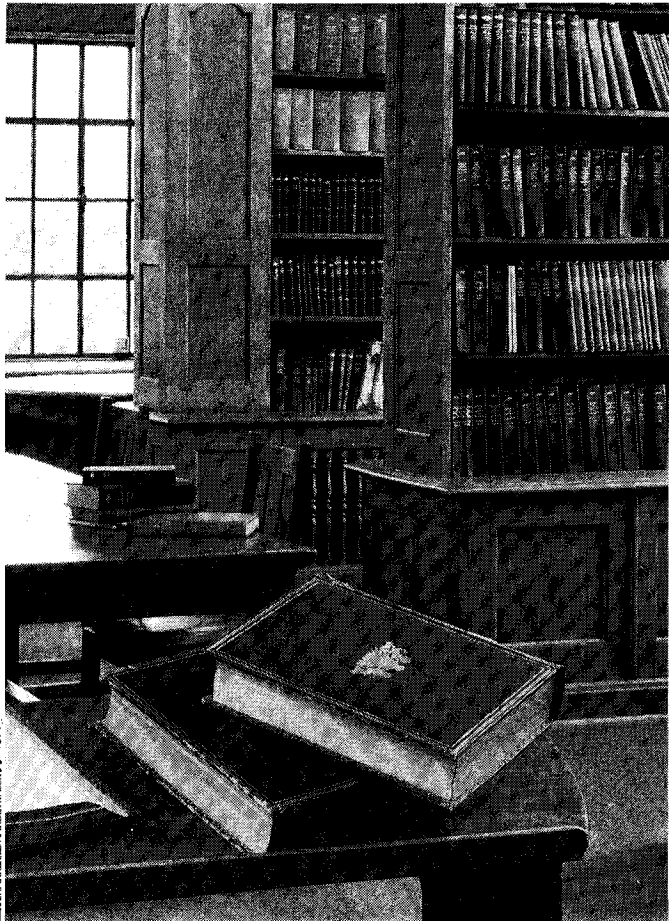
$$P/E = P_0 / EPS_1 = (1 - b) / (r - g) = (1 - b) / (r - bk)$$

where k = the return on new investments

Table 2 shows the range of P/E ratios at which the firm may sell as k, b and r are varied.

TABLE 2
P/E ratios for 2 different retention ratios, 3 potential returns from new investments, and 3 different costs of capital

	Retention Ratio 0,2			
	Rate of Return on New Projects (k)			
	20%	25%	30%	
Cost of Capital (r)	16%	6,7	7,3	8,0
	20%	5,0	5,3	5,7
	25%	3,8	4,0	4,2



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	Retention Ratio 0,5			
	Rate of Return on New Projects (k)			
	20%	25%	30%	
Cost of	16%	8,3	14,3	50,0
Capital	20%	5,0	6,7	10,0
(r)	25%	3,3	4,0	5,0

From the table it can be seen that the bigger the gap between the returns on the new investments and the firm's discount rate, the higher will be the P/E at which the firm sells. Also the more earnings the firm retains to invest in high yielding projects, the higher will its P/E be.

For a given level of earnings, the magnitude of the price to earnings multiple translates into the level of share price acceptable to investors. As we have seen, the P/E ratio encapsulates many things, including what the market thinks about the firm's level of EPS, the quality of its EPS and its future prospects. In the words of Alan Abelson (1976) "... P/E's in a way are like sausages – lots of stuff goes into the making of them, not all of it identifiable."

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for believing in big business
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For one thing, like other small countries with big business, it is big business that enables South Africa to compete in the international markets and be a big earner of foreign exchange.

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Cash flow ratios – Investment Basics XXVIII

1. INTRODUCTION

The objective of a statement of cash flow information is to provide users of financial statements with information concerning the source and use of all financial resources during a period: in particular, details of cash generated or utilized by operating activities, investing activities and financing activities. In South Africa, Statement of Generally Accepted Accounting Practice: Cash Flow Information (hereafter referred to as AC 118) was issued in July 1988. The effective date for implementation of AC 118 was a period commencing on or after 1 October 1988.

Financial statement ratios have been useful in financial analysis for a number of decades, and the techniques of traditional ratio analysis are well founded in the literature. Much of the financial analysis was based on accounting performance through profitability measures (eg. net income to sales, return on assets, return on equity, etc.). However, such ratios all suffer from the basic limitations of accrual based accounting.

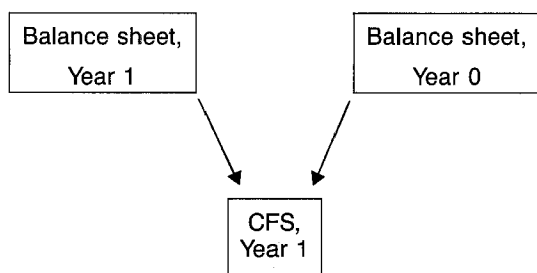
The concept of cash based performance ratios is not new. Prior to the publication of Cash Flow Statements (CFS), many surrogates for cash flow from operations were used. Such examples are:

- net income after taxation plus depreciation;
- net income after taxation plus depreciation plus deferred taxation;
- net income plus depreciation plus/minus working capital changes, etc.

CFS offers new/complementary ratios to measure a firm's performance. Cash flows from operations are now defined in a more standardised format.

2. CONCEPTUAL RELATIONSHIPS

Conceptually a CFS is the difference between two balance sheets, i.e. changes in assets, liabilities and equity.



The CFS is divided into three activities:

- Cash from operating activities
- Cash effects of investing activities
- Cash effects of financing activities

Investing activities are those activities relating to the acquisition and disposal of fixed assets, subsidiaries and investments.

Financing activities are those activities which result in changes in debt and capital funding.

Operating activities include all transactions and other events that are not investing and financing activities. Cash flows from operating activities are generally the cash effects of transactions and other events that enter into the determination of income.

Cash for the purpose of the CFS, is cash at bank and on hand and cash equivalents, such as money market instruments.

In broad terms the above three activities can be linked to an income statement and the two sides of a balance sheet:

Operating activities: Income statement plus/minus working capital changes (excluding cash, short term loans and overdraft).

Investing activities: Asset side of balance sheet (excluding current assets).

Financing activities: Equity and liability side of balance sheet, excluding three current liability items: creditors, taxation and dividends.

3. FORMAT OF A CASH FLOW STATEMENT (CFS)

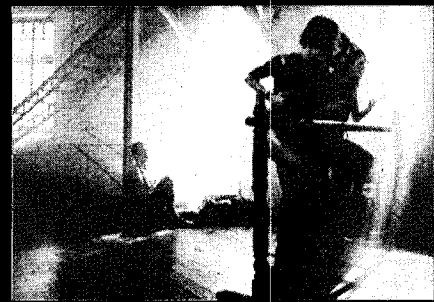
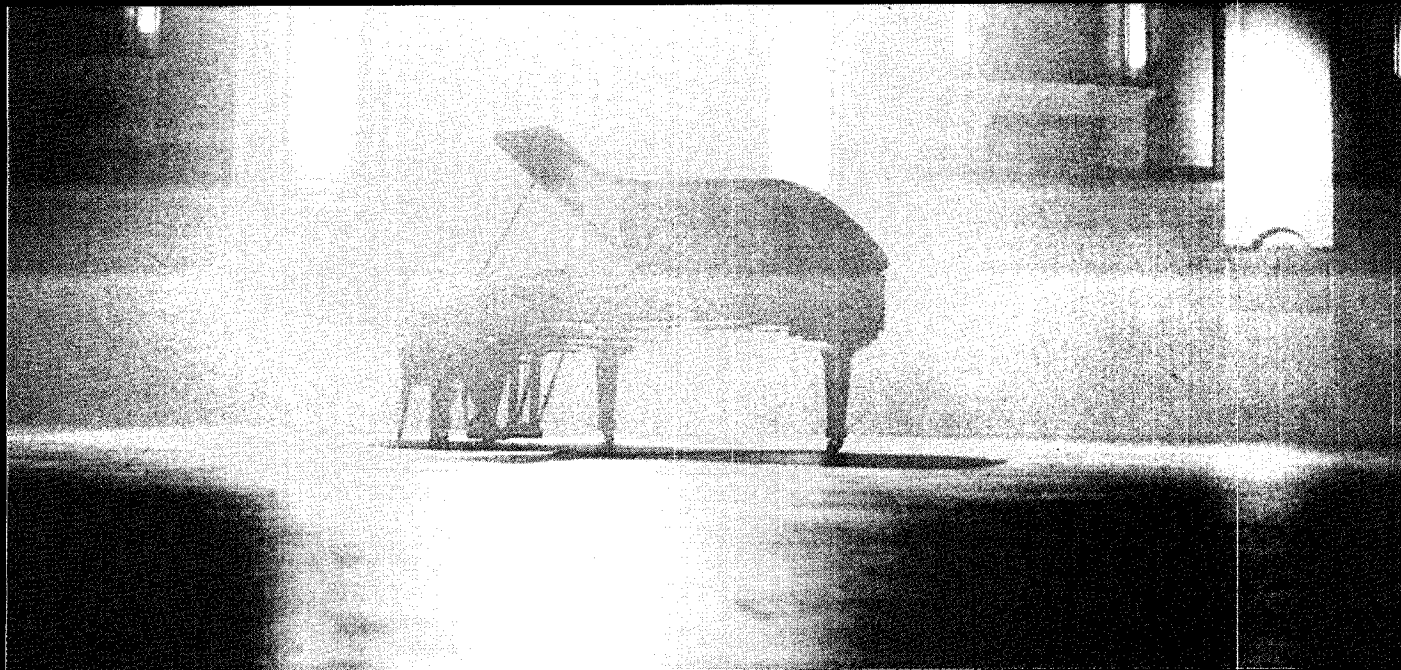
A CFS is usually of the following format (see Table A: a modified version of Barlow Rand's 1992 CFS):

**TABLE A
FORMAT OF A CASH FLOW STATEMENT**

OPERATING ACTIVITIES:		
Cash generated by operations (CF01)		4 036
Changes in non-cash components of working capital:		
Stock	(436)	
Debtors	(594)	
Creditors	491	(539)
Cash generated by operating activities (CF02)		3 497
Finance cost		(550)
Taxation paid		(657)
Cash available from operating activities (CF03)		2 290
Dividends paid		(461)
Cash retained from operating activities (CF04)		1 829
INVESTING ACTIVITIES:		
Replacement of fixed assets	(741)	
Expansion capital expenditure	(1 098)	
Proceeds on disposal of fixed assets and investments	1 827	
Other assets acquired	(1 122)	(1 134)
Cash retained after investing activities (CF05)		695
FINANCING ACTIVITIES:		
Long-term liabilities (net)	191	
Short-term loans repaid	(526)	
Proceeds of ordinary share issue	243	(92)
Cash available after financing activities (CF06)		603
Utilized to increase cash balance		603
		0

A study of the above will reveal that the items appearing between CF01 to CF04 are all income statement items with the exception of the changes in non-cash components of work

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ing capital (see 539 above). CF03 could well be regarded as the equivalent of net income after taxation after eliminating the impact of accrual accounting. CF04 could be regarded as the equivalent of net income after dividends i.e. net income for the year retained. Investing activities entail movements in fixed and other assets. Financing activities explain the movement in borrowed capital: both long and short, as well as ordinary equity issues and preference share capital issues and redemptions.

The subtotals (CF01 to CF06) are all calculated on a cumulative total basis in the order of operating, investing and financing activities.

4. FRAMEWORK FOR RATIOS

While cash flows from investing activities and from financing activities are important components, the most useful figure is likely to be cash from operations. However, operating activities are broken up into four subtotals CF01 to CF04. In our opinion the best measure to consider, is most probably CF03 which is the cash available (before dividends) from operating activities. CF03 is probably the closest cash flow concept available to the traditional net income after taxation under accrual based accounting.

Cash flow ratios may be discussed from the point of view of:
 Cash flow returns
 Cash flow coverage
 Capital expenditure cash flow ratios
 Financing cash flow ratios

Examples of the above cash flow ratios, and where applicable, comparable traditional ratios are given in Table B.

**TABLE B
 EXAMPLES OF CASH FLOW RATIOS (AND WHERE APPLICABLE, COMPARABLE TRADITIONAL RATIOS)**

CASH FLOW RATIOS		TRADITIONAL RATIOS
(a) Cash flow returns		
(i)	Operating cash flow/Sales = $\frac{CF03}{Sales}$	Net profit after taxation/Sales = $\frac{PAT}{Sales}$
(ii)	Operating cash flow/Assets = $\frac{CF02}{Assets}$	Operating income/Assets = $\frac{EBIT}{Assets}$
(iii)	Operating cash flow/Assets = $\frac{CF03}{Assets}$	Return on assets (ROA) = $\frac{PAT}{Assets}$
(iv)	Operating cash flow/Equity = $\frac{CF03 - PD - MD}{Equity}$	Return on equity (ROE) = $\frac{PAT - PD - MI}{Equity}$
(v)	Operating cash flow per share = $\frac{CF03 - PD - MD}{Number\ of\ ordinary\ shares}$	Earnings per share (EPS) = $\frac{PAT - PD - MI}{Number\ of\ ordinary\ shares}$
(b) Cash flow coverage		
(vi)	Interest cover = $\frac{CF02}{Interest\ paid}$	Interest cover = $\frac{EBIT}{Interest\ paid}$
(vii)	Dividend cover = $\frac{CF03 - PD - MD}{Ordinary\ dividends}$	Dividend cover = $\frac{PAT - PD - MI}{Ordinary\ dividends}$

TABLE B (CONTINUED)

CASH FLOW RATIOS	
(c) Capital expenditure cash flow ratios	
(viii)	Acquisition of fixed assets = $\frac{CF04}{Gross\ fixed\ assets\ purchased\ or\ CF04 + proceeds\ of\ fixed\ assets\ sold}$ Gross fixed assets purchased or CF04 Net fixed assets purchased
(ix)	Acquisition of fixed assets and subsidiaries = $\frac{CF04}{Gross\ fixed\ assets + subsidiaries\ acquired}$
(d) Financing cash flow ratios	
(x)	Debt coverage = $\frac{CF03}{Total\ debt}$
(xi)	Current liability coverage = $\frac{CF03}{Current\ liabilities}$
(xii)	Current portion of long-term debt coverage = $\frac{CF03}{Current\ portion\ of\ long-term\ debt}$

Abbreviations: PAT = Net income after taxation
 EBIT = Earnings before interest and taxation
 PD = Preference dividends
 MD = Dividends paid by subsidiaries to minority shareholders
 MI = Minority interest in income of subsidiaries

(a) Cash flow returns

The closest surrogate for net income after taxation will be CF03. Instead of using net income after taxation, CF03 can be used as the numerator in a number of ratios. These ratios can then be used in addition to the traditional accrual based ratios.

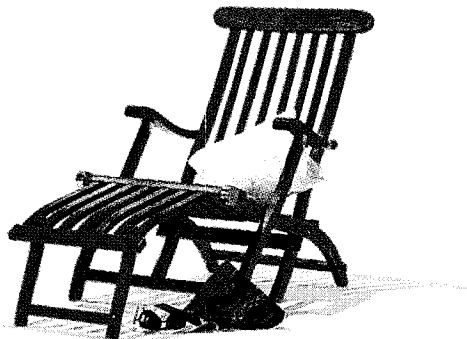
- (i) Operating cash flows (CF03)/sales will indicate the cash flow return to sales.
- (ii) Operating cash flow to assets could be compared to operating income to assets.
- (iii) Operating cash flow to assets (based upon CF03) could be compared to ROA.
- (iv) Operating cash flow to equity compared to ROE would give a shareholder a very good idea of the impact of accrual accounting on the return on his investment.
- (v) Operating cash flow per share can be used as an alternative to EPS.

(b) Cash flow coverage

- (vi) This ratio should be a better measure than the traditional interest cover to indicate risk of default on interest payments, because the ratio represent a cash flow figure rather than an accrual based figure.
- (vii) This ratio will supplement dividend cover. The difference between the cash flow coverage of dividends and ordinary dividend cover would indicate the impact of accrual based accounting.

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(c) Capital expenditure cash flow ratios

The ratios (viii) and (ix) show the company's ability to meet its capital expenditure out of operating cash flows. The capital expenditure could include replacement of fixed assets as well as expansion of fixed assets. A high percentage could be an indication that the company is not using borrowed money to a large extent when acquiring fixed assets, and *vice versa*.

(d) Financing cash flow ratios

Measures of liquidity and coverage are of prime interest to creditors. Creditors are concerned with the firm's ability to meet the required interest and principal repayments. Cash flow coverage of interest has been discussed under b(vi) above.

The ratios (x) to (xii) are indicators of the time it will take for the present CF03 to repay total debt, current liabilities and the current portion of long-term debt. As such it would be a good indicator of the potential risk of default on capital repayments.

CF03/current liabilities could also be used as an alternative to the current ratio (all things being equal). A ratio less than

one could indicate critical current needs, while a ratio in excess of one could indicate a healthy liquidity activity. This ratio is quite often quoted as a key indicator when predicting bankruptcy. A downward trend may indeed be a sign of a possible future disaster.

5. CONCLUSION

The incorporation of cash flow ratios into the analysis process has been rather slow and is very much overdue. Current literature has not provided an abundance of different ratios to be used. Companies should be encouraged to publish those cash flow ratios which they regard as suitable for their circumstances. Such ratios should preferably be included in a five or ten-year statistical summary. Ratios in isolation are of little value. By studying ratios over a longer period, a reader should be able to form an idea as to different norms for different companies and/or industries. If cash flow ratios could be calculated over a longer period, one might even be able to assess the influence of cash flows on share prices.

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4. An attempt should be made to limit the number of graphs included in any article.
5. Tables of statistical data should be kept as clear and brief as possible.
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7. Footnotes, elaborations or explanations of the main text, should be numbered and should appear at the end of the article not at the bottom of the page to which they relate.
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