

The Investment Analysts Journal

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Die Beleggings- Navorsers Tydskrif

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Inhoud

This issue in brief

Factors affecting dividend policy

P. J. C. Seneque

Although most lay investors take it for granted that the payment of dividends affects the market value of securities, this view has come in for a great deal of academic criticism in recent years. Two schools of thought on the subject have emerged, the one arguing that dividends are important in that they represent an aspect of investment return possessing a lower order of risk than do capital gains; the other that it is really capital gains, or their prospect, that motivate the purchase of equity securities. Prof Seneque's article looks at the nature of dividends against the background of the objectives of modern corporate enterprises and examines this controversy in detail. Although he does not resolve it, he concludes that empirical evidence provides some support for the notion of a positive dividend policy.

Strategic considerations for investment decision-making

G. S. Andrews

Corporate strategy is a comparatively new area of the science of financial management and one probably neglected by most investment analysts, and yet without a knowledge of the strategic objectives of a firm it is not possible properly to evaluate its performance. In his article, Mr Andrews draws attention not only to the fallacies which underly the traditional approaches of bankers and investors to the problems of evaluation but explains what is meant by strategy and how a knowledge of it can be used in practice. In doing so he places particular emphasis on the relationship between the firm and its environment and on the need for planning and anticipation on the part of management, regarding environmental change, in contrast to the need, purely, for adaptation.

Investment decisions in an inflationary economy

Tamir Agmon

The existence of high rates of inflation in most world economies today is a cause of many difficulties for businessmen for it affects their day-to-day decisions of management as well as their real investment in new productive capacity. Prof Agmon is particularly well qualified to discuss the matter of inflation and corporate performance for he is a senior lecturer at the Tel Aviv Business School and Israel is a country which has suffered in a unique way from an excessive and protracted increase in its price level. Prof Agmon's article deals with the responsibility of governments for inflation, its real effects on business decisions, the role of fiscal policy in an inflationary environment and the solutions open to financial management in adapting to it.

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Thin trading and tests for stock market efficiency

P. J. Strebel

In their reply to Dr Strebel's assertion that the efficient market hypothesis could at best be regarded as a half truth as far as the JSE was concerned (see issues Nos. 10 and 11 of this journal), Messrs Gilbertson and Roux had some sharply critical things to say of the methodology and logic of Strebel's approach to technical issues. This article is Dr Strebel's rejoinder. Without ignoring the complexities of the subject or academic properties, Dr Strebel hits back in kind. His argument is persuasive and should be of interest even to non-mathematical readers.

An econometric approach to exchange rate forecasting

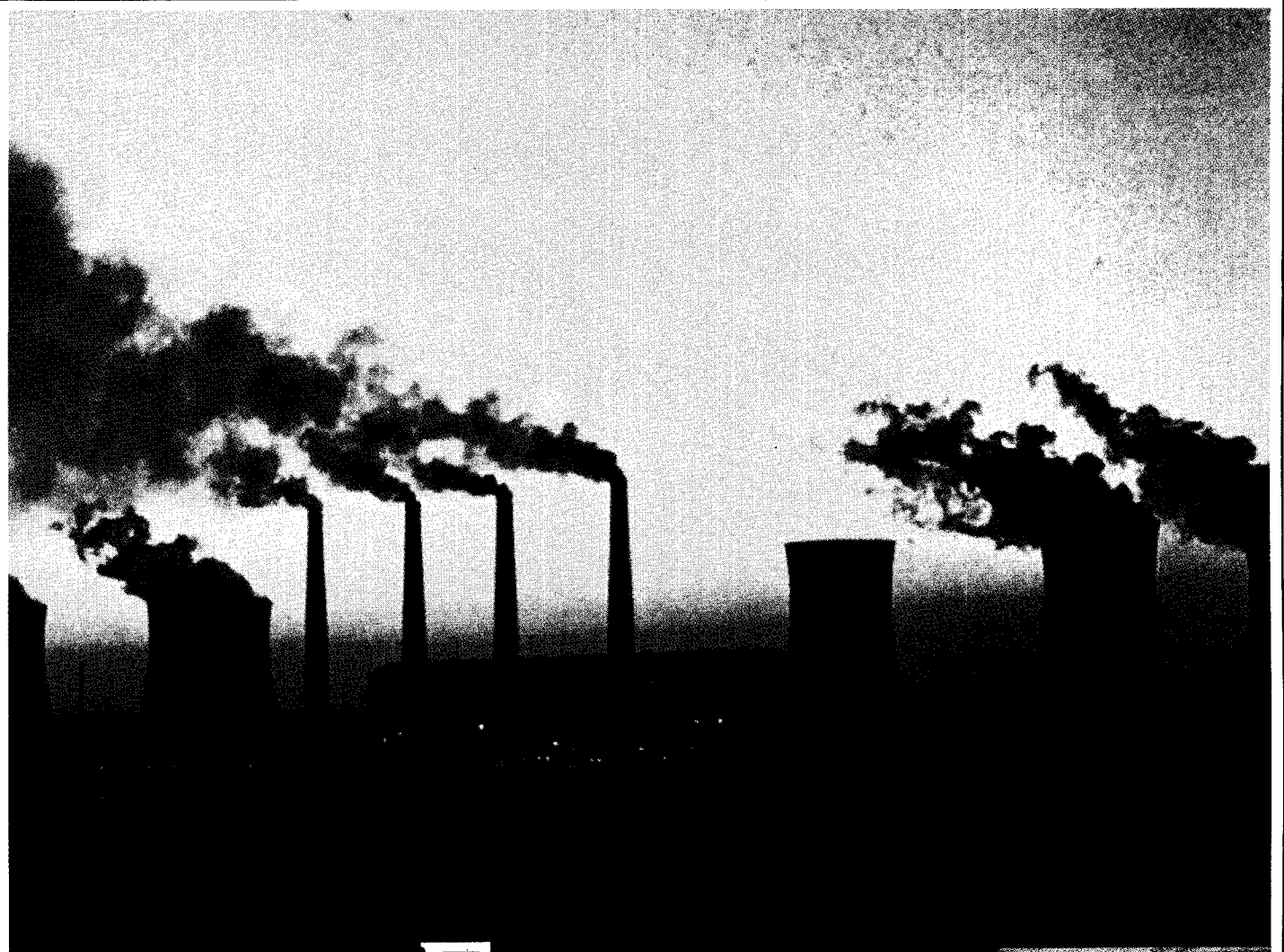
A. D. Cohen

This article by Mr A. D. Cohen describes an econometric model for the forecasting of exchange rate changes. With the recent decline in the exchange value of the dollar, attention has focused again on the position of the rand. Will this remain linked to the dollar or is the time approaching when the link will have to be broken? Mr Cohen does not answer these questions but he does suggest a way in which others can come to grips with them.

Investment basics — III

W. T. Floquet

This is the third article in our series entitled 'Investment Basics'. Its subject is the calculation of earnings per share and the value of the P/E ratio as an investment tool. Mr Floquet knows his subject well and his treatment of it should be helpful to seasoned analysts as well as beginners.



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The Investment Analysts Journal

Die Beleggingsnavorsers Tydskrif

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Revolutions are difficult to classify generically. Some relate to violent change in the structure of society; some to change in the ideas of men which is no less profound in its disruption of an established order. Some are effected quickly, the new overtaking the old, as it were, overnight; some work their way out only slowly, their change not always perceptible to those immediately affected by them. The revolution currently taking place in the world of finance is one essentially of the last mentioned kinds. It is a revolution of ideas and it is slow working but it is no less a revolution for being so, and when it has run its inexorable course, the transformation in thinking will be no less complete and dramatic.

The change in thinking to which reference is made here is that which started in 1952 with the publication of Harry Markowitz's now famous article in the *Journal of Finance* entitled "Portfolio Selection". For those familiar with what has been happening in recent years in the theory of finance, with the emergence to widespread use in the United States and other advanced market economies of beta coefficients and the application of systematic as opposed to purely intuitive procedures in portfolio management, it may seem incredible that it is now twenty-six years since Markowitz's article first appeared. But it is and that is a fact to wonder at no less than the fact that for a great number of practising investment analysts in South Africa and elsewhere, the works of Markowitz and his disciples still remain obscure to this day.

There was, of course, a reason why Markowitz's 1952 article and even his book of the same name which appeared in 1959 made only a small initial impact. Both treated their subject mathematically and both were concerned with explaining a highly complex system. It was not until William F. Sharpe, Professor of Finance at the Stanford Business School, published his book on portfolio theory and capital markets, that Markowitz's ideas were sufficiently simplified to be adaptable for use with the aid of modern digital computers. Of course, there has also been a great advance in computer technology and today that technology is available to a greatly expanded number of users at substantially reduced cost.

What is really interesting about these present developments in the fields of corporate finance and portfolio selection is not that they started in the academic ivory tower and have only slowly descended into the market place; it is that they have been linked to a great deal of empirical research and substantiation. It is not, as has often been the case with economic theory, that hypotheses have been developed which have relied purely on deductive reasoning for their authority. The theory of portfolio selection and capital markets is empirically supported, and for this reason, if for no other, it is theory which practitioners ignore at their cost.

Twaalfde uitgawe

Augustus 1978

Dit is moeilik om rewolusies generies te klassifiseer. Sommiges hou verband met hewige veranderings in die sosiale struktuur; ander met veranderings in die idees van mense, wat nie minder diepgaande is in die ontwrigting van 'n gevestigde orde nie. Sommiges word blitsvinnig ten uitvoer gebring, en die nuwe oorweldig die oue as 't ware oornag; ander speel hulle stadig uit, en die verandering wat daardeur teweeggebring word, is nie altyd waarneembaar deur diegene wat onmiddellik daardeur geraak word nie. Die rewolusie wat tans in die wêreld van finansies aan die gang is, is een wat in wese tot laasgenoemde soort behoort. Dit is 'n rewolusie van idees en die werking daarvan is stadig, maar is daarom nie minder 'n rewolusie nie, en wanneer dit sy onverbiddelelike gang gegaan het, sal die metamorfose van denke nie minder volledig en dramaties wees nie.

Die verandering in denke waarna hier verwys word, is die verandering wat in 1952 met die verskyning van Harry Markowitz se nou beroemde artikel in die *Journal of Finance* onder die titel "Portfolio Selection" begin het. Vir diegene wat vertrou is met wat die afgelope jare aan die gebeur is in die teorie van finansies, met die verskynsel van die uitgebreide gebruik in die Verenigde State en ander moderne markeconomieë van betakoëffisiënte en die toepassing van sistematiese, gestel teenoor suiwer intuïtiewe, prosedures in portefeuljebestuur, lyk dit miskien ongelooflik dat dit nou ses en twintig jaar is sedert die verskyning van Markowitz se artikel. Maar dit is nietemin 'n feit, en 'n feit wat net so vasstaan as dat die werke van Markowitz en sy volgelinge vir 'n groot aantal praktiserende beleggingsnavorsers in Suid-Afrika en elders tot op hede onbekend bly.

Daar was natuurlik 'n rede waarom Markowitz se artikel van 1952 en selfs sy boek met dieselfde titel wat in 1959 verskyn het aanvanklik slegs beperkte ingang gevind het. In albei is die onderwerp wiskundig behandel en was die skrywer gemoeid met die verduideliking van 'n uiters komplekse stelsel. Dit was eers toe William F. Sharpe, professor in Finansiële by die Stanford Business School, sy boek oor portefeuljeteorie en kapitaalmarkte die lig laat sien het, dat Markowitz se idees voldoende vereenvoudig is om aangepas te kan word vir gebruik met behulp van moderne syferrekenaars. Daar is natuurlik ook heelwat vordering gemaak met rekenaartegnologie en vandag is dié tegnologie teen aansienlik verlaagde koste tot beskikking van 'n heelwat uitgebreide getal gebruikers.

Wat werklik interessant is omtrent dié huidige ontwikkelings op die gebiede van maatskappyfinansies en portefeuljeseleksie, is nie dat dit in die akademiese ivoortoring ontstaan het en slegs stadig na die vlak van die mark afgedaal het nie; dit is dat dit gepaard gegaan het met 'n groot mate van empiriese navorsing en bevestiging. Dit is nie, soos al so dikwels die geval was

At the moment, the financial transformation in South Africa is still very much in its formative stages. Its arena is the universities, one or two leading companies and the columns of this journal: most executives concerned with corporate finance and professionals concerned with investment management remain largely unaware about it. But as more and more graduates emerge from the business schools and business colleges and assume positions of responsibility in commerce, industry and our financial institutions, the ideas that are already widely accepted and used overseas will take deeper root here too. When that happens, the probability is that the gap that presently divides protagonists and opponents of the efficient market hypothesis will be narrowed because one of the effects of a wider application of the principles involved will be to improve the efficiency of the market place.

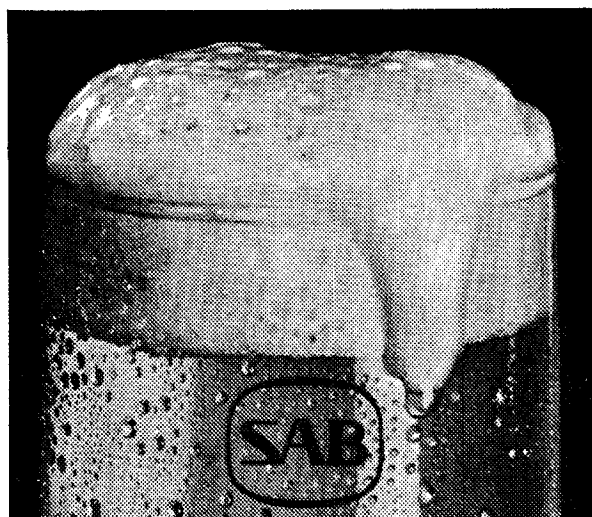
THE EDITOR

met ekonomiese teorie, dat hipoteses ontwikkel is wat vir hulle geldigheid uitsluitend op deduktiewe redenering staatgemaak het nie. Die teorie van portefeuljeselektering en kapitaalmarkte word empiries gesteun en om dié rede, al is dit om geen ander nie, is dit 'n teorie wat praktisyns tot hulle eie nadeel verontagsaam.

Op die oomblik verkeer die finansiële metamorfose in Suid-Afrika in 'n groot mate nog in die vormingsstadiums. Die strydperk waar dit afspeel is die universiteite, een of twee toonaangewende maatskappye en die rubrieke van hierdie tydskrif; die meeste mense in uitvoerende posisies wat betrokke is by maatskappy-finansies en professionele mense wat betrokke is by beleggingsbestuur bly grootliks onbewus daarvan. Maar namate al hoe meer gegraduateerdes deur besigheidskole en besigheidskolleges opgelewer word en verantwoordelike poste in die handel, nywerheid en ons finansiële instellings vul, sal die idees wat in die buiteland reeds alom aanvaar en toegepas word, hier ook dieper wortel skiet. Wanneer dit gebeur, is dit waarskynlik dat die gaping wat tans die voor- en teëstanders van die hipotese van doeltreffende markte skei, vernou sal word omdat een van die uitwerkings van 'n algemener toepassing van die betrokke beginsels sal wees om die doeltreffendheid van die mark te verbeter.

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A review of factors affecting the dividend policy of the firm †

1 INTRODUCTION

The firm's dividend decision has in the last ten to fifteen years received considerable attention from financial analysts and academics. Divergent views have been expressed and it is understood that the controversy has not been resolved, although the lack of new authorship on the subject in recent times may lead one to conclude that the debate is deadlocked.

The purpose of this paper is to re-examine the main areas of the debate and in particular to re-state and consider a model first presented by Lerner which, it is submitted, is both conceptually satisfying and offers financial managers an opportunity for simulation by using the model in examining and assessing their firms' financial policies.¹

2 DIVIDENDS AND THE FIRM

2.1 The nature of dividends

Dividends are the share of the profits of a company which is received by the shareholders. However, they do not become the property of the shareholders and shareholders have no right to them until the directors of the company have passed a resolution declaring a dividend. For purposes of this paper the declaration of a dividend assumes the subsequent payment of that dividend for it is the effect of the payment of the dividend which is significant. It must be noted, however, that the declaration itself has an interim effect on the market price of the affected shares.

Dividends can be classified in at least two ways – the source of the dividend and the medium of payment. Dividends may be declared out of capital or profits. This paper is concerned only with the latter. Payment of capital dividends are made only in very special circumstances and are subject to specific legal constraints. The medium of payment can be in cash or by means of capitalisation shares (bonus shares). This paper is concerned with the former and will not deal with the latter.

When payment of dividends are made in cash then "such dividends are a use of funds by the firm (and) therefore, the possible funds use, i.e., dividends, must be compared with the possible (other) funds use(s), i.e. proposed investments".² This represents the focal point of the problem – retain earnings to finance future projects or pay dividends.

2.2 The financial decisions of the firm

It has been stated that the financial decisions of the firm seek to answer three related questions:

- 1 How large should an enterprise be, and how fast should it grow?

2 In what form should it hold its assets?

3 What should be the composition of its liabilities?³

This means that the firm's financial management is concerned with the efficient allocation of capital within the firm, and it must determine where and in what amounts funds must be invested, where and in what amounts funds are to be obtained and how much to pay in dividends.

2.3 Objectives of the firm and the individual

The financial decisions of the firm cannot be taken in isolation but must be related to the objectives of the firm. That is to say that management must determine how the decisions will affect the firm in seeking to achieve its objectives. At this stage it is relevant to state that the views expressed in this paper "shall take the position that the objective of the firm in making its financial decision should be to maximise the economic welfare of its owners".⁴ This is directly related to the objective of the individual who in making his financial decisions should "maximise the utility of his consumption over time, that is, to strive to consume goods and services in the amounts and patterns and at the times that will yield him the greatest satisfaction".⁵

In considering dividends, which are paid by the firm to its individual shareholders, it is important to relate the objectives of the firm to individual objectives and, it is submitted, maximising the economic welfare of the owners is equivalent to maximising the utility of their consumption over time. The dividend decision is frequently referred to as a firm's dividend policy. In turn the dividend policy is related to the purpose of dividends:

*"The purpose of dividend payments is not to supply funds to the shareholders directly. It is to increase their overall wealth. They may then adjust their income streams to their preferred consumption patterns by personal transactions. In a similar way, they may adjust their income streams to their optimal patterns of personal investments."*⁶

This is a strictly normative approach.

2.4 The theoretical and practical approaches

The normative approach to dividend policy has been described by Solomon as follows:

"In a world of perfectly rational investors and managers, dividends can be treated as a passive residual. In such a world, a firm would invest the internal funds it generates either within the firm or by acquiring assets of another firm, subject only to the constraint that each new investment has a net present worth greater than zero, i.e., that the expect-

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†All footnote references appear at the conclusion of this paper.

*ted yield on internal investments is higher than the capitalisation rate for earnings of the quality expected. After all such investments opportunities have been exhausted, any internal funds remaining would be distributed to stockholders as cash dividends."*⁷

This theoretical approach to the payment of dividends requires that they should be paid only if the expected value of the company after the declaration of a dividend (nP_1) plus the dividend itself (D) is at least as great as the value before the declaration of the dividend (nP_0):

$$nP_1 + D \geq nP_0$$

where n are the number of ordinary shares issued, P is the market price per share, 0 is the period before the declaration of the dividend and 1 is the period after the last date to register for the dividend.

Although the market price per share will usually fall after the last date to register for the dividend, if the dividend is well advised the sum of the eventual market price plus the amount of the dividend may well exceed the market price of the share prior to the declaration of the dividend. In such an event the payment of the dividend has resulted in an increase in the economic welfare of the shareholder.

It would seem that in practice few companies, if any, follow the policy outlined above. In general the prevailing policy appears to be that dividends are treated as an active decision variable with retentions as the residual. Under such a policy desirable and acceptable investment opportunities which cannot be financed from retained earnings are financed from external sources of funds. As Solomon has stated:

*"In a sense one could say that under such a policy dividend payments are financed from borrowed funds!"*⁸

The practical approach to dividend policy has much common ground with the theoretical approach – and also considerable divergence. In practice the directors take into account factors and are subject to constraints which must also be considered by and affect the theoretical approach. In-so-far as the normative approach is concerned, there are in fact two separate points of view. The one school maintains, in broad terms, that the dividend decision is relevant to the value of the firm. Members of this school include Myron Gordon, Eugene Lerner, James Lintner and James T. S. Porterfield. The other school supports the view that dividend decisions are not relevant to the value of the firm. They include James E. Walter and the leading protagonists of that school – M. H. Miller and F. Modigliani.

3 COMMON FACTORS AFFECTING DIVIDEND POLICY

Before examining more closely the pragmatic approach and the two normative schools it is necessary to consider those common factors which affect the declaration of dividends.

3.1 Amount of earnings

The availability of profits to pay dividends is a *sine qua non* of dividend policy. The whole subject of what constitutes profit is itself the topic of con-

siderable controversy and as such lies outside the scope of this paper. Suffice it to say that company law, through the statutes and cases, has imposed constraints and guidelines for the directors' decisions regarding the payment of dividends.

3.2 Cash flows

When considering the payment of cash dividends the firm's cash flows must be taken into account. There is a liquidity constraint. Even if a dividend is paid by means of 'bonus shares' the impact of such an issue on the personal tax liability of the individual shareholders must be considered. If a shareholder considers that the future stream (of hopefully increased) dividends will not, when discounted, cover the tax that he will have to pay on the scrip dividend he may sell shares to pay for his tax or for consumption or investment and such sales if sufficiently widespread could depress the value of the firm's shares.

3.3 Incidence of taxation

One aspect of taxation has already been mentioned above but all aspects of taxation, corporate and personal, must be regarded as relevant factors to be taken into account.

In particular in South Africa the effect of the undistributed profits tax on the level of dividends declared is an important consideration for private companies as defined by the Income Tax Act.

3.4 Financial needs of the firm

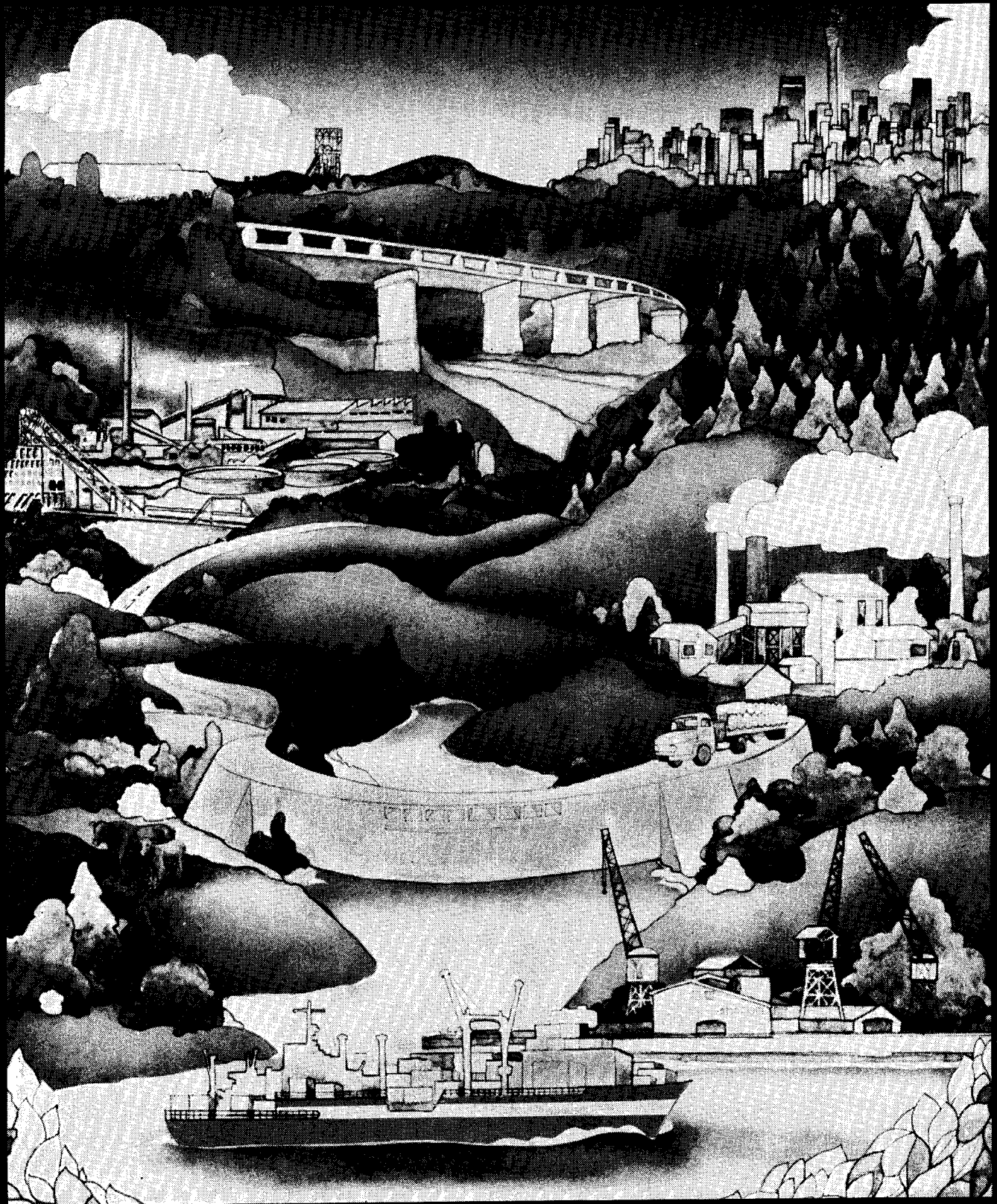
Both pragmatists and theorists recognise the importance of retained earnings as a means of financing the investment decisions of the firm. "Every dividend payment has associated with it a funds source, or financing opportunity undertaken – dividends are a use of funds, and any use of funds must have a source."⁹ In other words, the payment of a cash dividend has an opportunity cost in the form of an investment opportunity which may be foregone. When capital rationing exists this is an important factor which must be considered.

3.5 Contractual and legal constraints

Apart from the legal constraints, tax and company laws already mentioned, there may be other legal and contractual constraints. For example the articles of association of a company may impose certain obligations before dividends can be paid. The repayment of a particular class of debentures may be a prerequisite to the payment of any dividends, or specific reserves may have to be created and maintained before dividends can be declared.

3.6 Effect of dividend policy on liquidity and solvency

During periods of high inflation when the costs of replacing fixed and current assets are increasing it may well be that a firm's previously determined payout ratio cannot be maintained without jeopardising its liquidity and even its solvency. This problem is of course largely, if not wholly, attributable to the defects of the conventional historical cost accounting model. The use of a replacement cost or



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current cost accounting model could probably solve this problem. However this is an issue which cannot be debated in this paper.

3.7 Risk of take-over bids

If the dividend policy of the firm is perceived by shareholders as unsatisfactory their action of disinvesting in the firm's securities would force the price down. If the aggregate of such price was to fall below the true asset values of the firm then the firm could become the target for a take-over bid.

3.8 Criticism of high dividends

Management today is and must be conscious of maintaining a satisfactory relationship with its workers. If a firm's management decided on a dividend policy which was perceived by a relevant trade union or the workers themselves as being an excessively high payout ratio, especially during inflationary periods when the purchasing power of the workers' earnings is being diminished, a dangerous strain on labour relations within the firm could develop.

4 THE PRAGMATIC APPROACH TO DIVIDEND POLICY

In June 1966 a finance conference was held at the Graduate School of Business at Stanford University, U.S.A. There were numerous participants from industry as well as academics such as professors Bierman, Dougall, Lerner, Porterfield, Solomon and Weston. Porterfield presented a paper on dividend policy which was followed by a discussion. Some of the comments quoted below are relevant and of interest:

Porterfield: '... in your companies, what motivates your directors to make dividend payments when seemingly this may not be theoretically well advised? I should like to hear some reasoning on this point'.

Comment: 'Well I believe that the answer is that the owners of the shares do not fully understand the relationship between dividends and retention of earnings'.

Porterfield: 'Is it only that really?'

Comment: 'I think with many corporate directors its mainly because they would like to be re-elected'.

Porterfield: 'Good point'.

Comment: 'Many investors realise that they may be a lot better off if the company were to retain earnings. And I think that a number of companies follow stockholders' desires by retaining a substantial portion of earnings'."¹⁰

This brief extract is illuminating in the information it gives of the attitude of managers and directors.

A significant article dealing with the practical approach is that of Thomson and Walsh who studied the dividend practices of 230 companies. They state:

*"For the most part, the companies desire to give their shareholders a steady and dependable return without losing sight of the companies' long-term and short-term needs for funds. When deciding whether to distribute earnings, either in the form of cash or stock, or to retain them for future growth, most companies strive to follow policies that meet the shareholders' needs for income or capital appreciation, and, at the same time, preserve the soundness of company finances."*¹¹

This seems a fair representation of the practical approach to dividend policy. To the majority of the companies

surveyed the maintenance of a continuous record of dividend payments was of paramount importance, followed by stability of the rate of dividend and thirdly by the size of the dividend. This is illustrated by the following table¹²:

How 195 companies rank the relative importance of continuity, rate stability and dividend size

	First	Second	Third	Total companies
Continuity	137	48	10	195
Stability	50	132	13	195
Size	11	12	172	195

Other factors mentioned by Thomson and Walsh included those set out in section 3 above as well as three others. Firstly the high cost of replacing old plant and equipment places a strain on company finances with a resultant impact on funds available for dividends. This is an interesting comment with its implied criticism of current accounting practice which generally ignores the impact of rising price levels on company financial statements. A second factor is the need to repay borrowings when considering the application of earnings. The president of a corporation is quoted as saying: "There is a very rough rule-of-thumb that says one-third to the owners, one-third retained in the business, and one-third for debt retirement."¹³

Another factor which is considered is apparently the dividend policies of other companies: "For instance some companies report that they try to pay out the same percentage of net earnings as other companies in their industry."¹⁴

It is submitted that this brief survey presents a fair assessment of the practical approach to dividend policy.

5 DIVIDEND POLICY: THE NORMATIVE APPROACH

The normative study of dividend policy revolves around: "... the question whether a firm formally decides on (1) the amount of the dividend, using the residual to help finance its investments and to make up whatever deficiencies there are through external financing, or (2) the amount of retained earnings it wishes to invest, leaving the residual to dividends. One is the obverse of the other although the former is referred to as dividend policy and the latter as investment policy. Once a dividend decision is made, the company's retention-of-earning policy is also made, and vice-versa."¹⁵

The dividend decision, as stated earlier (paragraph 2.3) is directly related to the objectives of the firm and its individual shareholders. Furthermore the value of the firm's ordinary shares is directly derived from the expectation of dividends, as can be seen from the two following models:

The usual normative model:

$$P_0 = \sum_{t=1}^{\infty} \frac{Dt}{(1+k)^t}; \text{ or}$$

Gordon's normal growth model:

$$P_0 = \frac{D_1}{k-g}; \text{ where } P_0 \text{ is the value}$$

of the share now, D_t is the dividend per period, D_1 is the dividend in the next period, k is the cost of equity capital and g is the expected rate of dividend growth.

Value, therefore, is a function of dividends and cost of capital: "if the value of the firm is a function of its dividend-payout ratio, dividend policy will affect directly the firm's cost of capital."¹⁶

This is very briefly the point of view of one of the normative schools – that dividend policy affects the value of the firm.

The other school regards "the treatment of a dividend policy as a passive residual determined strictly by the availability of acceptable investment proposals implies that dividends are irrelevant; the investor is indifferent between dividends and capital gains."¹⁷ In other words it is not considered to affect the value of the firm (through its shares).

These two normative approaches will now be considered in greater detail.

6 DIVIDENDS ARE IRRELEVANT

That dividends are, or should be, irrelevant appears to be the view also of Solomon:

"If the present system of taxation, with its lower rate on capital gains,¹⁸ is superimposed on this pure model, the case for treating internal investments as primary and dividends as residual is strengthened even further because with taxation, the net yield available on individual investment per dollar of dividend paid becomes even lower than the net yield available though retention for internal investment purposes and the accompanying capital gain."¹⁹

However, Solomon does not appear to have developed a theoretical model in support of his view.

One of the earliest models to show that dividend policy should be a passive residual of internal re-investment policy was developed by Walter.²⁰

Walter's formula is:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where P is the market price per share, D is the dividend per share, E is the earnings per share, r is the internal rate of return and k is the cost of capital.

A strict interpretation of Walter's model states that if $r > k$ no dividend should be paid, and if $k > r$ the dividend should be 100% of earnings.

Assuming that $r = 0,15$; $k = 0,10$; $E = R6$ and $D = R3$ – then the market price per share is:

$$P = \frac{3 + \frac{0,15}{0,10}(6-3)}{0,10} = R75$$

but applying the decision rule, as $r > k$ no dividend should be paid – then the market price per share becomes:

$$P = \frac{0 + \frac{0,15}{0,10}(6-0)}{0,10} = R90$$

– with no dividend paid market price is maximised.

If one assumes that r drops from 0,15 to 0,09 then if $E = R6$ and $D = R3$ and k remains at 0,10 the value per share would be:

$$P = \frac{3 + \frac{0,09}{0,10}(6-3)}{0,10} = R57$$

but applying the decision rule as $k > r$ the dividend should be 100% of earnings, then the value per share becomes:

$$P = \frac{6 + \frac{0,09}{0,10}(6-6)}{0,10} = R60$$

The market price is maximised with a complete distribution of earnings.

It follows that if $r = k$, the market price per share will be insensitive to the payout ratio.

Quite logically Walter's formula states that if the internal rate of return is less than the cost of capital the individual shareholder's investment opportunities outside the firm are better and he should be paid the maximum dividend possible to enable him to exercise his right to such external investments.²¹

However, the most comprehensive argument that a firm's dividend policy should be a matter of indifference to shareholders is that put forward by Modigliani and Miller (MM) in 1961.²²

In paragraph 2.4 of this paper it was stated that the normative approach to dividend policy was generally to be found in the formula:

$$\text{Declare a dividend only if: } nP_1 + D > nP_0$$

$$\text{The MM theorem states: } D \equiv nP_0 - nP_1$$

In other words, whether or not a dividend is declared there will be no effect on the wealth of shareholders. The MM hypothesis, it must be noted, assumes perfect markets, rational behaviour and perfect certainty.²³ Furthermore under perfect markets is the assumption of no taxation and no transaction costs as well as equal information to all investors at no cost.

MM begin their argument with the fundamental principle of valuation for ordinary shares:

$$P_0 = \sum_{t=1}^{\infty} \frac{Dt}{(1+k)^t} \quad (\text{Eq. 1})$$

where all symbols are as stated earlier.

Equation 1 can be restated as follows:

$$P_0 = \frac{D_1 + P_1}{(1+k)} \quad (\text{Eq. 2})$$

where D_1 is the dividend per share at time 1, and P_1 is the price per share at time 1, and k is as before, that is the acceptable capitalisation rate, the cost of capital, Porterfield's Market Rate of Discount (MRD) or Keynes' Marginal Efficiency of Capital (MEC).

Equation 2 can be re-written for the whole firm if $n =$ number of ordinary shares in issue at time 0 and $m =$ number of new ordinary shares issued at price P_1 in period 1.

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This re-statement is necessary because the crux of the MM proposition is that the effect of dividends on shareholder wealth is exactly offset by other means of financing – and in this simplified example the issue of new ordinary shares is used.

Equation 2 re-written for the whole firm becomes:

$$nP_0 = [nD_1 + (n+m)P_1 - mP_1] / (1+k) \quad (\text{Eq. 3})$$

Now the total amount of new ordinary shares issued can be expressed as follows:

$$mP_1 = I - (X - nD_1) \quad (\text{Eq. 4})$$

where I is the total new investment in period 1; and X is the total net profit of the firm for the period.

Substituting equation 4 into equation 3 gives:

$$nP_0 = [(n+m)P_1 - I + X] / (1+k) \quad (\text{Eq. 5})$$

As D_1 does not appear in equation (5) and as X, I, $(n+m)P_1$, and k are deemed to be independent of D_1 , MM conclude that the current value of the firm is not affected by its current dividend decision.

MM go on to show that the current value of the firm is also unaffected by future dividend decisions or by the means of external financing even if this requires new debt.

It is this latter deduction, regarding the non-effect of new debt on the value of the firm, which provides the crux of the criticism levelled against MM by Porterfield and others, in particular Myron Gordon. Porterfield states: "There is considerably more reason to expect that MRD (Market Rate of Discount or k) would change as a result of increase in debt and its impact on the financial risk of the enterprise."²⁴

It seems, with respect, that Porterfield in making that particular statement has overlooked MM's other thesis concerning the cost of capital in respect of leverage – the risk cost of debt is the same as the risk cost of equity financing through a process of arbitrage by members.²⁵ Porterfield's criticism of the MM dividend indifference theorem should have been addressed through a criticism of their hypotheses of no change in the cost of capital as debt financing is increased.

Also of considerable interest is a more recent article by Keane.²⁶ In this article Keane enters the now famous debate between MM,²⁷ and Gordon,²⁸ wherein Gordon attacks the MM theorem that dividend policy is irrelevant. Keane points out that financial markets are in reality imperfect and expresses the view that Gordon's contention that shareholders prefer dividends may be intuitively sound, even though his arguments are defective, because this preference for dividends may be a protest against the informational deficiencies of internal financing. Keane makes the point that the stock exchange imposes rigorous disclosure requirements for new issues to assist potential investors to assess the future;²⁹ but for investments financed by retentions no such information is required. The annual financial statements of companies normally provide scant information on the intended uses of retained funds. It is this deficiency in knowledge regarding the future use of retained funds which make shareholders not indifferent to dividends.

7 DIVIDENDS ARE RELEVANT

Porterfield, Lintner and Lerner are foremost theorists in this school. Ignoring the tax aspect Porterfield states: "... the firm should declare and pay a dividend if the resulting decline in market price is less than the amount of the dividend paid."³⁰

In symbols:

$$D > P_0 - P_1$$

"conversely, the firm should not pay a dividend if..."³¹

$$P_0 - P_1 > D$$

Porterfield's dividend model depends on the concept of a trade-off between current dividends and future dividends and he goes on to demonstrate how the declaration of a dividend can maximise owner's wealth.

However, it is submitted that Lerner's model has greater merit.³² It shows specifically how the dividend-retention decisions are interrelated and how these decisions affect the value of the firm. In many respects it is a conceptually simple and satisfying model.

Again, certain simplifying assumptions are necessary. If a company has no debt and no preference shares in its capital structure then both dividends and its rate of growth can be expressed in terms of two variables – the rate of return on assets and the rate of retained earnings. The following symbols will be used:

- P = the price per ordinary share
- k = the cost of equity capital
- g = the rate of growth of assets
- r = the rate of return on assets
- b = the rate of retention
- D = the dividend per ordinary share
- T = the company tax rate
- A = total assets
- E = equity
- n = number of ordinary shares in issue

Dividends are paid from earnings after taxes and interest. If debt is assumed to be zero then interest payments are zero. Furthermore if b is the retention rate then 1-b is the dividend-payout rate. Then:

$$D = \frac{(1-T)(1-b)rA}{n} \quad (\text{Eq. 6})$$

Similarly the amount of earnings that the firm will retain, and consequently the increment to both assets and equity, can be expressed as:

$$\Delta A = \Delta E = (1-T)brA \quad (\text{Eq. 7})$$

Now g the rate of growth in assets is:

$$g = \frac{\Delta A}{A} = (1-T)br \quad (\text{Eq. 8})$$

The normal (Gordon's) growth model is expressed as:

$$P = \frac{D}{k-g} \quad (\text{Eq. 9})$$

Assuming a constant payout ratio, g in equation 8 is equal to g in equation 9, and substituting equations 6 and 8 into equation 9 gives:

$$P = \frac{(1-T)(1-b)rA/r}{k-(1-T)br} \quad (\text{Eq. 10})$$

A review of factors affecting the dividend policy of the firm

Equation 10 is Lerner's fundamental valuation and dividend model. This equation in fact states that the value of a company is the function of two decision variables – r, the required rate of return on assets, and b the rate of retention; plus three parameters – k, the cost of equity capital; T, the tax rate and A, total assets.

This can best be illustrated by means of an example. A company has R1 000 in assets (and equity), there are 1 000 shares of R1 each in issue, the firm's earnings are R200 (i.e. r = 0,20) before tax which is at 40 cents in R. The rate of retention, b, is 50%; and k, the cost of capital is 10%.

Equation 10, applied to this hypothetical firm, can be written as follows:

$$P = \frac{(1-0,40)(1-0,50)(0,20) R1\ 000/1\ 000}{0,10-(1-0,40)(0,50)(0,20)}$$

$$= \frac{0,06}{0,10-0,06}$$

$$= R1,50$$

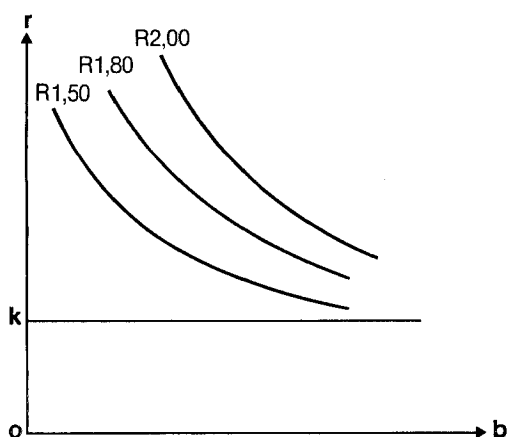
Equation 10 also implies that any particular price for a share can be achieved by an infinite number of r and b combinations. For instance, using the data given for the above example, a price of R1,80 can be achieved if the company selects any of the r, b combinations in the following table:

Combinations of r and b that satisfy the valuation equation for P = R1,80 when A = R1 000; n = 1 000; T = 0,4 and R = 0,10

r	b ³³
0,25	0,25
0,214	0,50
0,1875	0,75

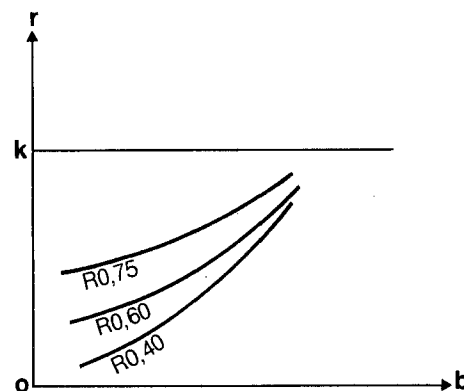
Only three values of r and b are given in the table but there are of course an infinite number of r and b combinations that are consistent with a price of R1,80. Similarly there are an infinite number of r and b combinations that are consistent with other prices – say R1,50 and R2,00. The locus of all points for any combination of r and b that is consistent with a price can be plotted to give an iso-price curve, since the price is the same at all points on the curve – hence three iso-price curves where r > k:

Diagram 1



if k > r then three iso-price curves would be as follows:

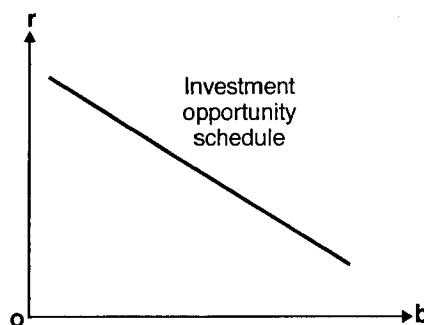
Diagram 2



These curves are perfectly logical. Looking at diagram 1, for any given value of r the price of a security will rise as the value of b increases and, for any given value of b, the price of a security will rise as the value of r increases. This is logical. If shareholders demand a return of k and if the company can earn a return on their investment such that r > k, shareholders are better off if the firm retains its earnings than if it distributes them. Similarly, for any given retention rate policy, that is for any given value of b, shareholders are prepared to pay more for the shares that can earn a higher return.

As Lerner points out the problem of selecting an r, b combination is not as difficult as would appear, since in practice company investment opportunities are limited. The more a company exploits its opportunities, that is the more projects it adopts, the lower the average rate of return it will earn on its assets. The company faces a negative sloping investment-opportunity schedule (the M.E.C. schedule of Keynes). This can be shown as in diagram 3.

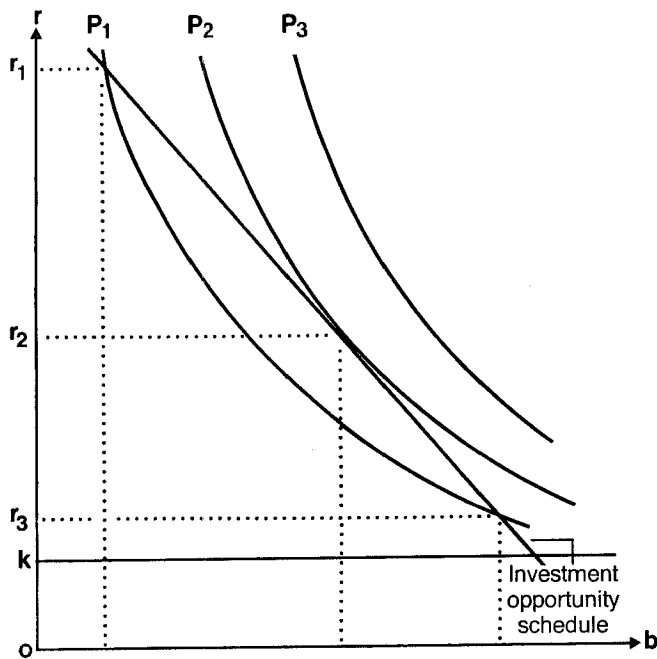
Diagram 3



A company can, over time, shift the investment opportunity schedule to the right by new technological developments, reductions in operating costs through new methods of production, etc.

The solution to the problem of what rate of return and retention rate a company should adopt if it wishes to maximise shareholders' wealth becomes clear if the iso-price lines are combined with the investment-opportunity schedule. In the following diagram a firm's investment opportunity schedule and a series of iso-price lines are brought together.

Diagram 4



The highest share price that can be obtained is represented by the iso-price line which is tangential to the investment opportunity schedule and accordingly at that point the optimum rate of return and retention rate are determined by reference to the points on the respective axes.

In diagram 4 the highest share price that can be obtained is P₂, the price that is obtainable if the firm adopts a rate of return r₂ and a retention rate of b₂.

Similarly it can be shown how changes in k or shifts in the investment-opportunity schedule will indicate the optimum r, b combination so that P is maximised.

So far the discussion has been based on a simplified model which assumed no debt in the capital structure. If debt capital is incorporated the equations become a little more rigorous but the principles remain valid.

Using the symbols as set out in page 14 except that rate of return on assets is now defined as being earnings before interest and taxes (EBIT), g is the rate of growth in equity funds, i is the rate of interest on liabilities, L represents the total liabilities and since the accounting equation states assets is equal to the sum of equity and liabilities, E + L represents total assets.

With debt in the capital structure therefore:

$$\begin{aligned} \text{Earnings after} \\ \text{interest and taxes} &= (1-T)[r(L+E)-iL] \\ &= (1-T)[rE+L(r-i)] \\ &= (1-T)[r+(r-i)L/E]E \end{aligned} \quad (\text{Eq. 11})$$

and, with b the retention rate:

$$D = (1-T)(1-b)[r+(r-i)L/E]E \quad (\text{Eq. 12})$$

and the change in equity becomes:

$$\Delta E = b(1-T)[r+(r-i)L/E]E \quad (\text{Eq. 13})$$

and the growth rate in equity is:

$$g = \frac{\Delta E}{E} = b(1-T)[r+(r-i)L/E] \quad (\text{Eq. 14})$$

This last equation implies that as long as $r > i$, g will rise as L/E increases. However, as financial leverage increases, that is as L/E increases, so i is likely to increase because of the higher financial risk undertaken. Furthermore as L/E increases the firm's investment undertakings are likely to increase thus moving down its investment opportunity schedule and the average rate of return on investments will be dropping.

The normal growth equation:

$$P = \frac{D}{k-g} \quad (\text{Eq. 15})$$

is now translated into:

$$P = \frac{(1-T)(1-b)[r+(r-i)L/E]E}{k-(1-T)(b)[r+(r-i)L/E]} \quad (\text{Eq. 16})$$

by substituting equations 12 and 14 into equation 15.

Equation 16 is now the equivalent of the fundamental equation 10 when debt is introduced into the capital structure. But now there are not only two variables r and b which determine P but four – the other two being i, the interest rate and L/E the capital structure. However, these two additional variables in reality represent a single decision variable as the interest rate is likely to be determined by choice of the debt to equity ratio and this does assist the analyst.

These valuation and dividend models developed by Lerner are, it is submitted, conceptually satisfying and clearly set out the relationship between the variables and parameters of the model. In addition by introducing the functions of the investment opportunity schedule and available funds the problems faced by a company's financial manager are clearly specified.

8 CONCLUSION

There are numerous factors which affect the declaration of a dividend. The most important – that a dividend policy should be compatible with the objectives of the firm, is the subject of considerable controversy. The two schools of 'relevance' and 'irrelevance' of dividends on the value of shareholders' wealth depends ultimately upon the acceptance or rejection of the indifference thesis regarding the effect of debt finance on k, the cost of capital. This effect on k is the critical factor which differentiates the two approaches. It is submitted however that Lerner's model which has been described at some length strongly supports the 'relevance' approach. However, 'empirical' evidence – not scientifically substantiated – would indicate that there is support for a positive dividend policy, that psychological factors which cannot be quantified, must be considered.

ACKNOWLEDGEMENT

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A review of factors affecting the dividend policy of the firm

References

- 1 Lerner, Eugene M. *Managerial finance: a systems approach*. New York: Harcourt Brace, 1971.
- 2 Porterfield, James T. S. *Investment decisions and capital costs*. Englewood, Cliffs: Prentice-Hall, 1965, p. 97.
- 3 Solomon, Ezra. *The theory of financial management*. New York: Columbia University Press, 1963, p. 8-9.
- 4 Porterfield, *ibid*, p. 12.
- 5 Porterfield, *ibid*, p. 16.
- 6 Porterfield, *ibid*, p. 86.
- 7 Solomon, *op.cit*, p. 139.
- 8 Solomon, *op.cit*, p. 100.
- 9 Porterfield, *op.cit*, p. 89.
- 10 Robichek, Alexander A. (Ed.) *Financial research and management decisions*. New York: Wiley, 1967, p. 67.
- 11 Thomson, G. Clark and Walsh, Francis J. Companies stress dividend consistency as reprinted in *Financial Decision Making* edited by Edward J. Mock. Scranton, Pennsylvania: International Textbook Co., 1967, p. 688.
- 12 Thomson and Clark, *ibid*, p. 688.
- 13 Thomson and Clark, *ibid*, p. 691.
- 14 Thomson and Clark, *ibid*, p. 692.
- 15 Archer, Stephen H. and D'Ambrosio, Charles A. *Business finance – theory and management*. London: McMillan, 1972, p. 545.
- 16 Van Horne, James C. *Financial management and policy*. Englewood-Cliffs: Prentice-Hall, 1972, p. 241.
- 17 Van Horne, *ibid*, p. 245.
- 18 In South Africa there is no capital gains tax. Solomon's argument would therefore be even stronger in the South African context.
- 19 Solomon, *op.cit*, p. 139.
- 20 See Van Horne, *op.cit*, p. 234-244.
- 21 Walter's dividend decision rule is, of course, the familiar capital budgeting decision rule. If the return on an investment is less than the cost of capital, the cut-off rate, do not invest.
- 22 Modigliani, Francis and Miller, Merton H. Dividend policy, growth and the valuation of shares. *Journal of Business*, vol. 34 No. 4, as reprinted in *Foundation for financial management* edited by James C. van Horne. Homewood, Ill.: Irwin, 1966, p. 481-513.
- 23 Modigliani and Miller, *ibid*, p. 482-483.
- 24 Porterfield, *op.cit*, p. 102.
- 25 Modigliani, Francis and Miller, Merton H. The cost of capital, corporation finance and the theory of investment. *American Economic Review*, vol. 48, No. 3, as reprinted in *The theory of business finance* edited by Stephen H. Archer and Charles D'Ambrosio. New York: McMillan, 1970, p. 125-160.
- 26 Keane, Simon. Dividends and the resolution of uncertainty. *Journal of Business Finance and Accounting*, vol. 1, No. 3, 1974, p. 389-392.
- 27 Modigliani and Miller. Dividend policy, *op.cit*.
- 28 Gordon, Myron J. Optimal investment and financial policy. *The Journal of Finance*, vol. 18, No. 2, May 1963, p. 264-272.
- 29 Keane is writing in the United Kingdom and is referring to the London Stock Exchange. The requirements of The Johannesburg Stock Exchange are equally rigorous.
- 30 Porterfield, *op.cit*, p. 88.
- 31 Porterfield, *op.cit*, p. 88.
- 32 Lerner, *op.cit*, p. 362-378.
- 33 The values are found as follows:

multiply both sides by the denominator, i.e. $0,10 - (0,6)rb$

$$\begin{aligned} 0,18 - 1,08rb &= 0,6r - 0,6rb \\ 0,18 - 0,48rb &= 0,6r \\ 0,18 &= 0,6r + 0,48rb \\ 0,18 &= r(0,6 + 0,48b) \\ r &= \frac{0,18}{0,6(1 + 0,8b)} \end{aligned}$$

setting b arbitrarily at 0,25 then:

$$\begin{aligned} r &= \frac{0,18}{0,6(1,2)} \\ &= \frac{0,18}{0,72} \\ &= \underline{0,25} \end{aligned}$$

or conversely: $0,48rb = 0,18 - 0,6r$

$$\begin{aligned} b &= \frac{0,18 - 0,6r}{0,48r} \\ b &= \frac{0,03 - 0,1r}{0,08r} \end{aligned}$$

and setting r (arbitrarily) at 0,25

$$\begin{aligned} b &= \frac{0,03 - 0,025}{0,02} \\ &= \frac{0,005}{0,02} \\ &= \underline{0,25} \end{aligned}$$

$$\text{re-write equation 10: } R1,80 = \frac{(0,6)(1-b)r \ 1\ 000/1\ 000}{0,10 - (0,6)rb}$$

100000 x
1075 =
10750.0000 *

10750.0000 :
365 x
90 =
2650.6849 *

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Strategic considerations for investment decision-making

Bankers are finding it increasingly difficult to evaluate loan requests. Investors face similar difficulties in deciding between alternative investment opportunities. The basic cause of these difficulties stems from the fact that the tried and trusted financial investment analysis methods are being used when these methods are no longer suitable for the task at hand.

The loan or investment decision maker, in using the traditional balance sheet, profit and loss account analyses methods, is committing the fundamental error of applying outdated techniques in a situation which requires a more sophisticated approach. The analyst, using the traditional methods, is persistently employing three fallacies in tandem, that when taken together, and without the assistance of a more rigorous approach, can lead to bad judgement and financial loss.

FALLACY NUMBER ONE

The first fallacy is the belief that the balance sheets of a company are a reliable measure of the company's situation. This may have been true in the past, but the inflationary conditions that have prevailed in recent years and which are likely to continue, have made a mockery out of the balance sheet. For example:

- 1 Assets are usually entered at historical cost and not at replacement cost.
- 2 The balance sheet does not provide any idea of the economic environment and outlook that faces that particular industry.
- 3 No measure of the key corporate asset of 'management ability and depth' is provided and many other weaknesses exist.

FALLACY NUMBER TWO

The profit and loss statement is a good indicator of financial strength. This is not true. There is almost no correlation between profits and cash. Making profits and having money in the bank are two very different things. The profit (or loss) account also has certain important weaknesses:

- 1 Are the stock figures which are used to calculate gross profits accurate? In many cases those stock figures are distorted.
- 2 The depreciation figure, especially in a period of inflation, is almost always inadequate.
- 3 Other problems regarding the allocation of expenses and write off of assets can also complicate the analysis.

FALLACY NUMBER THREE

Ratio analysis is able to reveal a company's strengths and weaknesses. The ratios are only able to tell a very

small part of the story, as these ratios are based on the profit and loss statement and balance sheet which have numerous deficiencies as discussed above.

Much of the difficulty associated with the use of the financial statements as tools to assist in the managerial decision-making process, stems from the fact that the accounts are embedded in the past. Managers, shareholders and financiers cannot use reports of past profits or losses and asset values as the only input for decision-making. Their requirements must be future orientated. The information provided by financial statements is not what is needed to make sound managerial decisions.

Discussions with bank managers has revealed that they are expected to make loan decisions based on balance sheets that are 'on average' six months old and often only become available one year after financial year end! This information is limited and may be useless from a decision-making point of view.

These facts are best illustrated by an example. In March 1969, the Penn Central Railroad Company reported a profit of \$4,4 million. On 19 June 1969, less than three months later, the company sued for bankruptcy. The 'numbers' were recalculated and the actual loss was estimated to be as high as \$120 million. A 'turnaround' of some \$125 million! Another interesting aspect of this corporate disaster is the fact that the accounting procedures adopted were perfectly legal yet the actual vs reported profit and loss figures differed by some \$125 million. Loving puts the point neatly when he states that "thanks to some unique bookkeeping, the parent Penn Central Company was able to report remarkable profits, figures that lulled creditors, shareholders, directors and managers. Many of the bookkeeping techniques conform to what the auditing fraternity calls accepted principles of accounting."¹ The Penn Central financial statement were obviously of limited assistance to the investor or lender.

How then can financial decisions be made more reliable? The answer to the problem revolves around the identification of a firm's situation with respect to the economic environment, the competitive climate, the firm's relative strength vis-à-vis its weaknesses and any threats or problems which it may encounter.

The objective of this article is to provide a framework for strategic analysis which can be used by the decision-maker to assist in the evaluation process. Obviously, the financial strength of the firm must be measured in some way, but the analyst must be aware of the inherent weaknesses of the financial accounts and the 'illusion of accuracy' that the generally accepted accounting principles impart to those statements and to any subsequent analysis of those statements.

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THE CONCEPTS OF STRATEGY AND STRATEGIC POSTURE

The strategy of the firm could be described as the way that the firm intends developing itself over the long term. Strategy has been defined as "the determination of the basic long term goals and objectives of an enterprise, the adoption of courses of action and the allocation of the resources necessary for carrying out these goals."²

These goals, the courses of action adopted and the direction in which the firm expends its efforts, will in the final analysis determine the survival capacity and the success of that firm. The performance of the firm is dependant on how the business is managed and organised and the 'kind' of markets in which it operates. The profit (or loss) figures and balance sheet data will be a result of these actions. Thus the lender/investor must make some attempt to analyse the strategy of the firm because the strategy employed will be the final determinant of the success or failure of that firm.

The strategic posture of the firm is the relationship between the firm and the environment. Certain firms will be able to take advantage of certain opportunities in an environment while another firm in the same environment will face a threat. The strength/weakness/opportunity/problem/threat configuration that the company faces determines that firm's 'posture'.

COMPONENTS OF STRATEGY

The environment that each firm faces is changing very rapidly. Technological advances, rapid consumer taste changes, political, social, legal and economic conditions all combine to exert pressure on the firm. It is the task of management to translate corporate abilities and functions into a system that will enable the firm to adapt to environmental changes.

Katz has identified seven strategic policy variables which taken together produce strategy and overall posture.³

The variables are :

- 1 Product policy – which products will the firm produce.
- 2 Customer policy – which customers have the greatest need for these products? What is the target market?
- 3 Distribution and promotional policy – how will the firm inform these customers that it is producing these products and how will it reach the customer with the product?
- 4 Pricing policy – what price should be charged?
- 5 Competitive advantage – what aspect of the firm's product will be emphasised to appeal to the target market?
- 6 Investment policy – where should funds be spent? Improving existing products, developing new products or diversifying?
- 7 Financing policy – where will the funds required to achieve objectives be obtained? Profits, loans, new equity capital?

Analysis of these strategic components will determine such aspects as :

- 1 The size of the market available to the firm and overall profitability.
(Products that can and will be produced, features that can and should be stressed will determine the market size and growth rate, the segment(s)

catered for and who the competitors will be. Promotional and distribution requirements can be assessed. The prices that can be charged and profits and returns can be estimated.)

- 2 The resources required to exploit the market opportunities that can be identified.

(If the market is expected to produce growth of say 20 per cent per annum in sales, what will financing needs be? When will new plant be needed? What additional investment will be needed in debtors, stocks and raw materials. Are there sufficient experienced managers available to produce this growth?)

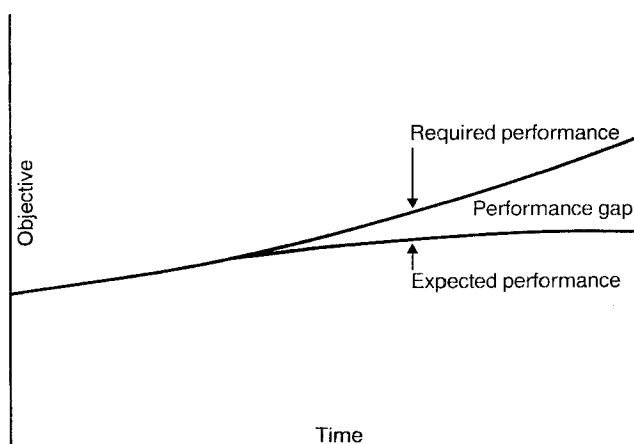
- 3 The corporate cash flow profile.

(Investors and bankers are becoming increasingly aware of the fact that cash flow is the critical determinant of corporate solvency and not profits as reported in the profit and loss statement. Cash inflows and outflows can only be calculated once detailed marketing and capital expenditure plans have been completed. Cash peaks and troughs can be reasonably accurately estimated at this stage. Management should be able to provide plans which reveal how the company intends to develop and grow in terms of products, markets, capacities and how these developments are to be financed. The expected return and repayment of the capital invested will depend on how management intend overcoming these problems. Unless the investor/lender knows the answer to these questions he will be unable to assess the risks involved in the decision.)

The analysis of the firm's plans should not be limited to the short term but should also be extended into the medium and long term. Management's objectives should be compared with expected performance over a three to five year period. This relationship is shown in Figure 1.

The 'expected performance' curve is the extrapolation of current performance under the assumption that no changes are made to the current strategic posture. This forecast will generally show a curve which falls off the further the projection is made into the future. Most products have a 'life' of between five to twenty years depending on how 'product' is defined.

Figure 1 : Gap analysis



The 'required performance' curve, on the other hand, is a compounded extrapolation of management's growth objective, however this is defined. If sales revenue is the objective, and management believes that sales will rise at a compounded rate of 15 per cent per annum this curve can be plotted after being adjusted for price increases. Management are often surprised at the magnitude of the 'gap' that is revealed between objectives and expected performance.

The question that must now be posed is: "How will this gap be filled?" Management's reply is often – 'new products' ! This seemingly simple answer to the question is, however, very much more complicated. The lender/investor should then expect answers to such questions as:

- 1 Which new products ?
- 2 Which markets will need these products ?
- 3 What is the growth rate of these markets ?
- 4 How will existing competitors react to entry ?
- 5 What reason (competitive advantage) will you be able to provide that will justify a customer's switch to the new products ?
- 6 What production/plant facilities are required ?
- 7 How will the products be marketed? With an existing or a new sales force ?
- 8 What additional investment in working capital and fixed assets will be required over the next few years to back the expected sales growth ?
- 9 Where will these funds be obtained? Additional debt? Retained earnings? New share capital ?
- 10 What effect will these activities have on cash flows ?

The lender/investor in many cases may not expect precise answers to such questions but will no doubt expect that the management have at least considered these problems. If these questions have not been considered and possible alternative solutions have not been identified and evaluated, this will suggest that management are not planning the future of the firm – and if they are not planning the future direction and needs of the firm the possibility of an investment being sound, or the obtaining of interest and loan repayments, are remote and risky.

Failure to answer the above questions is not confined to small companies. Large companies, with their so-called sophisticated management teams and techniques have made what appear in hindsight, to be elementary mistakes.

The much publicised withdrawal of RCA from the mainframe computer market is a good example of the failure to assess the impact of a new product on corporate profitability and cash flows. In 1970 RCA management concluded that they would expand their market share in mainframe computers from 3,2% to 10% by the mid-1970's.⁴ At this time it was estimated that IBM, the leading manufacturer, held a 69% market share. RCA thus adopted a market-share building strategy. Analysis of the computer industry shows that this industry is very capital intensive with roughly \$1,2 of assets being required to finance \$1,00 of sales.⁵ Industry sales projections and projectors of RCA's market share improvement and capital requirements for this company division are shown in Table I.

Table I: Computer industry and RCA share projections 1969 – 1974
(Dollar figures in millions)

Year	Projected industry sales	% RCA share	Capital required by RCA	Increased capital required
1969	\$7 170	3,2	\$276	\$0
1970	7 720	4,0	371	95
1971	8 940	5,0	536	165
1972	10 300	6,3	778	242
1973	11 800	8,0	1 135	357
1974	13 400	10,0	1 610	475

Source: W. Fruhan. *op.cit.* Page 102.

From Table I, the increased capital required to fund the projected sales growth using the 1,2:1 asset/sales ratio are seen to be enormous. In one year, 1970, the increased capital required is estimated at \$95 million. What must seem an obvious question must now be posed: "Where will these funds come from?"

Table II is a summary of the capital generation ability of RCA in 1969. The table shows that in 1970, the computer division would absorb some 80% of RCA's 1969 generated capital. Yet this division accounted for only 7% of RCA revenues in 1969. Obviously, RCA would be hard pressed to allow a division accounting for some 7% of sales to absorb 80% of funds available.

Table II: RCA's capital generation – 1969
(figures in millions)

Profit after tax	\$151
Dividends	68
Retained earnings	83
Debt/equity ratio	0,45
Thus: new debt available	37
Total capital generated	\$120

Source: W. Fruhan. *op.cit.* Page 102.

The computer division was closed a few years later. Clearly the basic strategy was unsound due to the inability of the company to generate capital. Analysis of historical financial statements would not have improved the investment decision. An analysis of marketing strategy and corporate financial capability would have improved the decision. The basic questions posed earlier were not asked by RCA management.

CONTINGENCY PLANNING AND THE CASH FLOW PROFILE

The lending/investment decision maker should not be naive concerning the effects of rapid growth or slump conditions on the security of his investment. Too rapid a growth rate generally requires increased investment to fund the growth in debtors, inventory and other assets which accompanies sales growth. The rapid-growth firm is invariably 'cash hungry'. Too often these firms experience cash difficulties, not because they borrow too much, but because they do not borrow or attract share capital in sufficient amounts to perform the tasks necessary for success.

A sudden slump in market demand can be disastrous to a firm with a heavy fixed cost burden as a result of high

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operational leverage. In many cases a sales drop of 10 per cent means that the firm is operating at below break-even. Thus the decision maker should also expect some form of contingency plan, which will show the likely impact on the cash position in the event of actual performance being above or below forecasted performance. The sensitivity of the cash position of the firm to performance variations are of vital concern to the decision maker. The analysis of the 'cash cushion' at different levels of performance will be of considerable assistance in evaluating the risk associated with the decision.

SUMMARY

One of the most significant changes in investment decision-making over the past few years has been the drift away from the analysis of the financial statements as the key criteria. Recently the emphasis has been shifted to that of the cash position of the firm. This move, although in the correct direction, is not sufficient. With a rapidly changing and hostile environment, the analysis must be more penetrating to be of any real assistance. By stopping the analysis at the 'projected' cash position the decision maker is examining the 'symptoms' and is not getting to the 'causes' of the situation. What is expected to generate those cash flows is the crucial aspect that must be examined.

The strategy to be employed is the 'name of the game'. The soundness of an investment, the security of a loan and the cash flows of the firm, all depend on what the firm wants to do, what it must do to survive, what it can

do, and what it will do. The historical financial statements should be seen for what they are – outdated, inaccurate and often misleading scorecards.

The firm's ability to survive and prosper will depend on how well it is able to adapt to environmental conditions and how effectively it is able to satisfy segments or markets. To provide for sound investment, this ability to develop must be a part of conscious attempts by management to control the destiny of the firm and to guide the company along a path which takes advantage of strengths, overcomes weaknesses and mitigates against threats. Investors and lenders should demand that management demonstrates that the firm has a sound strategy and that the posture of the firm is such that opportunities are exploited effectively. This approach by management will ensure that the firm does not merely react to a situation but rather adopts a purposive attitude and 'makes the future happen'.

References

- 1 Loving, R., 'Penn Central's Bankruptcy Express', *Fortune*, August 1970, p. 164.
- 2 Chandler, A., *Strategy and Structure*, The M.I.T. Press, Cambridge, Massachusetts, 1962, p. 13.
- 3 Katz, R., *Management of the Total Enterprise*, Prentice-Hall, Englewood Cliffs, New Jersey, 1970, pp. 52-56.
- 4 Smith, G., 'RCA Profits Tumble, Kodak sets mark', *The New York Times*, 15 October 1970.
- 5 Fruhan, W., 'Pyrrhic Victories in Fights for Market Share' *Harvard Business Review*, September-October 1972, pp. 100-107.

Investment decisions and financial management in an inflationary economy

INTRODUCTION

A high rate of inflation has become a prevalent phenomenon both in developing and developed countries. Many countries in today's world are paying the price of a double-digit inflation rate to maintain a relatively high level of employment and for more pronounced government involvement in the economy. Inflation has far reaching effects on many social, political and macro-economic aspects of our lives. In this article the question of the real effects of inflation on investment decisions and on corporate financial management is raised.

Indeed, it is argued that inflation does have a real effect on investment decisions and on the day-to-day financing decisions of almost any firm.

In the second section of the article the issue of inflation and government involvement in the economy is briefly discussed. The real effect of inflation on investment decisions in different industries is analysed in section three. Tax policy and capital subsidies are examined in the fourth section. The fifth and concluding section deals with financing decisions and other implications of inflation on financial management.

INFLATION AND GOVERNMENT INVOLVEMENT IN THE ECONOMY

Sustained inflation, and particularly high inflation are dependent on government policy. Initial government intervention which causes inflation will in turn lead to greater involvement to compensate for the damage which resulted from the initial inflation.

Two types of inflation are discussed in the economic literature: 'demand-pull' inflation; and 'cost-push' inflation.

In the first type, the government steps in to finance a budget deficit either by 'printing money' or by expanding domestic credit. The increase in the money supply causes a rise in prices and triggers the inflationary process.

In the second instance, the inflationary process is spurred by a rise on the cost side of the economy, e.g. new taxes such as a general sales tax; an increase in wages and salaries; or an exogenous increase in the cost of imported goods such as oil. The continuation of this 'cost-push' inflation depends on government reaction to this initial rise in the cost of doing business. The inflation will persist if the government responds to pressure by increasing the money supply.

As indicated in the above examples, an increase in the money supply is a necessary condition for inflation. As the government, through its monetary authorities, is the only agency controlling credit and currency in circulation, it bears the ultimate responsibility for inflation.

The inflationary process affects the income distribution of consumers, industries, and firms alike. In an effort to seek compensation for any reduction in their real

income, both consumers and firms approach the government. In Israel, cost-of-living clauses in wage contracts as well as subsidised long-term development loans for industry are two examples of such compensatory arrangements. Obviously, general uniform compensatory arrangements create problems as they may overcompensate some economic units and undercompensate others. In this way, the government is increasingly drawn into involvement in the economy because of inflation.

THE REAL EFFECTS OF INFLATION AND INVESTMENT DECISIONS

The real effect of inflation on investment decisions in the corporate sector lies in the uneven distribution of changes in the input and output prices for a given rate of inflation. In other words, inflation is measured by an index; most often the Consumer Price Index (CPI), a weighted average of many items. Were all prices to change in a uniform fashion, the use of this general index would be appropriate. However, various industries and economic activities respond in different ways to the same change in the money supply. What is relevant for the investor and for the manager is to what extent output and input prices are affected by a given rate of change in the CPI, and what is even more important, how the ratio between output prices and input prices has changed as a result of inflation. This last ratio is the 'terms of trade' of the particular activity vis-à-vis the economy at large.

The extent to which the same rate of inflation affects different industries is illustrated in Table 1 below.

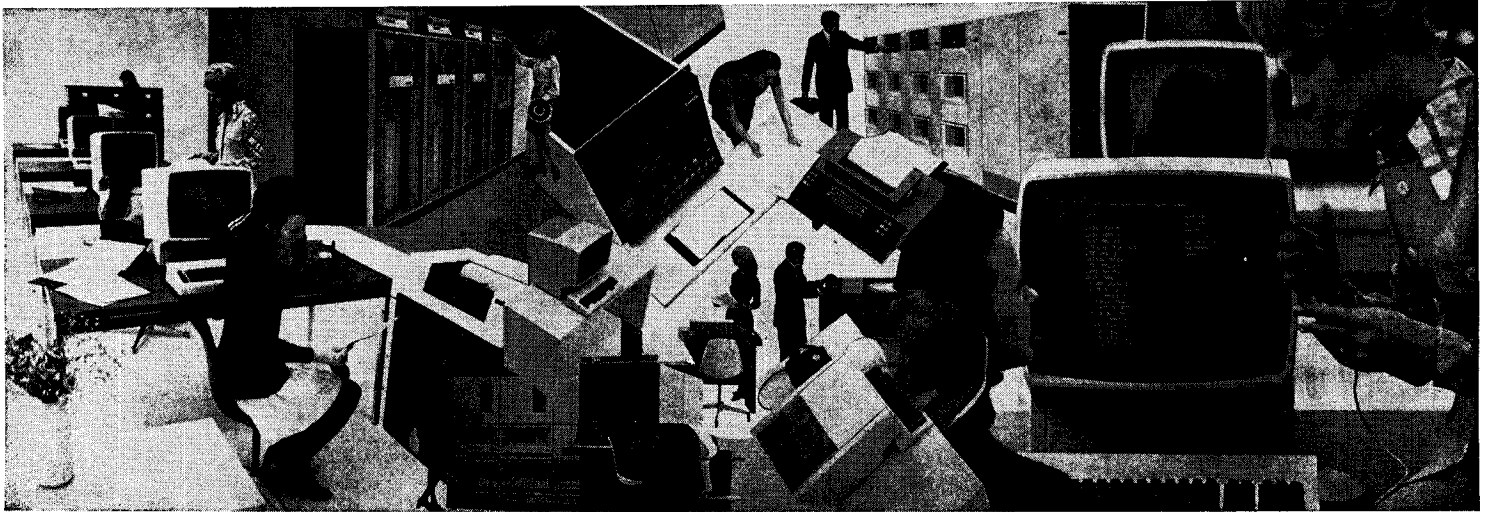
Table 1
Monthly changes in the price indices in Israel

February to March 1978
(% per month)

CPI	+3,7	Metal products	+1,5
Industrial WPI	+3,3	Minerals	+5,9
Chemicals	+5,0	Electric equipment	+4,2
Food	+0,8	Plastics	+5,0
Basic metal	+3,7	Building materials	+2,4

The change in the profitability of a given real investment as a result of inflation depends on the expected change in the 'terms of trade' of the activity. Those economic activities where the 'terms of trade' improve with inflation (i.e. the change in the prices of their inputs is smaller than the change in their output prices for the same change in the CPI), will be more profitable the higher the inflation. Those economic activities where the 'terms of trade' deteriorate with inflation will be less profitable.

*Senior Lecturer in International Finance, Tel Aviv University



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Thus, investment decisions and real profitability are not independent of the inflation rate. Moreover, as a high rate of inflation persists, it may affect the nature of investment as investors will be attracted to those investment projects where the 'terms of trade' improve with inflation.

TAX POLICY AND CAPITAL SUBSIDIES

In the previous section, the real effects of inflation on investment decisions were examined under conditions of no taxes and subsidies. However, governments do levy taxes and most do subsidise some industrial investment activities as well. In this section the combination of taxes, subsidies and inflation is discussed. Taxes are levied on the basis of historical cost and current income. In a state of high inflation, a substantial proportion of income is not real income, yet it is subject to tax. Given an inflation rate of 40% and a corporate tax rate of 65% (which are the current Israeli conditions), an all equity firm (i.e. an unlevered firm) must earn 114% per annum in order that its capital remain intact in real terms. The high rate of return required is a result of the following process: If the inflation rate is 40%, the firm must earn 40% in order to compensate the shareholders for the higher prices in the economy. The government, however, treats this compensatory income as regular, fully taxable income. Therefore, every pound of income before taxes is actually worth one pound minus the tax. In other words, the real rate of tax (adjusted to inflation) is higher than the nominal tax rate.

The relationship between the tax rate, the rate of inflation and the required rate of nominal return which yields a zero rate of real return is presented in Table 2 below.

Table 2
The relation between tax rate, the rate of inflation and the required zero return

Rate of inflation (%)	Tax rate (%)			
	40	50	60	65
10	17	20	25	28.5
20	33	40	50	57
30	50	60	75	85
40	67	80	100	114

One way to counteract this effect and to ensure a higher rate of return on the equity of the firm (ROE) is by using financial leverage. Financial leverage, or the introduction of borrowed capital to the firm, increases the return on equity because of the preferential tax treatment accorded to interest payments. Whereas dividends to shareholders are not considered an expense for tax purposes, interest payments to bondholders are deducted from taxable revenues of the firm. As a result, firms do tend to utilise debt, or use leverage. The extent of the leverage is an increasing function of the tax rate, and a decreasing function of the cost of bankruptcy. As was shown above inflation increases the real tax rate and thus, ceteris paribus, increases the use of financial leverage in the corporate sector.

In many countries, developed and developing alike, the government assists industrial enterprises by giving subsidised loans at nominally fixed interest rates. The

subsidy is created by fixing an interest rate below the expected rate of inflation. Thus the borrower receives a subsidy which is equal to the present value of the difference between the stream of his payments and the stream of payments calculated at the market rate of interest, a rate which reflects the expected rate of inflation.

These subsidies can be quite substantial. In Israel the government provides certain enterprises with up to 35 per cent of their fixed assets as a grant and an additional long-term loan on 40 per cent of their fixed assets at an interest rate of 22 per cent. (The current rate of inflation in Israel is about 40 per cent per annum.) Obviously once the loan is granted and the inflation rate rises, the subsidy is also increased.

The capital subsidy affects both investment and financing decisions. Given that the subsidy can be realised only by borrowing, it is not surprising to find that every enterprise attempts to maximise the subsidy by borrowing as much as possible from the government. What may be less apparent is the fact that the capital subsidy plus the tax policy tilts the risk structure making the investor less risk averse and penalising the successful entrepreneur. To illustrate this point, let us assume that two investors are initiating two identical enterprises. Given the capital subsidy, their equity position is smaller than what it would be without this policy. Let us assume further that one enterprise is a success and that the other one fails. The loss of equity for the bankrupt enterprise is smaller due to the capital subsidy. The loss will be smaller (and the subsidy larger) as the rate of inflation is higher. The successful enterprise will begin paying taxes which will increase with the rate of inflation. Thus it will 'repay' the government for the initial subsidy. Thus, inflation reduces both the relative cost of failure and the reward of success.

FINANCIAL MANAGEMENT AND INFLATION

One characteristic of a high inflationary period is the appearance of debt instruments with variable interest rates and variable payment schemes. In Israel there exist three main types of debt instruments:

- (a) Debt instruments denominated in nominally fixed interest rates (e.g. overdraft facilities, short-term commercial loans).
- (b) Debt instruments linked to the consumer price index (CPI) (e.g. most long-term 'free market' loans, mortgages).
- (c) Foreign currency debt instruments (denominated mostly in U.S. dollars).

The third type of debt instrument has attained popularity in Israel since the relaxation of exchange controls in October 1977.

The variety of denominations presents the financial manager with the problem of how to choose from among the different debt instruments. Which is riskier than the others? Should the debt portfolio of the firm include only one type of debt instrument or a composition of several debt instruments with different denominations?

Given the debt/equity ratio of the firm, it can be shown that the decision depends on two variables. The first one is e_1 = the expected cost, in terms of nominal currency, of the interest payments. This cost is function of

inflation, either directly or indirectly, through the change in the exchange rate. The second variable is c = the covariance between the operating income of the firm and the variable rates. The solution depends on market variable (e_1) and on firm specific variable (c). The general nature of the set of possible solutions is presented in Table 3 below.

Table 3
The composition of optimal debt portfolio under different assumptions with regard to e_1 and C

		$e_1 = 0$	$e_1 > 0$	$e_1 < 0$
$C \leq 0$		Nominally fixed debt	Nominally fixed debt	Mixed solution
$C > 0$	$\frac{C}{b^2} \geq L$	$X = \frac{L}{1}$	Mixed solution	$X = \frac{L}{1}$
	$C < L$	$X = \frac{C}{1 \cdot b^2}$	Mixed solution	Mixed solution

X_1 = the proportion of the variable debt in the total debt

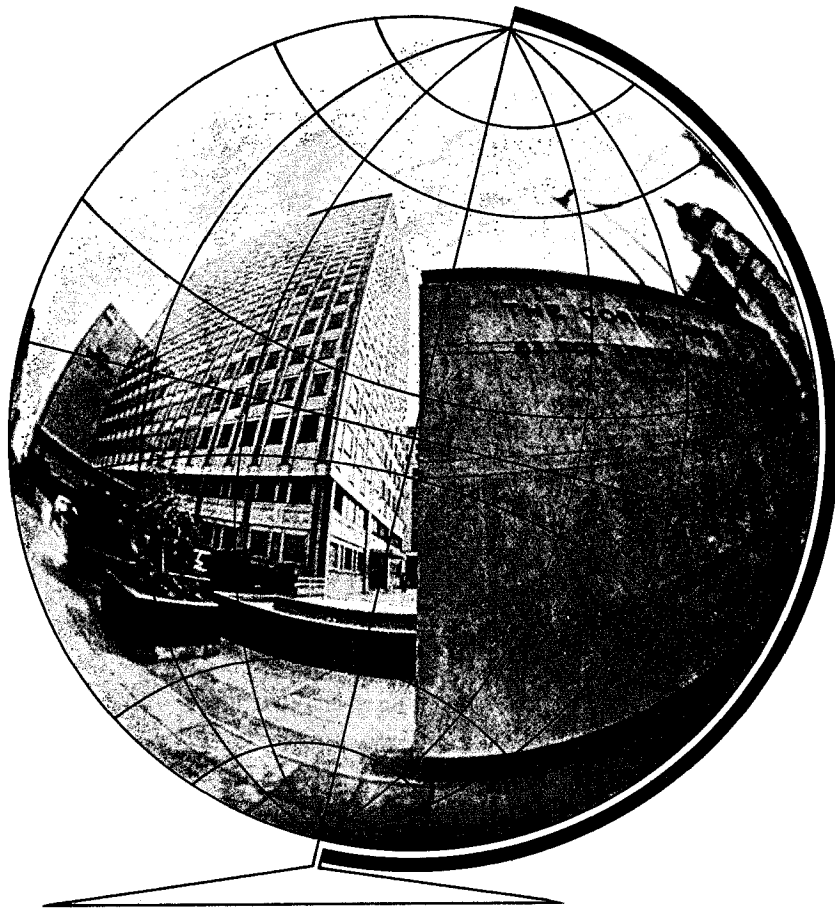
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Thin trading, market efficiency tests and The Johannesburg Stock Exchange: a rejoinder

ABSTRACT

Gilbertson and Roux's reply to criticism of their tests for efficiency on The Johannesburg Stock Exchange (JSE) contains little that is new, apart from a few contrived arguments. Gilbertson and Roux have made no more than a weak attempt to allow for the impact of thin trading and are claiming more for their tests than sober analysis would permit. At best, they have shown the Efficient Market Hypothesis to be consistent with approximately half of the JSE.

INTRODUCTION

In their response to my criticism of their tests for market efficiency on The Johannesburg Stock Exchange,^{1, 2, 3} Gilbertson and Roux attack several straw men and provide some misplaced instruction in elementary statistics. They do correspondingly little to correct the basic weakness in their earlier report. The same test data are discussed, with virtually no account taken of wide differences in share trading activity and statistical return behaviour.

Gilbertson and Roux claim to have provided "persuasive support for the view that the JSE is an efficient market". Unfortunately, as I pointed out in my earlier critique,² at least half the shares on the JSE are traded so infrequently, that important efficiency tests are rendered useless. More specifically, thin trading has three crucial statistical side effects:

- (i) leptokurtic, or highly peaked distributions of return which preclude the use of statistical tests designed for normally distributed data;
- (ii) discontinuities, or long interruptions in the time series of measured returns which severely restrict the reliability of risk coefficient estimates; and
- (iii) distortions in the measurement of portfolio returns which complicate the use of market indices and make risk adjusted performance appraisal virtually impossible.

This brief rejoinder elaborates somewhat further on the impact of these effects. It is shown that Gilbertson and Roux have made no more than a weak attempt to allow for thin trading and are claiming more for their tests than sober analysis would permit. Although there is evidence of efficiency in the high volume sector of the JSE, nothing can be said about the efficiency, or otherwise, of the low volume sector. At best, the Efficient Market Hypothesis (EMH) has been shown to be consistent with approximately half of the JSE.

IMPACT OF THIN TRADING

Distributions of returns are important because they determine the appropriate class of statistical tests. Most tests are designed for data which are normally distributed.

Since share returns tend to generate distributions which are more peaked than the normal distribution, special distribution functions (the stable Paretian, Student-t, Compound Normal) and tests are required, unless the deviation from normal can be shown to be insignificant. High volume JSE stocks have been shown,^{1, 4} to have return distributions which resemble those found on the larger New York and London exchanges. Thus, for these shares the same efficiency tests are appropriate.

But there is no evidence yet, that the return distributions of low volume JSE stocks are similar to those of the high volume stocks. In fact, the only available data⁵ suggests that thin trading may be associated with even more leptokurtic or peaked distributions. Depending on the extent of this deviation from normality, all performance appraisals based on linear regressions, for example, become almost meaningless in terms of statistical significance.

Rather than examine the impact of thin trading on statistical significance, Gilbertson and Roux attack a straw man. They make an obvious and redundant point about the lack of any *a priori* connection between a distribution type and random or non-random behaviour. What they completely ignore in this connection, is the data^{4, 5} suggesting that leptokurtic distributions on the JSE exhibit non-random substructure; the empirical return distributions can be subdivided into subperiods of homogeneous behaviour. It is this substructure and not the leptokurtosis per se which suggests non-random behaviour.

The second important side effect associated with thin trading is that of discontinuities in the time series of observed returns. Given the correlation,^{6, 7} between volume and discontinuous trading, this is a wide spread phenomenon on the JSE. Regression of a discontinuous series of measured returns from a low volume share against the continuous series of market returns, in order to estimate the beta risk coefficient, immediately generates problems. Two consequences are high standard errors on the beta coefficients and an empirical relationship between the betas and trading volume^{6, 7}. As Saloner put it: "fundamentally the much lower beta coefficients of the low traded shares are due in the first instance to a larger percentage of periods having zero returns . . . as a result of there being no trading during the month (false zeroes) . . ."

Apart from attacking another straw man, by invoking a spurious reference to Lawrence Fisher* and paraphrasing Myers, Gilbertson and Roux in their reply hardly acknowledge the extent to which discontinuous trading complicates risk adjusted performance appraisal. In a footnote they suggest that the problems can be overcome by measuring "the security return between

*Fisher⁹ in his discussion of market indices computed on the basis of arithmetic and geometric return averages, makes no mention of risk coefficient estimation or discontinuous trading.

adjacent trades (perhaps even periods of unequal lengths) and to regress these against market returns over the corresponding periods". Since changes in the interval over which returns are measured result in changes in beta estimates,⁸ the reliability of the procedure is highly questionable. The problem of beta distortion caused by discontinuous trading is not solved by merely replacing it with another type of distortion.** In the JSE example analysed by Saloner and Strebel,⁷ there were shares which exhibited as many as 40 false zeroes out of 90 monthly return measurements, that is, 40 months during which no trading occurred. The severity of the expected return distortion in such cases, combined with the number of shares on the JSE which exhibit discontinuities, also complicates the use of market indices. Since observed (ex post) returns are less relevant than expected (ex ante) returns upon which investors base their decisions, JSE market indices distorted by false zeroes are hardly representative of investor expectations about the market. These index distortions, in addition to those introduced into portfolio betas by the inclusion of low volume shares, are glibly ignored by Gilbertson and Roux.

JSE EFFICIENCY TESTS

With respect to the serial correlation and runs tests for non-random behaviour. Gilbertson and Roux introduce no separate data for thinly traded shares. The only thing of note in their response is yet another straw man which they create this time, in the form of runs tests carried out by Saloner and Strebel⁷ on 10 highly traded shares. They note as we did, that the data for highly traded shares are consistent with random behaviour. What they omit to mention are the results of our runs tests on 10 thinly traded shares which indicated significant non-random behaviour. Needless to say, the small sample sizes do not permit firm conclusions concerning the random or non-random behaviour of low volume shares.

As mentioned in my previous critique, the lack of a documented, successful trading rule on the JSE is the best available evidence consistent with the EMH. Since then, Gilbertson and Roux have also applied a single trading rule test to 14 of Saloner and Strebel's low volume shares. These performed "worse, if anything" than the same test on high volume shares. But, a single filter test on 14 of the more than 200 JSE shares which can be classified as thinly traded, is hardly conclusive. Even less convincing are Gilbertson and Roux's portfolio performance tests, which in effect are useless. Without an adequate correction for the beta distortion caused by discontinuous trading (section 2 above), risk adjusted performance appraisal of JSE mutual funds which include low volume shares, is meaningless. The problems of risk coefficient estimation are not limited to discontinuous trading however. Roll,¹¹ in a recent article, has questioned whether under the best of circumstances, the underlying capital asset pricing model (CAPM) is testable at all.

Gilbertson and Roux mention other less severe problems in connection with the CAPM. In this regard, they

present some typically contorted logic: "the point we wish to make is that the problem of the validity of the CAPM is common to both American and South African results. Thus, the South African findings should not be dismissed on these grounds alone". It is questionable whether U.S. researchers would be flattered by the notion that consistency with their results constitutes a reason for accepting Gilbertson and Roux's claims. It is certain that they could not support the Gilbertson and Roux logic. If the CAPM has problems, these undermine the validity of tests based on the CAPM, not only in the U.S., but in South Africa as well.

In summary, there is agreement that South African shares exhibit signs of non-random behaviour in their return series. However, it has yet to be shown that this behaviour can be profitably and consistently exploited. On the other hand, the Gilbertson and Roux mutual fund performance tests will remain irrelevant, until the distortions generated by discontinuous trading are removed. The distortions increase with thin trading and few separate tests have been performed on thinly traded shares. Gilbertson and Roux's claims with respect to the low volume half of the JSE, therefore, are hopelessly overstated.

References

- 1 Gilbertson, B. P. and Roux, F. J. P., "The Johannesburg Stock Exchange as an efficient market", *The Investment Analysts Journal* (S.A.), 9, March 1977, pp. 21-27.
- 2 Strebel, P. J., "The limited efficiency of The Johannesburg Stock Exchange", *The Investment Analysts Journal* (S.A.), 10, August 1977, pp. 15-20.
- 3 Gilbertson, B. P. and Roux, F. J. P., "Some further comments on The Johannesburg Stock Exchange as an efficient market", *The Investment Analysts Journal* (S.A.), 11, April 1978, pp. 21-30.
- 4 Schlosberg, H. H., "Distribution Models for Daily Log-price Relatives", University of the Witwatersrand, Graduate School of Business Administration, MBA Research Report, June 1976.
- 5 Ozen, M., "An Investigation into the 'Normal' Hypothesis for Log-price Relatives in Homogeneous Time Segments", University of the Witwatersrand, Graduate School of Business Administration, MBA Research Report, June 1977.
- 6 Saloner, G., "The Impact of Trading Volume on Share Price Volatility", University of the Witwatersrand, Graduate School of Business Administration, MBA Research Report, June 1977.
- 7 Saloner, G. and Strebel, P. J., "Low Trading Volume, Systematic Risk Measurement and Market-Efficiency", unpublished working paper, June 1977.
- 8 Pogue, G. A. and Solnik, B., "The Market Model applied to European Common Stocks: An Empirical Approach", *Journal of Financial and Quantitative Analysis*, Vol. 9, December 1974, pp. 917-944.
- 9 Fisher, L., "Same New Stock Market Indices", *Journal of Business*, Vol. 39, January 1966, pp. 191-225.
- 10 Scholes, M. and Williams, J., "Estimating Betas from Daily Data", unpublished manuscript, University of Chicago, September 1976.
- 11 Roll, R., "Critique of Asset Pricing Theory Tests: Past and Potential Testability of Theory", *Journal of Financial Economics*, Vol. 4, No. 2, 1977, pp. 129-176.

**When the return interval is reduced from a month to a single day, discontinuous trading becomes a problem even on the New York Stock Exchange. Myron Scholes¹⁰ has recently devoted a substantial working paper to the theoretical and econometric ramifications of the problem.



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An econometric model for foreign exchange rate forecasting*

INTRODUCTION

The object of this article is to postulate and test a foreign exchange rate model. South African companies are becoming increasingly involved in foreign exchange dealing, and it is therefore felt that research in the area is both relevant and necessary. In evaluating this, as well as any other econometric model, the limitations of the resulting forecasts must be kept in mind: the forecast is a statement of the future based purely on the momentum of past time series, and is useful and valid to the extent that the future is a reflection of the past.

CHOICE OF INDEPENDENT VARIABLES

A fundamental requirement of any model is that a strong *a priori* relationship, based on general economic theory, exists between the dependent and independent variables used in the model.

The relationship between supply and demand is a focal point behind the choice of variables. The rate of exchange "fluctuates continuously with every variation in the relationship between the current supply of and demand for the currency, and all factors which go to make up and affect current supply and demand are, consequently, of the first importance in considering movements in rates of exchange".¹ Accordingly, the choice of variables used in the model will be motivated in terms of this relationship.

1 Balance of payments (BOP)

A country running a BOP deficit will find its exchange rate under pressure to adjust downwards, as supply of its currency increases relative to demand. Conversely, a surplus on the BOP will lead to an upward pressure on the rate, as demand for the currency increases relative to supply.

2 Gold and foreign exchange reserves (GER)

When a country's BOP is in deficit, the GER will often be used to finance the deficit. Therefore, the running-down of the GER will be associated with a downward pressure on the exchange rate. Conversely, the building-up of the GER as a consequence of a BOP surplus, will be associated with an upward pressure on the rate.

Under the present exchange rate system, central banks tend to intervene in foreign exchange markets in an attempt to limit the movements of their exchange rates. Such action, which will be reflected in the GER, will affect the balance of the supply and demand for the currency, and will accordingly produce an exchange rate different from what it would have been without official intervention.

3 Employment index (EI)

This variable was included in the model for the following reasons: Firstly, an EI gives some indication of the level of capacity utilisation and economic activity in a particular country. These factors influence a country's BOP and, hence, affect the exchange rate. Secondly, in the current economic and political environment, an EI is a measure of confidence in the stability and potential of an economy. This can have a profound effect on an exchange rate, as foreign exchange markets will respond to changes in confidence.

4 Interest rates

Holders of investment funds will often move their funds from country to country to take advantage of differences in interest rates. The buying and selling of different currencies will therefore occur, and exchange rates will change in response to adjustments in the amounts supplied and demanded. For the purposes of this model, two interest rates have been used: the bank rate (BR) and the call rate (CL). The BR was selected because it tends to influence the general structure of interest rates in a particular economy. The CL, being a shorter term rate, was chosen for its volatility, which tends to attract speculative dealings in foreign exchange, as investors move in and out of currencies attempting to take advantage of interest rate differentials.

5 Prices

Differences in domestic price levels from country to country affect the price competitiveness of exports and imports. These price differentials will affect the flows of international trade, if we assume that demand is price elastic, and will thereby lead to changes in exchange rates. Both consumer (CPI) and wholesale (WPI) price indices have been included in the model. This is to ensure that the model exposes the exchange rate to the broadest possible inflationary influence.

6 Money and near-money supply (MNM)

The inclusion of this variable is in response to the monetarist view that the money supply is one of the most important determinants of the rate of inflation. Therefore, the line of causation is that a change in the MNM leads to a change in the inflation rate, resulting in an adjustment to the exchange rate.

METHODOLOGY AND TERMINOLOGY

(a) The model was constructed using the currencies of five of South Africa's major trading partners,

* Paper based on a MBA research report, Graduate School of Business Administration, University of the Witwatersrand, Johannesburg 1977

which float in terms of the rand. The currencies selected were the Japanese yen, French franc, British pound, German mark and Swiss franc. The U.S. dollar had to be excluded from the analysis in view of the fixed but adjustable exchange rate maintained between the rand and the dollar.

- (b) Monthly data covering the period January 1973 to March 1977 were collected for the variables used in the model. The data for the Japanese yen covering the period January 1973 to December 1976, the French franc, January 1973 to August 1976, the British pound, German mark and Swiss franc, January 1973 to November 1976, were initially run through the Multiple Regression sub-programme of the Statistical Package for the Social Sciences. It was felt that these data covered a sufficiently long time period to be used as a basis for the model.²

Successive runs using various time lags were undertaken. For example, a two month lag is one in which the values of the independent variables at the end of month one are used to predict the value of the dependent variable, the exchange rate, at the end of month three.

The lag yielding the highest multiple correlation coefficient (R) was selected for use in the model. This criterion was used, as R² measures the proportion of the variability in the dependent variable that is attributable to the combined linear influence of the independent variables.

- (c) The sub-programme generated an equation which best fitted the dependent and independent variables used in the model. The general form of the multiple regression equation is:

$$Y^1 = A + B_1 X_1 + B_2 X_2 + B_3 X_3 \dots + B_k X_k$$

where Y¹ represents the estimated value of the dependent variable;

A is the intercept on the Y-axis;

B₁ are the regression coefficients;

X₁ are the independent variables.

- (d) For a model to be of maximum benefit to a company, it should be continually updated as soon as new data become available. This is a simple procedure which merely involves adding an extra set of variables to the existing data base, and then recalculating the relationship between the dependent and independent variables. The updating process unavoidably leads to changes in the regression coefficients, the multiple correlation coefficient and the intercept on the Y-axis. Nevertheless, this process is vital if the model is to remain valid over time. This follows from the fact that firstly, the more recent the data, the greater the confidence levels of the projections made by the model, and secondly, this process tests the stability of the relationships between the variables over time.

The updating process was tested for the Japanese yen, forecasts covering the period January 1977 to March 1977, the French franc, September 1976

to November 1976, the British pound, German mark and Swiss franc, December 1976 to February 1977.³

- (e) The estimated values of the exchange rate (Y¹) were calculated using the equations generated by the sub-programme.

The differences between Y¹ and the actual exchange rate (Y) is the residual (RL). RL gives an indication of the absolute error of the prediction. The percentage residual (%RL) was also calculated:

$$\%RL = \frac{RL \cdot 100}{Y}$$

The %RL provides a relative measure of the error of prediction.

- (f) Y¹ and Y were plotted graphically on a monthly basis from 1973 onwards.

RESULTS OF THE MODEL

1 Japanese yen

Optimal time lag: Three months

Basic run: Exchange rate =

$$\begin{aligned} & -520,17546 + 8,12138 EI + 7,59478 CL \\ & + 0,00316 GER - 2,31868 WPI + 9,63381 BR \\ & + 1,81115 CPI - 0,00470 BOP \end{aligned}$$

$$R = 0,94105; R^2 = 0,88557$$

Update run 1: Exchange rate =

$$\begin{aligned} & -520,53096 + 8,11831 EI + 7,53879 CL \\ & + 0,00318 GER - 2,31292 WPI + 9,71188 BR \\ & + 1,80855 CPI - 0,00443 BOP \end{aligned}$$

$$R = 0,94371; R^2 = 0,89059$$

Update run 2: Exchange rate =

$$\begin{aligned} & -515,72641 + 8,08182 EI + 7,61331 CL \\ & + 0,00316 GER - 2,30473 WPI + 9,59088 BR \\ & + 1,79523 CPI - 0,00463 BOP \end{aligned}$$

$$R = 0,94638; R^2 = 0,89563$$

Update run 3: Exchange rate =

$$\begin{aligned} & -452,34073 + 7,59234 EI + 6,78869 CL \\ & + 0,00307 GER - 2,13640 WPI + 10,47441 BR \\ & + 1,76249 CPI - 0,00031 MNM \end{aligned}$$

$$R = 0,94870; R^2 = 0,90004$$

Average RL = -1,7021

Standard deviation of RL = 13,9160

Average %RL = -0,5929

Standard deviation of %RL = 3,7526

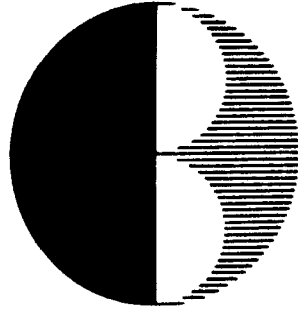
2 French franc

Optimal time lag: One month

Basic run: Exchange rate =

$$\begin{aligned} & 1,50544 + 0,10868 EI - 0,00026 GER \\ & - 0,06664 CPI - 0,00539 MNM + 0,01871 WPI \\ & + 0,03689 BOP - 0,03083 BR - 0,00054 CL \end{aligned}$$

$$R = 0,96173; R^2 = 0,92492$$



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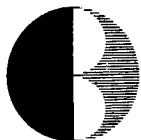
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Update run 1: Exchange rate =
 $1,72241 + 0,10461 \text{ EI} - 0,00025 \text{ GER}$
 $- 0,06560 \text{ CPI} + 0,00502 \text{ MNM} + 0,01973 \text{ WPI}$
 $+ 0,03713 \text{ BOP} - 0,02939 \text{ BR} - 0,00057 \text{ CL}$
 $R = 0,96156; R^2 = 0,92460$

Update run 2: Exchange rate =
 $1,23972 + 0,10959 \text{ EI} - 0,00025 \text{ GER}$
 $- 0,06468 \text{ CPI} + 0,00501 \text{ MNM} + 0,01894 \text{ WPI}$
 $+ 0,03264 \text{ BOP} - 0,02990 \text{ BR} - 0,00060 \text{ CL}$
 $R = 0,96210; R^2 = 0,92563$

Update run 3: Exchange rate =
 $0,43201 + 0,11824 \text{ EI} - 0,00026 \text{ GER}$
 $+ 0,00572 \text{ CPI} + 0,00477 \text{ MNM} + 0,01172 \text{ WPI}$
 $- 0,00088 \text{ CL} - 0,00408 \text{ BOP} - 0,01141 \text{ BR}$
 $R = 0,96148; R^2 = 0,92445$
 Average RL = $-0,0049$
 Standard deviation of RL = $0,1925$
 Average %RL = $-0,1574$
 Standard deviation of %RL = $3,2511$

3 British pound

Optimal time lag: Three months

Basic run: Exchange rate =
 $4,18753 - 0,04246 \text{ EI} + 0,00004 \text{ GER}$
 $+ 0,00787 \text{ BR} - 0,00186 \text{ WPI} + 0,00002 \text{ MNM}$
 $+ 0,01303 \text{ CL} + 0,00067 \text{ CPI} + 0,00001 \text{ BOP}$
 $R = 0,78102; R^2 = 0,60999$

Update run 1: Exchange rate =
 $3,92340 - 0,03975 \text{ EI} + 0,00004 \text{ GER}$
 $+ 0,00779 \text{ BR} - 0,00193 \text{ WPI} + 0,00002 \text{ MNM}$
 $+ 0,01197 \text{ CL} + 0,00082 \text{ CPI} + 0,00002 \text{ BOP}$
 $R = 0,78638; R^2 = 0,61839$

Update run 2: Exchange rate =
 $3,56649 - 0,03656 \text{ EI} + 0,00004 \text{ GER}$
 $+ 0,00592 \text{ BR} - 0,00205 \text{ WPI} + 0,00002 \text{ MNM}$
 $+ 0,01283 \text{ CL} + 0,00126 \text{ CPI} + 0,00002 \text{ BOP}$
 $R = 0,77596; R^2 = 0,60211$

Update run 3: Exchange rate =
 $2,86476 - 0,02775 \text{ EI} + 0,00004 \text{ GER}$
 $+ 0,00763 \text{ BR} - 0,00166 \text{ WPI} + 0,00002 \text{ MNM}$
 $- 0,00002 \text{ BOP} + 0,00081 \text{ CPI} + 0,00246 \text{ CL}$
 $R = 0,75129; R^2 = 0,56444$
 Average RL = $0,0361$
 Standard deviation of RL = $0,0341$
 Average %RL = $5,7609$
 Standard deviation of %RL = $5,1719$

4 German mark

Optimal time lag: Three months

Basic run: Exchange rate =
 $7,57321 + 0,01913 \text{ EI} + 0,00001 \text{ GER}$
 $+ 0,02026 \text{ BR} - 0,09494 \text{ CPI} + 0,03584$
 $+ 0,00271 \text{ MNM} - 0,01809 \text{ BOP} - 0,00046 \text{ CL}$
 $R = 0,92804; R^2 = 0,86125$

Update run 1: Exchange rate =
 $9,97332 - 0,00180 \text{ EI} - 0,00069 \text{ BOP}$
 $+ 0,00172 \text{ MNM} + 0,04136 \text{ BR} - 0,08864 \text{ CPI}$
 $+ 0,02915 \text{ WPI} - 0,00046 \text{ CL}$
 $R = 0,93106; R^2 = 0,86688$

Update run 2: Exchange rate =
 $11,97617 - 0,01745 \text{ EI} + 0,00135 \text{ MNM}$
 $+ 0,06391 \text{ BR} - 0,09133 \text{ CPI} + 0,02854 \text{ WPI}$
 $- 0,01048 \text{ BOP} - 0,00051 \text{ CL}$
 $R = 0,93445; R^2 = 0,87320$

Update run 3: Exchange rate =
 $12,34597 + 0,00108 \text{ MNM} + 0,06862 \text{ BR}$
 $- 0,08961 \text{ CPI} + 0,02757 \text{ WPI} - 0,02111 \text{ EI}$
 $- 0,01040 \text{ BOP} - 0,00050 \text{ CL}$
 $R = 0,93750; R^2 = 0,87891$
 Average RL = $-0,1219$
 Standard deviation of RL = $0,1498$
 Average %RL = $-3,7851$
 Standard deviation of %RL = $4,5516$

5 Swiss franc

Optimal time lag: Three months

Basic run: Exchange rate =
 $13,55610 - 0,01494 \text{ MNM} - 0,00052 \text{ BOP}$
 $- 0,02673 \text{ CPI} + 0,32837 \text{ CL} - 0,03453 \text{ WPI}$
 $+ 0,00002 \text{ GER} - 0,02052 \text{ EI}$
 $R = 0,95441; R^2 = 0,91090$

Update run 1: Exchange rate =
 $13,80933 - 0,01492 \text{ MNM} - 0,00048 \text{ BOP}$
 $- 0,02876 \text{ CPI} + 0,34503 \text{ CL} - 0,03439 \text{ WPI}$
 $- 0,02129 \text{ EI} + 0,00002 \text{ GER}$
 $R = 0,95621; R^2 = 0,91434$

Update run 2: Exchange rate =
 $13,75786 - 0,01483 \text{ MNM} - 0,00048 \text{ BOP}$
 $- 0,02861 \text{ CPI} + 0,34259 \text{ CL} - 0,03432 \text{ WPI}$
 $- 0,02106 \text{ EI} + 0,00002 \text{ GER}$
 $R = 0,95802; R^2 = 0,91781$

Update run 3: Exchange rate =
 $11,70469 + 0,00006 \text{ MNM} - 0,00038 \text{ BOP}$
 $- 0,03278 \text{ CPI} + 0,25586 \text{ CL} - 0,03464 \text{ WPI}$
 $+ 0,08625 \text{ BR} + 0,00001 \text{ GER} - 0,01245 \text{ EI}$
 $R = 0,95588; R^2 = 0,91370$
 Average RL = $-0,0012$
 Standard deviation of RL = $0,2010$
 Average %RL = $-0,5081$
 Standard deviation of %RL = $5,2549$

An econometric model for foreign exchange rate forecasting

Figure 1. Graph illustrating the actual and predicted exchange rates for the Japanese yen.

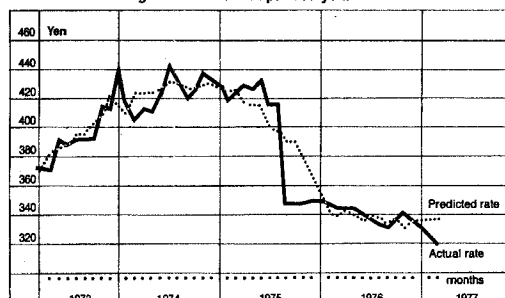


Figure 2. Graph illustrating the actual and predicted exchange rates for the French franc.

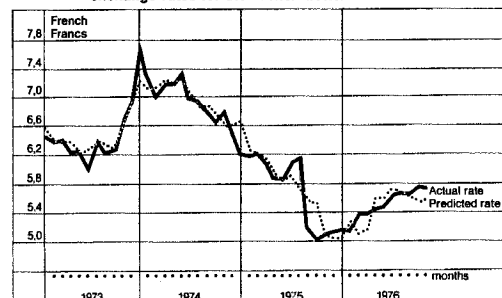


Figure 3. Graph illustrating the actual and predicted exchange rates for the British pound.

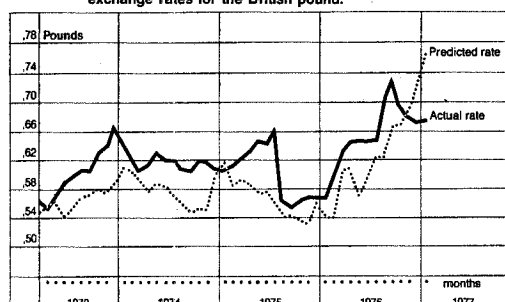


Figure 4. Graph illustrating the actual and predicted exchange rates for the German mark.

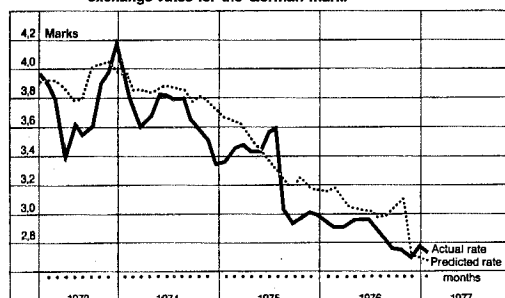
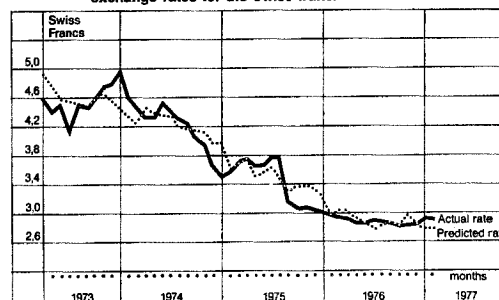


Figure 5. Graph illustrating the actual and predicted exchange rates for the Swiss franc.



EVALUATION OF THE MODEL

The empirical testing of the model has shown that it provides useful forecasting information. It will be noted that the multiple correlation coefficients varied from one currency to another. This obviously makes the model more accurate and therefore more relevant to certain currencies. Although the pound has statistically acceptable correlation coefficients, it is felt that the residuals are too large and erratic for practical use. The results of the other four currencies showed that the model managed to forecast their underlying trends extremely well, so providing useful information for foreign exchange management. At times, the forecast exchange rate was extremely close to the actual rate. However, the closeness of these forecasts are seen to be too erratic to be of great practical use, although they remain pertinent as a guiding factor in decision-making.

The results of the model show that the highest residuals were recorded in the few months following the devaluation of the rand in terms of the dollar in September 1975. This is to be expected, as the underlying determinants of the exchange rate movements for the five currencies used in the model do not influence the rate which is

maintained between the rand and the dollar. The updating process, illustrated in the application of the model, shows that in spite of some changes in the regression coefficients and the intercepts on the Y-axis, the multiple correlation coefficients were remarkably stable over time. If the model is to be valid and useful for foreign exchange management, the relationships postulated in it must be stable.

CONCLUSION

This article has covered the postulating and testing of an econometric model for foreign exchange rate forecasting. It is hoped that this research may provide a basis, a methodology and some insight for using a model in practical foreign exchange management.

Footnotes

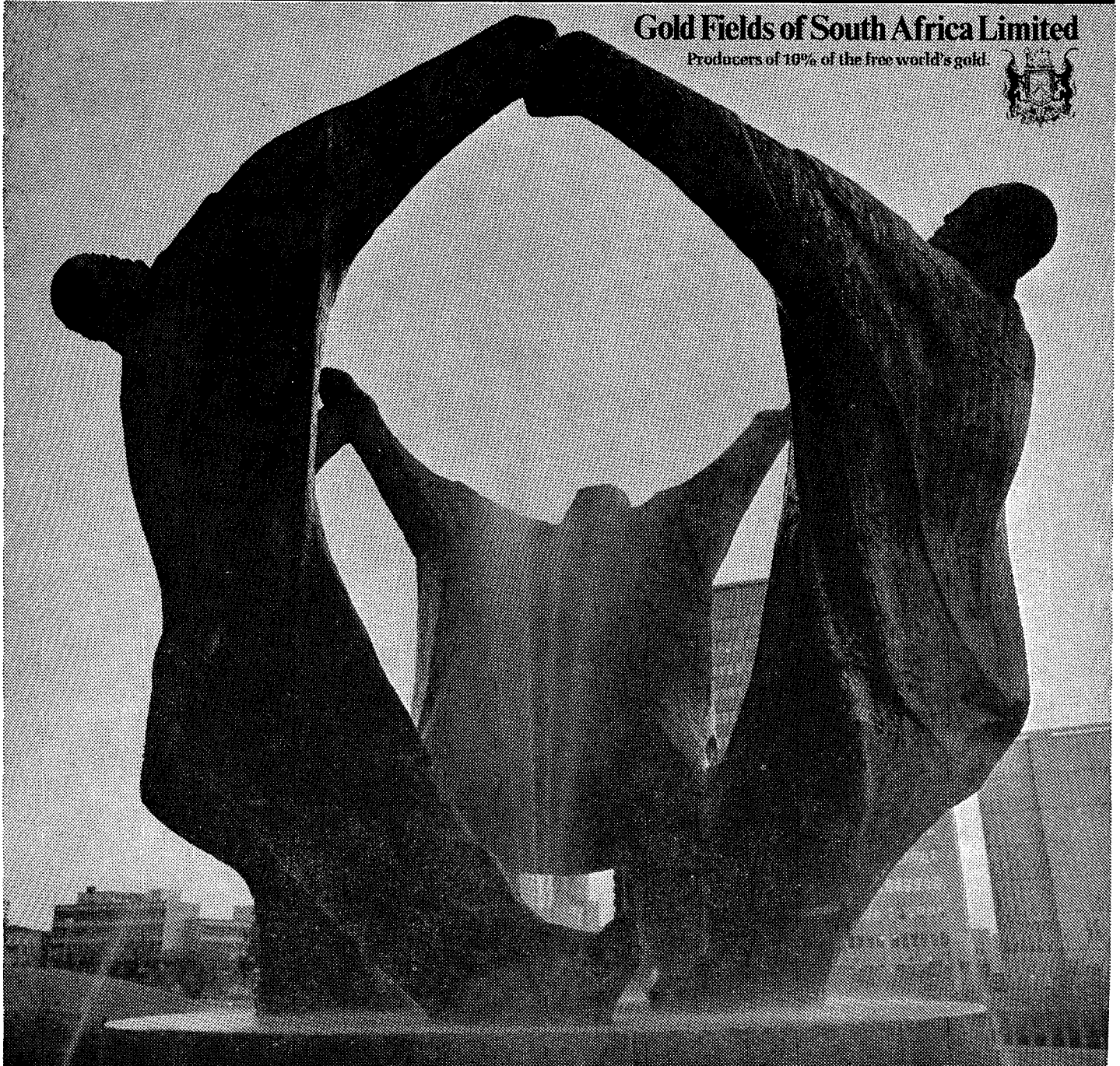
- 1 Evitt, H. E., *A Manual of Foreign Exchange*, p. 15.
- 2 The equations and correlation coefficients generated by these runs are grouped under the heading "Basic run" in section 4.
- 3 The equations and correlation coefficients generated by this process are grouped under the headings "Update run 1, 2 and 3" in section 4.

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Investment basics — III

EARNINGS PER SHARE AND P/E RATIOS

Joel Stern is emphatic "Earnings per share don't count". This is, of course, a minority view and investors around the world still rely heavily on EPS as a basis for investment decisions. However, as a result of accounting evolution, there are currently so many versions of EPS that its value, and that of the P/E ratio, is being undermined. The current situation is rather like the manager who is promised a bonus equal to x% of net profit: unless net profit is unambiguously defined, his bonus could have little or no value. Similarly, without clearly defining all aspects of EPS, it can prove misleading or even meaningless as an investment aid.

Before delving more deeply into the prevailing complications, let us examine the method of calculation and the rationale behind EPS. The definition of earnings per share in Statement 1.004 of Generally Accepted Accounting Practice is as follows:

"Earnings per share means the income in cents attributable to each equity share, based on the consolidated net income for the period, after tax, and after deducting outside shareholders' interests and preference dividends, but before extraordinary items, divided by the weighted average number of equity shares in issue and ranking for dividend in respect of the period."

Although the definition in GAAP 1.004 is largely self-explanatory, the following example should help clarify any obscure points:

Company A

Issued capital at 30th June 1978:

500 000 10% preference shares of R1 each
2 000 000 ordinary shares of 50 cents each

On 31st December 1977 the company issued by way of a 1 for 3 rights issue, 500 000 ordinary shares.

Calculation of earnings per share	R000's
Consolidated net income	2 000
Taxation	800
Group taxed profit	1 200
Minority interests therein	150
Net recurrent income	1 050
Extraordinary items – loss	200
Net income	850
Preference dividends	50
Attributable to ordinaries	800
<i>Weighted average shares in issue:</i>	<i>Number</i>
1st July 1977	1 500 000
Issued 31st Dec 500 000 x 6/12	250 000
Weighted average	1 750 000
Earnings per share (1 050 – 50) ÷ 1 750	57,1c

So much for the calculation – now for the rationale. There are three main reasons for calculating EPS:

- By converting attributable income to a per share basis, shareholders are readily able to assess the extent to which their dividends per share are covered by earnings (dividend cover is calculated by dividing the earnings per share by the dividend per share).
- The EPS calculation reduces corporate profit growth to a comparable basis by adjusting for increases in income which are occasioned purely by additional issues of shares (such as growth in income resulting from a share exchange merger or additional income which is generated by funds raised through a rights issue).

This is illustrated in the following example. Three companies each earned taxed profits of R1m in 1976 and R1,5m in 1977 – on the face of it a thoroughly comparable performance. However, Company A increased its capital by a heavy rights issue at the start of 1977, Company B acquired a competitor earning R200 000 in exchange for 250 000 new shares also at the beginning of the year, while Company C's capital was unchanged. Once this is taken into account it will become obvious that Company C was the best performer of the three as its growth was achieved without the injection of new capital. This is reduced to quantifiable proportions by the EPS calculation:

	Company A	Company B	Company C
1976 taxed profit	R1,0m	R1,0m	R1,0m
Shares in issue	2,0m	2,0m	2,0m
EPS	50c	50c	50c
1977 taxed profit	R1,5m	R1,5m	R1,5m
Shares in issue	2,5m	2,25m	2,0m
Weighted average	2,5m	2,125m	2,0m
EPS	60c	70,6c	75c
Growth	+20%*	+41%	+50%

If profit growth alone was compared, a wholly misleading impression of the three companies would be obtained. The EPS calculation is thus vital – if growth means anything to investors.

*This growth figure takes no account of any possible bonus element arising from a rights issue at less than full market price. GAAP 1.004 has avoided this question, stating that "... reliable calculation of such an element is normally impracticable. It should therefore be assumed that all such issues have been made at full market price."

(c) Earnings per share can be related to a share price to establish a price earnings ratio which facilitates comparisons between the values attributed to the listed shares of different companies. Without an EPS figure it would be difficult to assess whether a particular company's shares are cheaper than those of another company. The use of the P/E ratio is now widely accepted as an important means of comparing the market rating of one share with another.

The P/E ratio is simply the price of the share dividend by the historical earnings per share. While this is often referred to as the company's 'multiple' of the number of years earnings which the current price represents, it must be clear that this relates solely to the earnings of the preceding financial year. It does not purport to indicate the number of years it will take for the company's earnings to recoup the price paid for the shares. Clearly, if the company is in a growth phase and future earnings are expected to rise then a P/E ratio of, say, 5 does not mean it will take 5 years to recover the price paid – the actual period will be lower. On the other hand, if earnings are expected to fall, it will take longer than 5 years for the price to be recovered.

Companies with above-average growth potential will generally command higher P/E ratios than those with low growth prospects but many other factors also influence the share's multiple, such as its financial status, the marketability of the shares, stability of the industry, calibre of management, etc. The P/E ratio must, therefore, be understood for what it is. It should not be used mechanically, but purely as a reference point against which judgement can be made as to a share's value – either in absolute or relative terms.

In spite of their limitations, it is clear that both earnings per share and P/E ratios form a vital function in the investment process.

However, while the rationale behind EPS and P/E ratios is sound there are (as mentioned at the start of this article) a number of problems which have arisen and which are beginning to undermine their validity. About the price there can, of course, be no doubt and the principal area of uncertainty is the figure on which earnings per share is calculated. It is, paradoxically, the introduction of Generally Accepted Accounting Standards which is causing the confusion. During this important stage in the evolution of accounting, those responsible appear to favour a degree of flexibility which was certainly **not generally accepted before the standards were released**. This is having the effect of condoning a proliferation of different earnings per share almost to the point where (as one UK journal put it) companies are allowed to choose their own earnings per share figure.

There are two main areas of weakness. The first arises from GAAP 1.003 "Taxation in the Financial Statements of Companies". This South African Standard followed the example of UK Standard and required a charge to be raised in respect of deferred tax. This encountered a great deal of opposition from companies to the point where the UK accountants have now totally reversed their earlier recommendations. UK companies are now no longer required to provide for deferred tax if they can show that it is reasonably probable that they would not have to pay it in the foreseeable future. This is, of

course, very subjective as it relates to forecast capital expenditure in future years – a forecast made solely by the directors and subject to change from year to year. The EPS figure, thus, becomes largely a matter of choice and South Africa will surely follow the British example:

Another serious deficiency arises from the weak and imprecise definitions contained in GAAP 1.003 "Extraordinary Items and Prior Year Adjustments". In this standard, abnormal items and extraordinary items are differentiated. The former are included in earnings per share while the latter are excluded (see definition of earnings per share above). The definition of extraordinary items in 1.003 is:

"Extraordinary items, for the purposes of this statement, are those items of income and expense which derive from events or transactions outside the ordinary activities of the business and which are both material and expected not to occur frequently or regularly. They do not include items which, though abnormal in size and infrequent in occurrence (and which may, therefore, require separate disclosure), derive from the ordinary activities of the business."

Ordinary activities are not defined, and the examples of extraordinary items which are cited, in the Standard, are very limited:

- (i) The discontinuation of a significant part of a business.
- (ii) The expropriation of assets.
- (iii) Major losses for reasons such as earthquakes, hurricane, fire or flood.
- (iv) Writing-off intangibles including goodwill because of events or developments outside the ordinary activities of the business.

Abnormal items are not defined but three examples are provided:

- (i) Abnormal charges for bad debts and write-offs of stock and research and development expenditure.
- (ii) Abnormal provisions for losses on long term contracts.
- (iii) Most adjustments of prior year taxation provisions including adjustments of deferred taxation arising from changes in tax rates.

In practice it has become clear that both companies and their auditors are in a state of some confusion. There are examples of where the same item (profits/losses on the sale of subsidiaries have been treated **within the same audit firm** as extraordinary by one partner and abnormal by another – in both cases in respect of conglomerate companies. A sale of a factory is, in certain cases, treated as abnormal and in others as extraordinary. There are many similar examples and, without being too cynical, the debits are generally treated as extraordinary while the credits are considered abnormal.

Apart from the uncertainty caused by these two standards, the companies themselves have done much to reduce the comparability of earnings per share. There are those companies which provide special depreciation on the replacement value of assets or make other inflation accounting adjustments, there are those who have switched from a FIFO to a LIFO basis of stock valuation, there are those who have adopted a deferred

tax provision and there are those who have chosen to ignore it. There is the whole question of attributable earnings of associate companies and there is no consistency regarding the inclusion of earnings of overseas subsidiaries whether these are fully remittable or not.

Because of the great importance of EPS and P/E ratios to the investment decision, great care should be exercised in determining just what the correct and comparable earnings per share is for each company. The concept of EPS and the use of P/E ratios was never intended to be the whole answer and the dangers of

using one all embracing measurement of performance and price have been extensively canvassed elsewhere. Certainly, in future years increased attention will have to be paid by the investment community to other important considerations such as cash flow, current asset financing, fixed asset replacement provisions, gearing influences, etc. However, even when these are better understood and developed, the EPS concept will remain one of the most important of the various investment tools and it is critical that the accounting profession moves towards greater standardisation on this score.