The Investment Analysts Journal

Number 21 June 1983

Die Beleggings-Navorsers Tydskrif

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Contents

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Inhoud

This issue in brief

A theory of the financial rand discount

Although exchange control on non-residents has now been abolished, this article by Barr and Kantor serves a useful purpose in making clear the theoretical issues behind the operation of the financial rand system. Its interest may be principally for students of South African financial history but it will not be without value even to hardnosed traders in local financial markets for it contributes to an understanding of how such markets work and interrelate.

The efficient market hypothesis and a change to LIFO: An empirical study on the JSE

In an inflationary world, traditional accounting procedures can be misleading, particularly with regard to the estimation of distributable profit and this has given rise to the widespread adoption of the LIFO method of inventory valuation. Because LIFO understates the value of end-period stock levels it also understates earnings and so minimises the distortion caused by rising stock replacement costs. In this study by Knight and Affleck-Graves of the impact of LIFO reporting on the JSE, various aspects are considered. Its general conclusion is that LIFO effects are not generally efficiently reflected in JSE prices which suggests that inconsistencies in the market valuation process create investment opportunities that keen analysis can expose.

Dividend policy and practice in South Africa

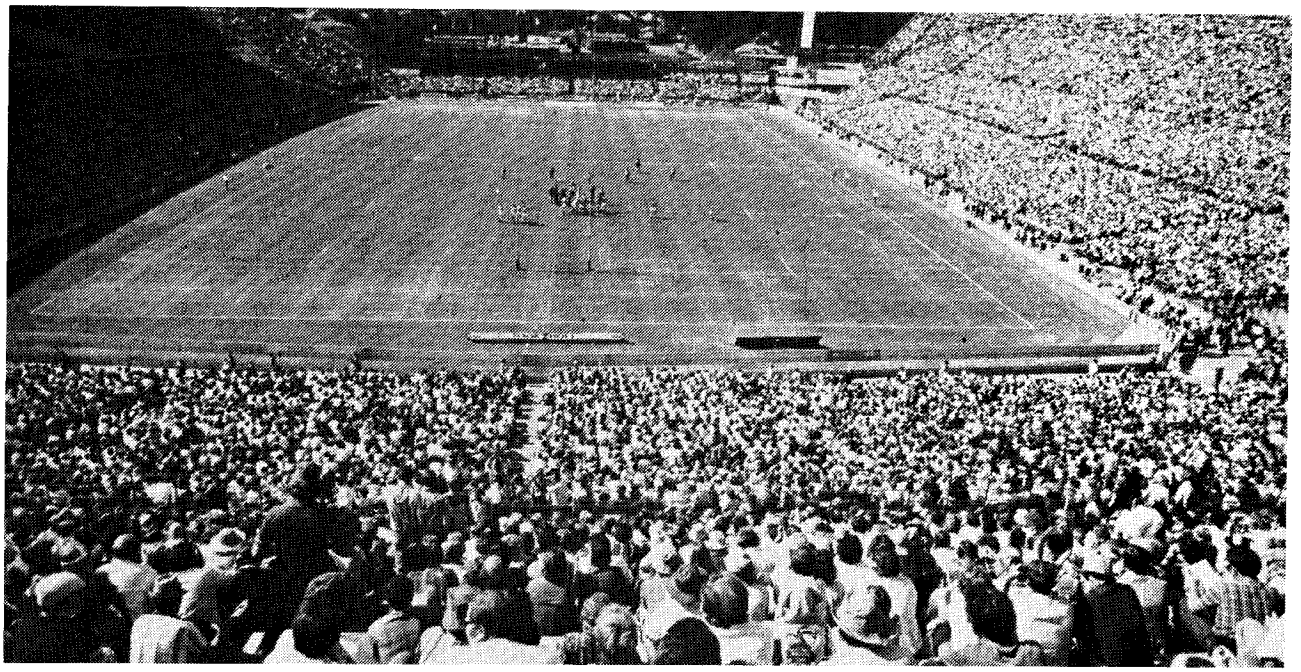
What determines the level of a company's dividend and what effect does dividend payout have on the valuation of a share? These are questions of fundamental importance to investment analysis and security valuation which continue to provoke controversy. This paper by Seneque and Gourley approaches the problem empirically and comes up with some interesting conclusions.

The valuation of take-overs by companies listed on The Johannesburg Stock Exchange

The second paper by Narendra Bhana, based on a recently completed Ph.D. thesis, deals with different methods used in South Africa by predator companies in the valuation of prospective acquirees. One of his findings is that technically sophisticated valuation procedures, such as DCF analysis, play only a small rôle and this heightens the risk of take-over failure. The small rôle could be explained by the strategic nature of the issues involved but a greater attention to likely future profitability seems to be called for.

An introduction to gold mining tax

This is the second article in a three-part series by Ian Davies in our investment basics section.



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Through the mattress on which you sleep; the fruit juice that you drink for breakfast and the clothes and shoes that you put on. The supermarket where you shop and your chair at home or work. The luggage that you take on your next trip and the hotel that you visit.

So next time you open a beer, drink to your shareholding in one of the most rewarding and responsible organisations in South Africa.

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The Investment Analysts Journal

Die Beleggingsnavorsers Tydskrif

Twenty-first issue

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Short-term developments in the balance of payments and in the domestic money market situation may have had an important bearing on the timing of the announcement, but it would have been short-sighted and irresponsible to have based a very important decision such as this one only on the situation of the day. A logical deduction could otherwise have been that South Africa would re-introduce exchange controls on non-residents as and when the short-term situation became adverse again. And this is surely not our intention. The abolition of the Financial Rand System is a permanent and non-reversible decision. We have no doubt that the more flexible monetary policy will enable us successfully to meet the balance of payments problems of the future.

Dr Chris Stals
Senior Deputy Governor of the SA Reserve Bank

21 April 1983

The removal of exchange control in respect of non-residents in February was an important step towards the establishment in South Africa of an efficient foreign exchange market. By definition, an efficient financial market is one which promotes the best use of real resources in an economy, so the step, presumably, is one greatly to be welcomed. Who, after all, can be against efficiency and, thus, in favour of waste? Yet the full implications of efficient financial markets may not be realised by either politicians or members of the business community. Being for efficiency may well mean being for a system that is inimical to the retention of old attitudes and to practices to which many in South Africa remain strongly wedded. So it is worth, briefly, considering its implications before joining in general homage to the new development.

It is important to stress that there are two aspects to exchange market efficiency. These have to do, respectively, with the spot market and the forward market. Efficiency in currency trading, therefore, cannot really be separated from efficiency in interest rate determination. At the present time neither the spot nor the forward exchange markets are free and both continue to be greatly influenced by the action of the authorities. The merit of what has been happening under De Kock is that the authorities are gradually reducing their involvement and making it possible for basic market forces to assert themselves. One of the demerits of the regime until now has been the fact that official domination has tended to involve the suspension of basic competitive responsibilities. To take a position against the Reserve Bank in the exchange market, for example, has generally been too risky purely because of the size of the latter's participation and not because of the basic rightness of its action. So other market participants, especially on a day-to-day basis, have found it convenient simply to follow a price set by the Bank. Once the spot market is free this will no longer be possible and traders will be forced to think for themselves in deciding both what the price

Die opheffing van deviesebeheer ten opsigte van nie-inwoners in Februarie was 'n belangrike stap met betrekking tot Suid-Afrika se vestiging as 'n doeltreffende deviesemark. 'n Doeltreffende finansiële mark is uiteraard 'n mark wat die beste benutting van die reële hulpmiddele in 'n ekonomie bevorder en dié stap moet dus seker hartlik verwelkom word. Wie kan op stuk van sake teen doeltreffendheid en sodoende ten gunste van verkwisting wees? En tog kan dit wees dat nòg die politici nòg lede van die sakewêreld die volle implikasies van doeltreffende finansiële markte besef. Om ten gunste van doeltreffendheid te wees, kan wel beteken om ten gunste van 'n stelsel te wees wat strydig is met die behoud van ou denkwyses en praktyke waaraan baie mense in Suid-Afrika verknog is. Dit is dus die moeite werd om die implikasies daarvan kortliks te oorweeg voor almal die nuwe ontwikkeling prys.

Dit is belangrik om nadruk daarop te lê dat deviesemark-doeltreffendheid twee aspekte het. Dit het onderskeidelik te make met die kontant- en die termynmark. Doeltreffende valutahandel kan dus nie werklik losgemaak word van doeltreffende rentekoersbepaling nie. Op die huidige tydstip is nòg die kontantmark nòg die deviesetermynmark vry en albei word steeds in groot mate deur die optrede van die owerheid beïnvloed. Die waarde van gebeure onder die bewind van dr De Kock lê daarin dat die owerheid sy betrokkenheid geleidelik verminder en dit vir die basiese markkragte moontlik maak om hulleself te laat geld. Een van die tekortkominge van die huidige bewind tot op hede was die feit dat amptelike oorheersing geneig was om die opskorting van basiese mededingingsverantwoordelikhede te veroorsaak. Dit was byvoorbeeld oor die algemeen te riskant om teen die Reserwebank posisie in die deviesemark in te neem bloot weens die omvang van die Bank se deelname en nie as gevolg van die basiese korrektheid van sy optrede nie. Ander markdeelnemers het dit, veral op 'n daaglikse grondslag, gerieflik gevind om die prys wat deur die Bank vasgestel word, te volg. Sodra die kontantmark vry

Financial Nightmare No. 6 – The Ex-Executive

My financial nightmares put Bill Johnson right off his food. Your company's going to be deep in the mire if any of your top guys disappear, I said. Your sales go for a loop, there's nobody to run production and goodness only knows who'd look after the finances. I was doing a beautiful job. Then somebody suggested talking to L&GV. They gave him this Business Income Benefit. For the lowest possible cost, he can cover all his executives against death and permanent disability. If he has to make a claim, the income he gets will equal the estimated loss of profits, which means he pays no extra tax. The income cover is matched to his executive profit potential and is then adjusted for inflation each year. So, if sales go down, the replacement is expensive or recruitment costs a bomb, he doesn't feel a thing.

Now he's relaxing over business lunches. And I'm cooking hamburgers in a take-away joint.

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should be and which way it is likely to move. The channelling of the dollar proceeds of gold and diamond sales directly to the mining companies will be a major step forward to making the spot market more efficient because it will remove the Reserve Bank from its present dominant price setting rôle. The withdrawal of the Bank from the rôle of seller of forward cover will be a major step forward in creating a proper forward market because it will make the costs of selling foreign currency receivables forward purely a matter of South African and overseas interest rate differentials.

Whatever the theoretical merits of freely competitive money and exchange markets, their establishment will not be without problems for a comparatively small economy like South Africa's which trades a large proportion of its GDP and is very dependent on a single export commodity with a high price volatility. It is interesting to observe what effect the rise in the price of oil had on the pound sterling and the far larger British economy in the 1979-81 period. An overvalued currency in this case certainly added to a loss of competitiveness in manufacturing industry which had already been caused by excessive domestic inflation and, thus, was a major additional cause of a massive increase in unemployment. For South Africa, the gold price could play a similar, but exaggerated, rôle if the exchange market were to be set entirely free. A massive rise in the gold price, similar to that which occurred in 1980, could cause a rise in the exchange rate that was very damaging to other export industries, and a fall in the price, similar to that which occurred in 1981/2, could cause a fall in the exchange rate that was inimical to official attempts to bring an already excessive inflation rate under control. Of course, it can be argued that any undue initial rise in the exchange rate would have anti-inflationary consequences and that the excessive inflation of 1982 was essentially the result of a failure to allow the exchange rate to respond to market forces in the first place, but this, even if true, ignores the effect such a development would have had on non-gold exporters and the employment they so importantly provide. In short, can South Africa, with its unique socio-political problems, really afford to be exposed to this sort of thing?

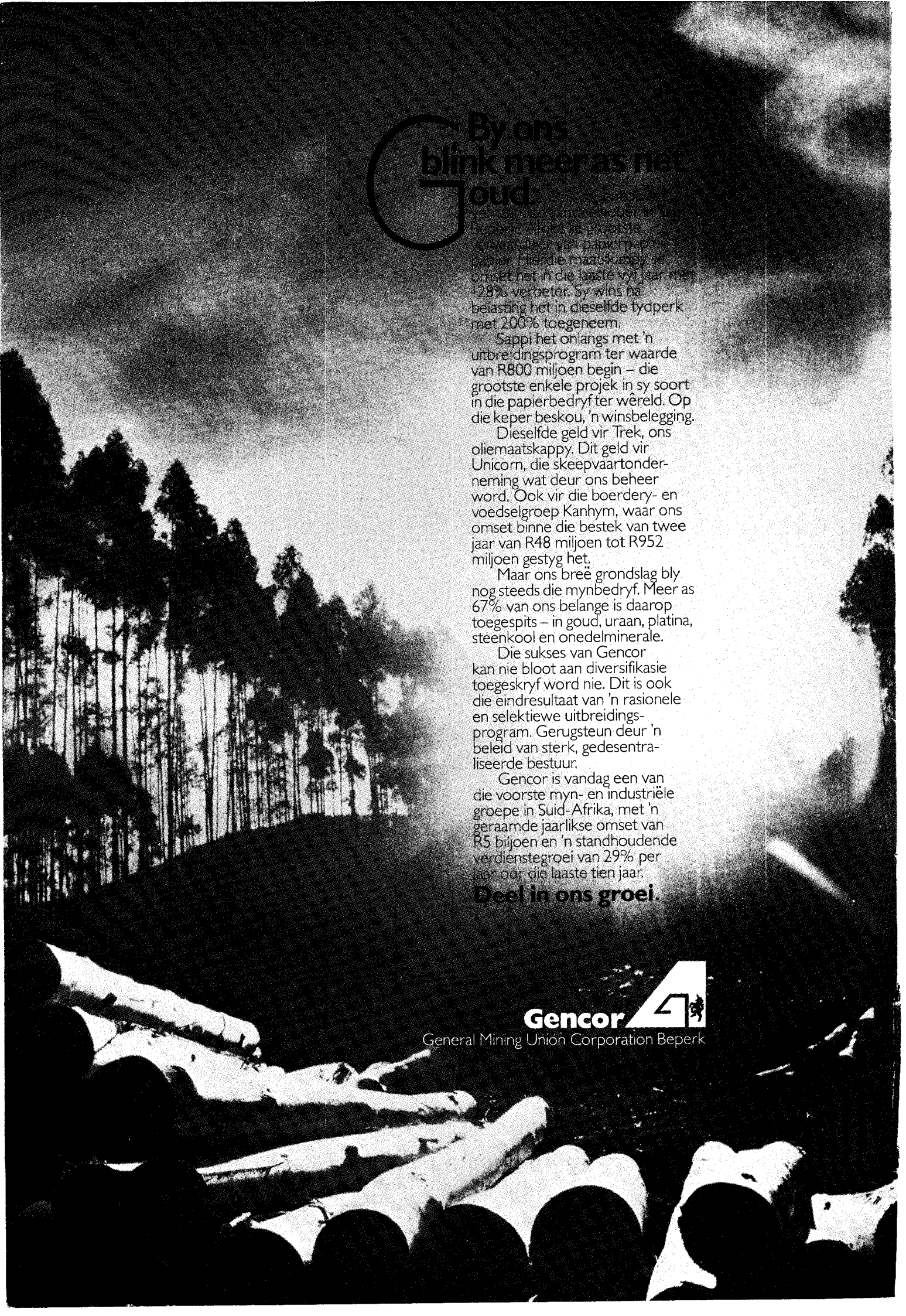
What, perhaps, needs to be stressed is the fact that financial markets and their freedom and efficiency, cannot be separated entirely from the freedom and efficiency of markets, including the labour market, in the real economy. When the price of gold rises relative to the prices of other mining exports, the profitability of gold mining increases and makes it possible to pay mining workers more in the gold sector. But what happens if, when this occurs, other metal and mineral prices are depressed because of general conditions of oversupply on a world-wide basis. The trouble is that in South Africa, pay conditions in the gold sector set the direction of labour contracting in the mining industry at large. In an Adam Smithian world, i.e. in a world of perfect competition and minimal government interference, wage rates, even within the mining sector, would be differentiated according to the law of marginal productivity because this would be permitted to operate. But our institutional framework today has changed and wage rates have ceased to be flexible downwards, and not only because of the monopolistic influences of collective bargaining.

Even in financial markets difficulties arise which inhibit efficiency. For example, for the forward exchange market to do its job properly, domestic interest rates must be left to find a level that accurately reflects the expectations of market participants including their expectations as to the

is, sal dit nie meer moontlik wees nie en handelaars sal genoop word om self te besluit wat die prys behoort te wees en in watter rigting dit waarskynlik sal beweeg. Die kanalisering van die dollaropbrengs van goud- en diamantverkope direk na die mynmaatskappye sal 'n belangrike stap voorwaarts wees om die kontantmark doeltreffender te maak, want dit sal die Reserwebank van sy huidige rol van oorheersende prysvasstelling onthef. Die onttrekking van die Bank as verkoper van termyndekking sal 'n belangrike stap voorwaarts wees om 'n behoorlike termynmark daar te stel, want dan sal die koste verbonde aan termyndekking op valutaontvangstes bepaal word deur die verskil in plaaslike en oorsese rentekoerse

Wat ook al die teoretiese verdienstelikhede van vry mededingende geld- en deviesemarkte, dit sal nie sonder probleme wees vir 'n betreklik klein ekonomie soos dié van Suid-Afrika, wat 'n groot deel van sy BNP verhandel en baie afhanklik is van 'n enkele uitvoerkommoditeit met 'n baie onbestendige prys, nie. Dit is interessant om te sien watter uitwerking die styging in die olieprys in die tydperk 1979-81 op die pond sterling en die Britse ekonomie, wat veel groter is, gehad het. 'n Oorwaardeerde valuta het in hierdie geval beslis meegehelp om die fabriekswese se verlies aan mededingendheid, wat reeds deur buitensporige binnelandse inflasie veroorsaak is, te vergroot en was dus 'n belangrike bykomende oorsaak van die geweldige styging in werkloosheid. In Suid-Afrika kan die goudprys 'n soortgelyke, dog veel groter, rol vervul indien die deviesemark geheel en al vry gemaak word. 'n Geweldige styging in die goudprys, soos dié wat in 1980 plaasgevind het, kan veroorsaak dat die wisselkoers styg, wat baie skadelik vir ander uitvoernywerhede was, en 'n daling in die prys, soos dié wat in 1981/2 plaasgevind het, kan 'n daling in die wisselkoers veroorsaak wat skadelik was vir amptelike pogings om die inflasiekoers, wat reeds buitensporig was, onder beheer te bring. Daar kan natuurlik aangevoer word dat enige oormatige aanvanklike styging van die wisselkoers anti-inflasionistiese gevolge sal hê en dat die buitensporige inflasie van 1982 hoofsaaklik veroorsaak is omdat daar in die eerste plek versuim is om die wisselkoers toe te laat om op markkragte te reageer, maar, self al is dit waar, veronagsaam dit die uitwerking wat so 'n ontwikkeling op nie-gouduitvoerders en die uiters belangrike werkgeleenthede wat hulle bied, sou gehad het. Kortom, kan Suid-Afrika met sy unieke sosio-ekonomiese probleme werklik bekostig om aan so iets blootgestel te wees?

Miskien is dit nodig om die feit te beklemtoon dat finansiële markte en die vryheid en doeltreffendheid daarvan nie heeltemal losgemaak kan word van die vryheid en doeltreffendheid van markte, met inbegrip van die arbeidsmark, in die werklike ekonomie nie. Wanneer die goudprys in verhouding tot die prys van ander mynuitvoere styg, styg die winsgewendheid van die goudmynbou en is dit moontlik om mynwerkers in die goudsektor meer te betaal. Maar wat gebeur, in so 'n geval, as ander metaal- en mineraalpryse laag is weens 'n algemene toestand van oorvoorsiening die hele wêreld deur? Die probleem is dat, in Suid-Afrika, loontoestande in die goudsektor die rigting vir arbeidsooreenkomste in die mynbedryf oor die algemeen bepaal. In Adam Smith se wêreld, d.i., 'n wêreld van suiwer mededinging met minimale owerheidsinmenging, sou loontariewe, selfs in die mynbousektor, volgens die wet van marginale produktiwiteit gedifferensieer wees, want daar sou dié wet toegelaat word om van krag te wees. Ons hedendaagse institusionele raamwerk het egter



By ons blink meer as net goud.

Sappi het onlangs met 'n uitbreidingsprogram ter waarde van R800 miljoen begin – die grootste enkele projek in sy soort in die papierbedryf ter wêreld. Op die keper beskou, 'n winsbelegging.

Dieselfde geld vir Trek, ons oliemaatskappy. Dit geld vir Unicorn, die skeepvaartonderneming wat deur ons beheer word. Ook vir die boerdery- en voedselgroep Kanhym, waar ons omset binne die bestek van twee jaar van R48 miljoen tot R952 miljoen gestyg het.

Maar ons breë grondslag bly nog steeds die mynbedryf. Meer as 67% van ons belange is daarop toegespits – in goud, uraan, platina, steenkool en onedelminerale.

Die sukses van Gencor kan nie bloot aan diversifikasie toegeskryf word nie. Dit is ook die eindresultaat van 'n rasionele en selektiewe uitbreidingsprogram. Gerugsteun deur 'n beleid van sterk, gedesentraliseerde bestuur.

Gencor is vandag een van die voorste myn- en industriële groepe in Suid-Afrika, met 'n geraamde jaarlikse omset van R5 biljoen en 'n standhoudende verdienstegroei van 29% per jaar oor die laaste tien jaar.

Deel in ons groei.

Gencor

General Mining Union Corporation Beperk

consequences of the Government's own policy actions. But what if this is inappropriate having regard to the level of interest rates overseas which might be reflecting conditions completely at odds with those prevailing in South Africa for reasons not just economic? Consider the situation where, like the present, overseas interest rates are high in real terms when inflation in South Africa is high relative to overseas inflation. Are South African rates to be allowed to fluctuate irrespective of the consequences for domestic unemployment?

These are important issues and to mention them does not mean to reject the bold initiative Dr De Kock and his team have embarked upon. South Africa needs more efficient financial markets, not less, and has suffered until now because official manipulation has often given protection to the wasteful, and delayed adjustment to changed circumstances in the world economy. But equally, we need to be realistic when promoting market efficiency as to the strategic bounds within which we are prepared, in the final reckoning, to let it operate.

It is probably fair to say that the single most important price in the South African economy is the exchange price of the rand. This can assume two alternative roles in terms of the formulation of monetary policy. Either it can be regarded as a policy instrument, in which case it becomes subject to deliberate manipulation by the authorities in order to achieve specified policy goals, or it can be regarded as a barometer of economic activity and change, in which case it is observed by all, Government and private sectors alike, for the objective information it conveys. Strictly, it cannot be both of these at the same time without needlessly increasing the possibility of confusion amongst market participants. At the present time the role of the exchange rate in South Africa is being changed from instrument towards barometer but it is still uncertain how far the authorities want to go in its transformation. In no small measure their decision will be governed by what they also decide about how monetary policy in South Africa in the future is to be conducted.

It is common cause amongst economists that the authorities, no less than the suppliers of actual goods in markets characterised by imperfect competition, cannot even where they are dominant, fix both the price and quantity of what they supply simultaneously. As far as monetary policy is concerned, this means that in a closed economy policy must target either on interest rates or on the money stock but it cannot target on both. In an open economy, the situation may be complicated by a desire to control both the exchange rate and the level of the gold and foreign reserves, and again a choice has to be made. At least theoretically, the authorities cannot have it both ways. Clearly, however, if the choice is made to control the growth of the money stock and changes in money, which reserve changes affect directly, both interest rates and the exchange rate must be left as free as possible, for together they determine prices in the spot and the forward markets. The problem in South Africa has to do with the fact that the system, modelled as it is on British lines, does not really lend itself to money stock regulation. Too many back doors open the way for escape and the central bank frequently finds itself in the position in which it is forced to give retroactive sanction to an increase in bank lending. The only way it can effectively discourage this, short of changing the structure (to which consideration is already being given), is to impose a penal cost on last resort borrowing which in effect means interest rate targeting.

If this analysis is correct, it will not really be possible to move towards a freer exchange market without at the

verander en loontariewe is nie meer afwaarts aanpasbaar nie, en dit nie net as gevolg van die monopolistiese invloede van kollektiewe onderhandeling nie.

Selfs in finansiële markte kan probleme ontstaan wat doeltreffendheid strem. Byvoorbeeld, vir die termyndeviesemark om sy werk behoorlik te kan verrig, moet binnelandse rentekoerse toegelaat word om 'n vlak te vind wat die verwagtinge van markdeelnemers, met inbegrip van hulle verwagtinge ten opsigte van die regering se eie beleidsoptredes, akkuraat weerspieël. Maar wat as dit onvanpas is met inagneming van die peil van buitelandse rentekoerse wat moontlik toestande weerspieël wat geheel en al oneens is met dié wat in Suid-Afrika heers, om redes wat nie net ekonomies van aard is nie? Dink aan 'n situasie waar, soos wat tans die geval is, buitelandse rentekoerse in reële terme hoog is en inflasie in Suid-Afrika, in verhouding tot buitelandse inflasie, hoog is. Moet Suid-Afrikaanse koerse toegelaat word om te skommel ongeag die gevolge wat dit vir binnelandse werkloosheid inhou?

Hierdie kwessies is belangrik en om dit te noem beteken nie dat die moedige inisiatief van dr De Kock en sy span verwerp word nie. Suid-Afrika het meer, nie minder, doeltreffende finansiële markte nodig en het tot dusver swaar gekry, omdat amptelike manipulasie dikwels die verkwisters beskerm het en aanpassing by veranderde omstandighede in die wêreldekonomie vertraag het. Maar wanneer ons markdoeltreffendheid bevorder, moet ons eweneens realisties wees wat betref die grense waarin ons bereid is om dit op stuk van sake te laat funksioneer.

Daar kan waarskynlik met billikheid gesê word dat die belangrikste enkele prys in die Suid-Afrikaanse ekonomie die wisselkoersprys van die rand is. By die formulering van monetêre beleid kan dit twee plaasvervangende rolle vervul. Dit kan òf as beleidsinstrument beskou word, in welke geval dit aan opsetlike manipulering deur die owerheid vir die verwesenliking van verklaarde beleidsdoelwitte onderhewig raak, òf dit kan as barometer van ekonomiese aktiwiteit en verandering beskou word, in welke geval dit deur almal, eweseer deur die regering en die privaatsektor, in ag geneem word vir die objektiewe inligting wat dit oorbring. Streng gesproke kan hierdie rolle nie gelyktydig vervul word sonder om die moontlikheid van verwarring by markdeelnemers onnodig te laat toeneem nie. Die rol van die wisselkoers in Suid-Afrika word tans van instrument na barometer verander, maar dis nog nie seker hoe ver die owerheid hierdie verandering wil voer nie. Hulle besluit sal in geen geringe mate gereël word deur hoe hulle besluit die monetêre beleid in Suid-Afrika voortaan bestuur moet word.

Alle ekonome is dit eens dat die owerheid, in geen geringer mate as die verskaffers van werklike goedere in markte wat deur onvolmaakte mededinging gekenmerk word, self waar hulle oorheersend is, nie die prys sowel as die hoeveelheid van dit wat hulle verskaf terselfdertyd kan bepaal nie. Wat monetêre beleid betref, beteken dit dat die beleid in 'n geslote ekonomie òf op rentekoerse òf op die geldvoorraad toegespits moet wees, maar nie op albei nie. In 'n oop ekonomie kan sake bemoeilik word deur die wens om die wisselkoers sowel as die peil van goud- en deviesereserwes te beheer, en weer eens moet 'n keuse gedoen word. Ten minste wat die teorie betref kan die owerheid nie sy mes na albei kante laat sny nie. As daar gekies word om die groei van die geldvoorraad en geldveranderings te beheer, wat direk deur reserweveranderings beïnvloed word, moet rentekoerse sowel as die wisselkoers klaarblyklik so vry as moontlik

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same time altering the basis of money market regulation generally and without, indeed, taking steps to ensure that other markets (labour and goods) are more reflective of basic competitive forces. In other words, the removal of non-resident exchange controls, referred to at the outset of this editorial, have to be seen in a far wider context than that of the exchange market alone.

The editor

gelaat word, want saam bepaal hulle pryse op die kontant- en termynmarkte. Die probleem in Suid-Afrika het te make met die feit dat die stelsel, wat op die Britse lees geskoei is, hom nie werklik leen tot die reëling van die geldvoorraad nie. Daar is te baie deure wat 'n uitkomkans bied en die sentrale bank bevind hom dikwels in dié posisie dat hy genoop word om goedkeuring met terugwerkende krag te verleen vir 'n toename in uitlening deur banke. Die enigste manier om dit effektief te ontmoedig sonder om die struktuur te verander (waaraan reeds oorweging verleen word), is om 'n strafkoste aan leen in laaste instansie op te lê wat in werklikheid rentekoerstoespitsing beteken.

As hierdie ontleding juis is, sal dit nie werklik moontlik wees om in die rigting van 'n vryer deviesemark te beweeg sonder om terselfdertyd die grondslag van geldmarkreëling oor die algemeen te verander en inderdaad sonder om stappe te doen om te verseker dat ander markte (arbeid en goedere) die basiese mededingende kragte beter weerspieël nie. Met ander woorde, die opheffing van deviesebeheer ten opsigte van nie-inwoners, waarna aan die begin van hierdie hoofartikel verwys is, moet in veel breër verband as slegs dié van die deviesemark gesien word.

Die redakteur

FINANCIAL STATEMENT

Turnover	R 6 829 million
Group profit before taxation	R 670 million
Group profit after taxation	R 415 million
Group profit after taxation attributable to ordinary shareholders in Barlow Rand Limited	R 246 million
Earnings per share before non-trading items	175,1 cents
Dividends per ordinary share	70,0 cents
Total assets	R 5 055 million
Number of shareholders	23 348
Number of employees	
– subsidiaries	149 818
– associates and managed companies	86 448

Salient features taken from 1982 Annual Financial Statements.

Ranked 81 (1981 – 114) in Fortune magazine's 1982 survey of companies outside the U.S.A.

SOCIAL STATEMENT

A company's first duty is to its shareholders. But a company our size has another responsibility. To the 236 266 people who work for us. That's why we've made a commitment –

* To work for changes in any laws and attitudes that result in discrimination against employees in the work situation.
* To appoint and promote people according to ability and achievement.
* To remunerate employees on a non-discriminatory basis. Experience, performance, and the nature of the job being the determining factors.
* To continue our comprehensive training and development programmes. Not only to ensure our progress, but to equip our employees for a better future with better opportunities.
* To provide, where necessary, financial assistance for the education of our employees' dependants.
* To continue to finance the development of education and training institutions through the C.S. Barlow Foundation.
* To improve the quality of the life of our people.

All these commitments – and others – are embodied in our own Code of Employment Practice which we adopted in 1978. It's a living document. And we regularly monitor the progress our companies are making in its implementation.

BARLOW RAND LIMITED

GREY-PHILLIPS, BUNTON, MUNDEL & BLAKE 71316

By G. D. I. Barr and B. S. Kantor*

A theory of the financial rand discount

PREAMBLE

When South African exchange controls on non-residents were removed in February and a unified rand established, foreign investors enjoyed an immediate appreciation in the value of their South African assets. Students of the financial rand mechanism had simultaneously to abandon some of their hard-earned intellectual capital. This capital is represented below in a paper written naturally before the exchange control reforms. The discussion of the financial rand below will no longer be of direct interest to participants in South African financial markets. However, the record of the way it worked will remain of interest to students of South African monetary history. It will also be of relevance to any other dual exchange rate system. The rate established by exchange rate expectations identified in our discussion remains of crucial importance for South Africa. As established in the paper, under the financial rand system, any deviation between the actual and expected commercial rand led to changes in the value of the financial rand and the financial rand discount. Thus, the value of the financial rand influenced interest rates in South Africa and the share market. Under the unified exchange rate, deviations between the actual and expected value of the rand will lead to changes in the prices of South African financial securities and capital inflows. These capital inflows will affect the money supply. Thus, unless market forces are allowed to equalise the expected and the actual value of the rand, interest parity will not hold and money supply control in South Africa will be prejudiced. Our paper on the financial rand can be regarded as a demonstration in a particular context of the importance for financial markets of exchange rate expectations.

1 INTRODUCTION

South Africa has a dual currency system; commercial rand, held almost entirely by South African residents, may be used for foreign trade and factor payments and is exchanged for foreign currency at the commercial rate of exchange; financial rand is deposits in South African banks, held by non-residents who may acquire or dispose of financial rand by selling or buying local assets, including securities on The Johannesburg Stock Exchange, or by direct conversion of foreign exchange into or out of financial rand. The exchange of financial rand for commercial rand, or vice versa, for the purpose of investment or disinvestment in South African assets, requires South African Reserve Bank approval.[1]

The foreign exchange value of the financial rand, usually quoted in US dollars, is determined by the interaction of supply and demand by non-residents for South African securities and assets. The most common statistic used to illustrate the state of the financial rand market is the financial rand discount, which is the percentage gap between the commercial rand exchange rate and financial rand exchange rate at any point in time. The financial rand discount (FR_{dis}) may be formally defined as follows:

$$FR_{dis} = \frac{CR_x - FR_x}{CR_x} \cdot 100$$

where CR_x represents the foreign exchange (e.g. the US dollar) value of the commercial rand and FR_x, the foreign exchange value of the financial rand. All references in this paper to exchange rates are to the foreign exchange (e.g. US dollar) value of the rand.

The purpose of this paper is to develop a theory of the behaviour of the financial exchange rate and the financial rand discount. The discussion draws for support on the literature of dual exchange markets and on the asset market approach to flexible exchange rates.[2] The proposed theory is then tested for the South African case.

2 DUAL EXCHANGE RATE SYSTEMS – AN OVERVIEW

The exercise of exchange control by a central banking authority separates the domestic from the world's financial markets in an attempt to 'protect' the exchange rate by limiting the demand for foreign exchange and thus give rise to a more valuable commercial exchange rate. The financial rand market, previously named blocked rand or securities rand, is an adjunct of exchange control and emerged in the early 1960s when controls were imposed on transactions in securities between London and Johannesburg.[3] The term 'financial rand' was used after January 1979 when the Reserve Bank formally adopted a policy of managing a float of the commercial rand.[4]

The main purpose of any dual exchange rate system is to isolate the commercial exchange rate from what are regarded as de-stabilising capital flows. Such systems as practised in the past in Belgium and Britain, differed in detail from the South African system, but all attached different prices to transactions affecting the current and capital accounts of the balance of payments with designated capital account transactions having to be conducted in financial currency and current account transactions in commercial currency.[5]

In the Belgian case, perhaps the best known of the dual exchange rate systems, all capital account transactions by residents and non-residents had to be conducted in financial Belgian francs. The central bank offset surpluses or deficits of foreign exchange, acquired through the current account of the balance of payments at the commercial exchange rate, with equivalent purchases or sales of financial Belgian francs. It is worth noting that in this system the financial Belgian franc could stand at a premium to the commercial franc,[6] an outcome which is not possible if there exists an option to undertake capital account transactions in the commercial currency.

The financial rand market, however, is probably closest in character to the market in investment dollars that preceded the recent removal of exchange controls in Britain.[7] Under this system, residents were required to

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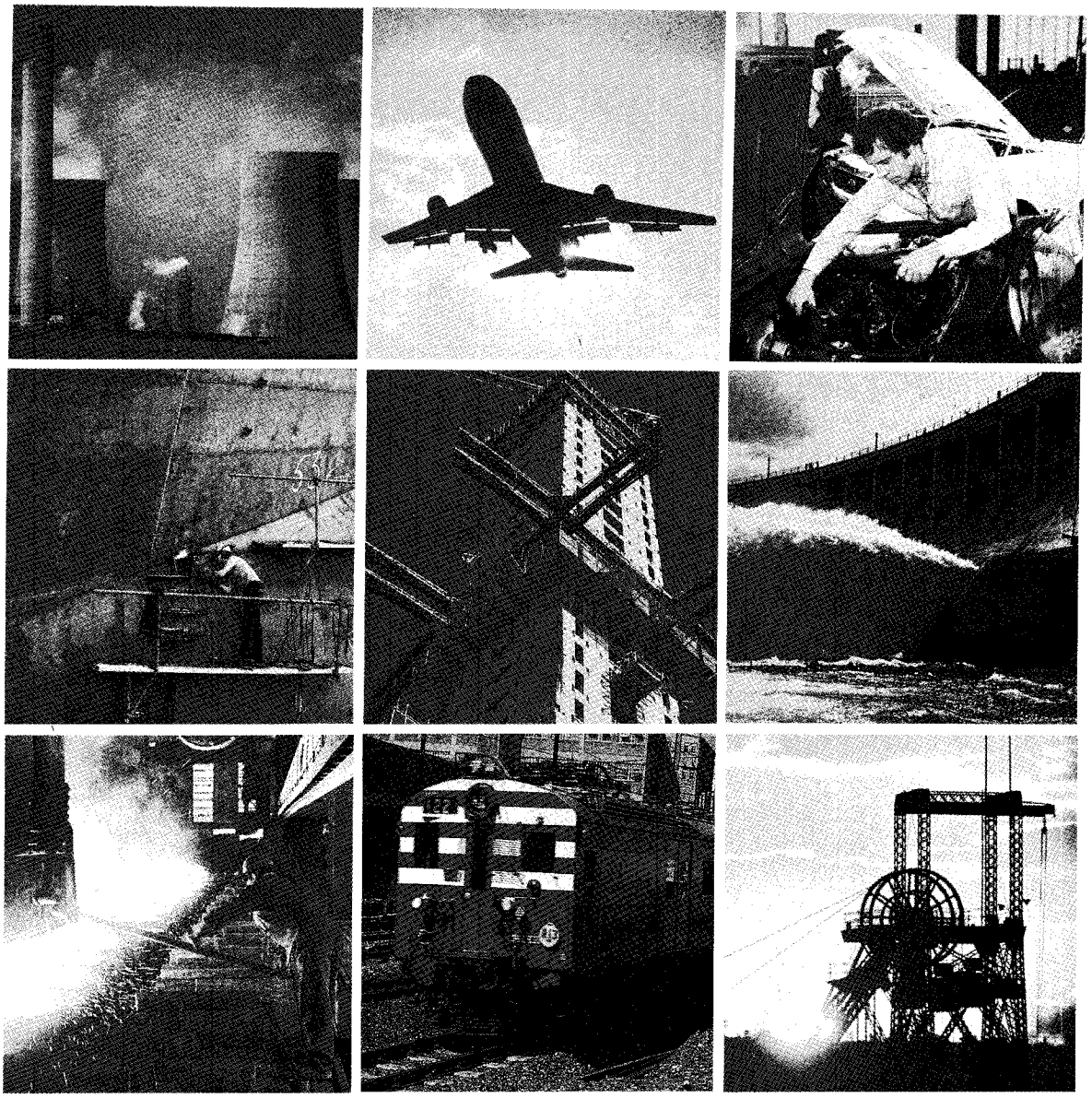

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pay a premium on American dollar investments which was variable and determined by market forces. In June 1972, this investment premium was extended to South African securities held by British residents.[8]

3 THE DETERMINATION OF THE FINANCIAL RAND EXCHANGE RATE AND THE FINANCIAL RAND DISCOUNT

(i) The influence of political uncertainties

If it is assumed that South African and foreign owners of South African assets are equally well informed about the likelihood and implications of political disturbances in South Africa, then the path of expected earnings, for any given commercial rand exchange rate, is clearly the same for all. However, given a change in the degree of political uncertainty and because of exchange control, the return required by South African investors may change relative to the (risk adjusted) return required by overseas investors in South African securities. If so, the rand and US$ prices of South African securities may not change equi-proportionately in response to a change in political risk and hence the financial rand discount may change.[9]

(ii) Taxation

It is important to note that non-resident holders of South African securities are subject to a tax on dividend income. Other things constant, this tax reduces the value of non-resident held South African securities relative to locally held securities. Thus, expectations of political instability, apart from the direct effects on earnings and the required rate of return, may affect expectations of tax changes. Such expectations again will also affect overseas prices relative to local prices and hence the financial rand discount. Without exchange control a tax which discriminated against non-residents would be difficult to administer. Foreign prices of South African securities held abroad and subject to additional taxation would stand at a discount to the local price. This, in turn, would encourage South Africans, uninhibited by exchange control, to buy securities in London, so eliminating the discount. Similarly, foreign owners of South African shares would arrange to receive income in South Africa and remit capital and accumulated income which, presumably, would, upon realisation of the investment, not be subject to discriminatory taxation.

(iii) The expected value of the commercial rand

Dividend or interest income earned by non-residents is received in the commercial currency. Thus the value of the financial rand or of South African securities held abroad depends upon the expected value of the commercial currency over the period of the investment. The interdependence of the value of the commercial and financial currency is implicit in the following equilibrium conditions for a dual exchange rate system, derived by A. Lanyi and also applied by R. P. Flood in their respective discussions of dual exchange rates.[10] The equation is given below

$$i_w = i_h \cdot \frac{CR^e}{FR} + \frac{FR^e - FR}{FR}$$

where

i_w – represents the expected rate of return earned by a non-resident holder of a financial currency (the required world rate of return),

i_h – represents the rate of return earned by residents (the home rate of return),

CR^e – represents the mean of the expected foreign exchange value of the commercial currency over the times at which interest or dividend payments are received, i.e. the mean of the relevant forward exchange rates,

FR^e – as above, except for the financial currency. A forward market may also be available in the financial currency.

Applying this equation to South Africa, over some time period, would give the following:

$$i_w = i_h \cdot \frac{CR_x^e(1-\tau)}{FR_x} + \frac{FR_x^e - FR_x}{FR_x}$$

where again

i_w – required world rate of return over the time period (that is the rate of return available to a non-resident holder of income yielding securities bought with financial rand),

i_h – required home (i.e. South African) rate of return established in the domestic money and capital markets over the time period,

CRx^e – mean of the expected foreign exchange values of commercial rand exchange rates over the times at which interest or dividend payments are received, i.e. mean of forward exchange rates (if quoted) at those times,

FRx^e – as above except for financial rand exchange rates,

τ – non-residents' tax as a fraction.

As indicated above, the total return to a non-resident holder of South African securities comes in two components. The foreign investor has an expectation of receiving an after tax interest or dividend yield of

$$\frac{i_h CR_x^e(1-\tau)}{FR_x} \qquad (1a)$$

on his intital investment. The second term represents the expected increase or decrease in the capital value of the investment. It should be noticed that the equation (1) above represents the interest parity condition for a financial currency. For the non-resident investor in South African securities, the difference between the world rate of return (i_w) and the expected return for a South African investment (equation (1a) above) is equal to the expected increase (or decrease) in the financial exchange rate.

$$\frac{(FR_x^e - FR_x)}{CR_x} \qquad (1b)$$

Such an interest parity condition will be maintained by arbitrage between the exchange and money markets of South Africa on the one hand and the outside world on the other.

In the particular case of South Africa, forward exchange to cover expected investment income would not normally be made available by the exchange control authorities nor is there a market in forward financial rands. The financial rand market, however, since it is subject to arbitraging opportunities will be 'efficient' in the technical sense of the term. Thus the statistical distribution of the value of the financial rand rate at time t may be adequately represented at time t-1 by:

$$\frac{\tilde{FR}_{x(t)} - FR_{x(t-1)}}{FR_{x(t-1)}} = \theta_o + \tilde{a}_t \qquad (2)$$

where

a_t – is a white noise disturbance term,

θ_o – is the capital appreciation expected over the period t-1 to t,

$\sim$ denotes the statistical distribution of the variable in question.[11]

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Now if we take our time interval to be very small, then:
$\theta_o = 0$ and thus taking expectations we have,
$FR_{x\,(t)}^{e} = FR_{(t-1)}$,
and so equation (2) reduces to:

$$\frac{i_w}{i_h} = \frac{CR_x^{e}(1-\tau)}{FR_x} + \theta \qquad (3)$$

Thus if we consider a particular South African security with rand earnings E, and with earnings yields of i_w and i_h then

$$i_w = \frac{E \cdot CR_x^{e} \cdot (1-\tau)}{P_w} \qquad (4)$$

where P_w is the price of the South African security in foreign currency on the world's capital markets, and

$$i_h = \frac{E}{P_h} \cdot CR_x \qquad (5)$$

where P_h is the local South African price measured in foreign currency.

Then, after substitution in (3), we obtain the familiar relationship

$$\frac{P_h}{P_w} = \frac{CR_x}{FR_x} \qquad (6)$$

As is well known, and may be easily observed, arbitrage between the financial rand and securities markets continuously maintains this relationship. Equation (3) demonstrates that the financial rand exchange rate is a function of the expected commercial rand rate, the required rates of return locally and overseas, and non-resident tax rates.

Figure 1
4/79 – 6/81

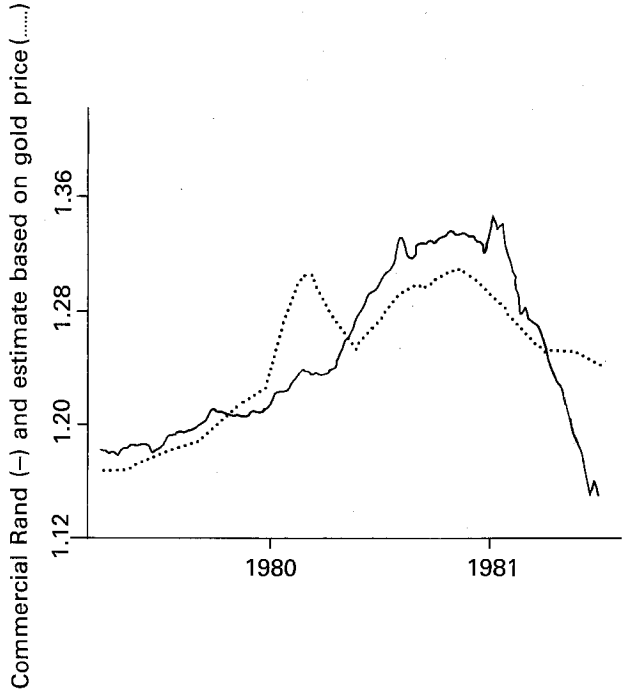


Figure 2
1/79 – 6/81

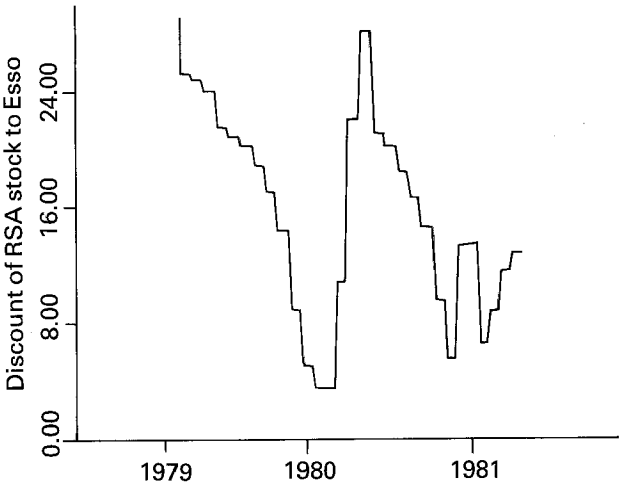
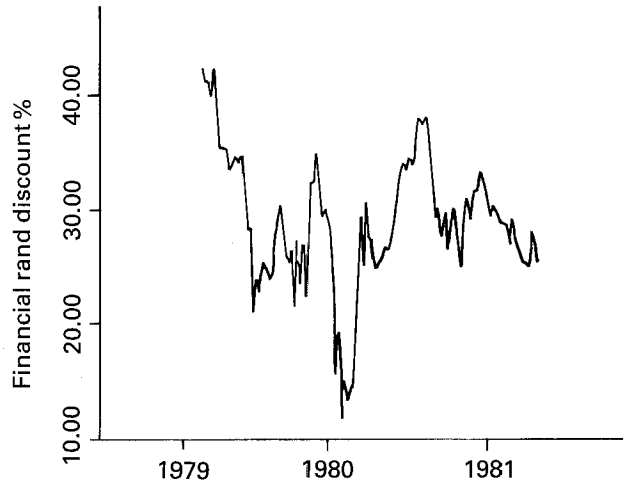


Figure 3
1/79 – 6/81



Thus, for example, if the commercial rand exchange rate was expected to increase, then, other things remaining constant, the financial rand exchange rate must increase for the equilibrium condition to hold.

4 DETERMINATION OF THE FINANCIAL RAND DISCOUNT

As demonstrated in (3), the finanical rand exchange rate is directly related to the expected commercial rate of exchange. Considering the financial rand discount equation,

$$FR_{dis} = \frac{CR_x - FR_x}{CR_x} \cdot 100 \qquad (7)$$

we get, by substitution of (3) in (7),

$$FR_{dis} = \frac{(CR_x - i_w^{(i_h)} CR_x^{e}(1-\tau))}{CR_x} \cdot 100 \qquad (8)$$

Thus, for any given commercial rand exchange rate (CR_x), non-resident tax (π), home rate of return (i_h), and world rate of return (i_w), the financial rand discount (FR_{dis}) would narrow if the expected commercial rand (CR_x^{e}) were to rise, and widen if CR_x^{e} were to fall.

5 THE DETERMINATION OF THE COMMERCIAL RAND EXCHANGE RATE

This reasoning would have to presuppose that the commercial rand exchange rate was not itself determined in an efficient market or else the short term future expectation of the commercial rand exchange would be equal to the actual commercial rand exchange rate. There are strong reasons for believing the commercial rand exchange rate is not determined in an efficient market since the rate is managed by the South African Reserve Bank.

The first five autocorrelations of first differences of the natural log of CR_x are given below in Table 1 for weekly data over the period 30/1/79 to 24/6/81 (124 observations). On statistical grounds one would therefore reject the hypothesis at the 1% level that the commercial rand exchange rate was determined in an efficient market.

Table 1

Lags	1	2	3	4	5
Autocorrelation estimates	0,393	0,359	0,329	0,245	0,296
	(4,37)	(3,59)	(2,92)	(2,02)	(2,37)

t-statistics are provided in parentheses. $t^{1\%}_{120} = 2{,}358$ *(one sided test)*

The predominant forces that determine the managed commercial rand exchange rate seem to be the same as those that have governed exchange rate movements since the abandonment of fixed exchange rates in the early seventies. These are the state of the balance of payments and the level of foreign exchange reserves. The most important and readily available information about the prospects for the South African balance of payments is, of course, given by the gold price. As would be expected, there is a strong empirical relationship between the dollar gold price and the commercial rand exchange rate.

Table 2 gives the results of the two linear regressions of alternative specifications for the relationship between the commercial rand exchange rate and the price of gold, i.e. for the equation

$$CR_x = \alpha + \beta x_t + u_t \qquad (9)$$

where x_t is the independent explanatory variable

u_t is a white noise series

Table 2

Period studied	x_t	$\hat{\alpha}$	$\hat{\beta}$	R^2	DW	
30/1/79 – 24/6/81	contemporaneous gold price	1,08739 (87,62)	0,00031 (12,62)	0,6734	0,892	(10)
30/1/79 – 24/6/81	10 week moving average of gold price	1,08866 (95,48)	0,00033 (14,53)	0,6921	0,732	(11)

t – statistics of the regression estimates are given in parentheses below the parameter estimates

As may be seen, a moving average of the gold price (equation 11) provides a more satisfactory explanation of exchange rate changes than the contemporaneous gold price (equation 10). This is possibly because, in making its exchange rate adjustments, the South African Reserve Bank considers the average of the price of gold over some previous period rather than just a particular weekend price of gold.

It may also be seen that even though the equation is mis-specified to some extent in that the Durbin-Watson statistic is unsatisfactorily low, the gold price does give a statistically significant explanation of the commercial rand exchange rate.

The mis-specification of the relationship is, however, understandable given the mechanics of exchange rate management. The Reserve Bank would not wish foreign exchange dealers to profit from an ability to predict short-term changes in the commercial rand exchange rate. Furthermore, the gold price is clearly not the only determinant of the foreign exchange reserve position or the exchange rate. However, other influences on the balance of payments, for example money supply developments, can only be observed with long lags.

6 THE DETERMINATION OF THE EXPECTED COMMERCIAL RAND EXCHANGE RATE (CR_x^e)

It would seem appropriate to presume that expectations of the commercial rand exchange rate would be determined rationally. Rational expectations are expectations based upon all the relevant information and are equivalent to the predictions of economic theory. Thus it would be rational for economic actors affected by changes in the commercial rand exchange rate to expect the Reserve Bank to alter the commercial rand exchange rate in response to actual and expected developments in the balance of payments accounts, as it has done in the past. Rational expectations would rely, therefore, on a model of the forces influencing the balance of payments and of the Reserve Bank's exchange rate policy reactions to them. Any such model would have to include, as an important force, fluctuations in the price of gold, and as has been indicated, changes in the price of gold can account for a large proportion of changes in the commercial rand exchange rate.

A number of such rational expectations models of market determined exchange rates have been constructed.[12] Prominent among the forces specified to influence the balance of payments and therefore the exchange rate in such models are the supply and demand for domestic money. Flood adopted such a model to explain the behaviour of the financial exchange rate in a dual exchange rate system. In Flood's model, as in the case of the Belgian system, the commercial exchange rate is assumed fixed and surpluses or deficits in commercial transactions across the balance of payments lead to equivalent purchases or sales of financial currency by the central bank. Thus, in the Flood model, the expected value of the financial currency depends upon the expected state of the current account of the balance of payments, as influenced by money supply developments.[13]

7 CALCULATION OF THE EXPECTED COMMERCIAL RAND EXCHANGE RATE (CR_x^e)

In order to forecast the commercial rand exchange rate, a rational speculator having regard for the current price of gold might use the estimated relationship (equation (11)) to form an expectation of the commercial rand exchange rate. The relationship between the expected commercial rand exchange rate on the basis of the time series of observed gold prices using equation (11) and the actual commercial rand exchange rate is illustrated in Figure 1. It may be seen that the commercial rand exchange rate was, in this sense, overvalued over the period May 1980 to February 1981 and between April 1981 to June 1981 appeared substantially undervalued for the realised gold

price. This undervaluation became even more marked over July and August 1981, when increases in the dollar price of gold brought very little change in the commercial rand exchange rate.

8 TEST OF THE THEORY OF THE FINANCIAL RAND DISCOUNT BEHAVIOUR

It has been established above, in equation (8), that for any fixed non-residents' tax and required returns, locally and abroad, the financial rand discount will narrow and widen as the commercial rand exchange rate is expected to appreciate or depreciate. The major factor that would influence the prices of South African assets held abroad, independently of domestic prices, would be changes in taxes expected to be applied to dividends or interest paid to non-resident security holders. Expectations of such changes would be associated with political disturbances regarded as pointing to a change in government and therefore a change in tax policy with respect to foreign asset holders.[14]

In order to test the validity of equation (8) and its implication which is that the financial rand discount anticipates movements in the commercial rand exchange rate, it is necessary to isolate this other influence.

A measure of political risk is available that is independent of changes in the financial rand discount. South African government bonds denominated in US$ are traded in Euro-capital markets, and changes in the yields on such bonds relative to other bonds can be taken to indicate the influence of changes in political risk. When South Africa is regarded as more or less risky, yield differences will widen or narrow.

In order to remove the effect of the variable political risk the financial rand discount was regressed on pure political risk in the form of the discount on the yields of ESSO dollar bonds to the yields on RSA dollar bonds traded on the Euro-capital markets (see Figure 2). The behaviour of the residuals of this regression can be regarded as representing the behaviour of the financial rand discount independently of political risk.

The regression of the financial rand discount with the effect of political risk removed, against the percentage deviation of the commercial rand exchange rate from its expected value was then performed and taken as a test of equation (8). After the removal of the political risk effect, the ratio $\frac{i_h}{i_w}$ is assumed to be constant over the period of the test.

The following equation was thus estimated.

$$FR_{dis} \mid \text{political risk} = \alpha + \beta \left(\frac{CR_x - CR_x^e}{CR_x}\right) + u_t \qquad (12)$$

where

$FR_{dis} \mid$ political risk

is the vector of residuals of the regression of financial rand discount against political risk as described above.

The expected commercial exchange rate (CR_x^e) was calculated using equation (11) of Table 2. Again, it is stressed that this measure of CR_x^e, based as it is only on the gold price, is only one of a number of formulations which could have been used to model the determination of the CR_x^e.

The results are given in Table 3 below:

Table 3

Studied	$\hat{\alpha}$	$\hat{\beta}$	R^2	DW
30/1/79 – 24/6/81	0,02206 (0,08)	0,19637 (3,89)	0,3451	1,821

t statistics are indicated in parenthesis

The relationship, although not a very strong one, in terms of the R^2 obtained is highly significant statistically. The null hypothesis that β is zero is rejected and the null hypothesis that α is zero is accepted at the 1% level. The null hypothesis that there is no first order autocorrelation in u_t is accepted at the 5% level.[15]

CONCLUSION

Drawing on the literature of dual exchange rate systems, equation (8) provides a theory of determination of the financial rand discount. The evidence supports the implication that the financial rand discount changes in response to the market expectation of movements in the commercial rand exchange rate. The statistical test reveals that the data supports the relationship predicted by the theory in a statistically significant manner.

Footnotes

1 For a description of the South African exchange control system, see *Exchange rates in South Africa – Interim report of the Commission of Inquiry into the Monetary System and Monetary Policy in South Africa,* Government Printer, Pretoria, 1978, RP 112/1978. (The De Kock Commission Interim Report.)

2 See Anthony Lanyi. Separate Exchange Markets for Capital and Current Transactions. Staff papers, IMF, 22, 1975. pp.714-749. See also: B. Decaluwe & A. Steinherr. A Portfolio Balance Model for a Two-tier Exchange Market. *Economica,* 43, 111-125; and V. Barattieri & G. Ragazzi. An Analysis of the Two-tier Foreign Exchange Market. *Banca Nazionale del Lavoro, Quarterly Review,* No. 99, December 1971, pp.354-72; and J.M. Fleming. Dual Exchange Markets and Other Remedies for Disruptive Capital Flows. Staff Papers, 21 (March 1974), pp.1-27; and J.M. Fleming. Dual Exchange Rates for Current and Capital Transactions: a Theoretical Examination. In his *Essays in International Economics* (Harvard University Press, 1971), pp.296-325.

3 For a history of the development of the financial rand market, see R.M. Gidlow. Exchange Control and the Blocked Rand Mechanism *South African Journal of Economics,* 44, No. 1, March 1976, pp.84-94.

4 See Gerhard de Kock. New Developments in Monetary Policy in South Africa. *South African Journal of Economics,* Vol. 49, No. 4, December 1981, p.331.

5 See A. Lanyi, op. cit., for a description of alternative dual exchange rate systems.

6 See A. Lanyi, op. cit:, p.726.

7 See *Bank of England Quarterly Bulletins,* Vol. 19, September and December 1979.

8 See R.M. Gidlow, 1976, op. cit., p.86.

9 See R.M. Gidlow. Developments in the Securities Rand Market, 1976-1979. *South African Journal of Economics,* Vol. 47, No. 3, September 1979, especially Section 3, pp.261-265, for an alternative explanation.

10 See A. Lanyi, op. cit. pp.734-740; and R.P. Flood. Exchange Rate Expectations in Dual Exchange Markets. *Journal of International Economics,* Vol. 8, 1978, pp.65-77.

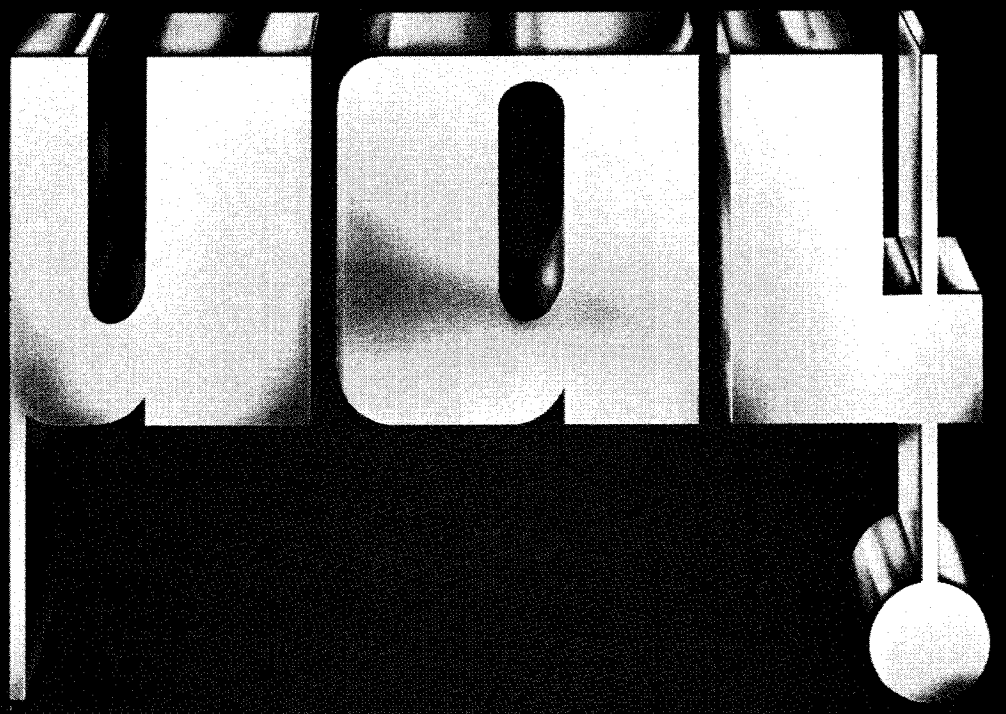
11 See Eugene F. Fama. *Foundations of Finance.* Basic Books, New York, 1976; especially Chapter 5 on the nature of efficient capital markets.

12 See J.A. Frenkel. A Monetary Approach to the Exchange Rate: Aspects and Empirical Evidence. *Scandinavian Journal of Economics,* 78, No. 2, May 1976, pp.200-221. Reprinted in J.A. Frenkel & H.G. Johnson. *The Economics of Exchange Rates: Selected Studies.* Addison-Wesley Publishing Co., Reading Massachusetts, 1978.

13 See R.P. Flood, op. cit.

14 See Section 3(1) and (2) above.

15 The 0,1% significance point for R^2 with 120 degrees of freedom equals 0,086 (under the null hypothesis that the population efficient of determination squared is zero). For the Durbin-Watson statistic for 120 sample points $d = 1,65$ and $d_U = 1,74$ at the 5% level.



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By Rory F. Knight and John F. Affleck-Graves*

The efficient market hypothesis and a change to LIFO: An empirical study on the JSE

1 INTRODUCTION

LIFO refers to the last-in-first-out cost flow assumption of inventory valuation whereby it is assumed that the costs of the most recent purchases of merchandise should be charged to the most recent sales of such, thus depressing the value of end-period inventory and understating earnings in inflationary times. This is the converse of the FIFO approach which refers to the first-in-first-out cost flow assumption of inventory valuation whereby end-period inventory is valued at the most recent purchase price and the estimate of earnings in inflationary times is, consequently, greater.

LIFO is given an economic significance by virtue of the fact that if applied to tax reporting a reduced liability for tax is incurred. Thus the present value of future cash flows is increased because the present value of future tax payments decreases. The result is an increase in economic well being, in times of rising prices.

With the increase in price levels witnessed in recent years, this characteristic has enticed a number of South African companies to change to LIFO to improve their inflation squeezed cash positions. There are certain immediate implications of a switch to LIFO. The more important are listed below:

(i) Section 22(5) of the Income Tax Act, No. 58 of 1962, requires that if a company uses the LIFO system for tax purposes it must use LIFO for financial reporting purposes. However, this section does not prohibit the simultaneous footnote disclosure of FIFO information.

(ii) The reported book value of the firm diminishes as inventory is valued at older prices.

(iii) The equity of the company reduces and based on book value the firm may seem more highly geared.

(iv) If there is a reversal of current trends and the price level falls, earnings will be inflated above the FIFO figures and an increased tax will become payable.

(v) LIFO removes the unrealised holding gains reported on a FIFO system and thus the difference between the two earnings figures (LIFO and FIFO) may measure, to a degree, the firm's exposure to inflation.

It is noted that it is, of course, possible for a firm to report LIFO and not take it for tax purposes, in which case a change to LIFO would have no economic significance whatsoever. However, no such case has been encountered on the JSE (Knight (1981)).

Thus, a change in accounting method from FIFO to LIFO may be classified in terms of accounting theory, as a translatable change which has an economic impact and a negative impact on earnings. Moreover, this negative impact on earnings is counter-directional to the economic impact which is positive.

Hence a study of the effect of such a change should be of great interest as it should indicate which impact (earnings or economic) has the dominant influence on the share price.

In addition, by examining the length of time it takes the JSE to adjust to the informational content implied by the change, the efficiency of the market can be tested. More specifically a test of the semi-strong form of the Efficient Market Hypothesis (EMH) can be made.

The purpose of the study will therefore be to:

(i) indicate to both the management and the investing public what impact a change to LIFO **has** had on share prices;

(ii) provide investors with some information on the likely impact of future changes to LIFO;

(iii) provide the management (report preparers) of companies considering a change with information on the likely impact on their share price; and

(iv) test the efficiency of the JSE in the semi-strong form.

2 RESEARCH METHODOLOGY

The effect on a company's share price of a change to LIFO is examined using the two-stage time series methodology. This approach was first employed by Fama, Fisher, Jensen and Roll (1969) in the first direct test of the semi-strong form of the EMH. This method has now become firmly established in the finance literature and is briefly summarised below in the context of the LIFO problem.

Consider a company which decides to change from FIFO to LIFO. The raw data required comprise the weekly returns on the share price which are defined in terms of the following formula:-

$$R_t = \frac{P_t + D_t - P_{t-1}}{P_{t-1}}$$

where R_t is the return on the share in period t;

P_t is the price of the security at the end of period t; and

D_t is the dividend paid during period t.

The first stage of the methodology involves the removal of those movements in share prices which are attributable to market-wide or common factors. Such factors are common to all shares and King (1966) has shown that for the NYSE approximately 50% of the variability in share prices is due to such common factors. The effect of these market-wide influences must be removed so that the effects of a change to LIFO can be clearly observed and not obscured or confounded with broad market movements.

The market related return can be removed as follows:

Estimate the $\propto$ and ß coefficients in the well-known market model:

$$R_t = \propto + ßR_{M;t} + e_t$$

where R_t is the return on the security in period t;

$R_{M;t}$ is the return on the market in period t;

e_t is the residual or non-market related return in period t;

$\propto$ and ß are the regression parameters estimated using ordinary least squares.

*The authors wish to acknowledge the financial support given by the CSIR and the University of Cape Town's Staff Research Fund.

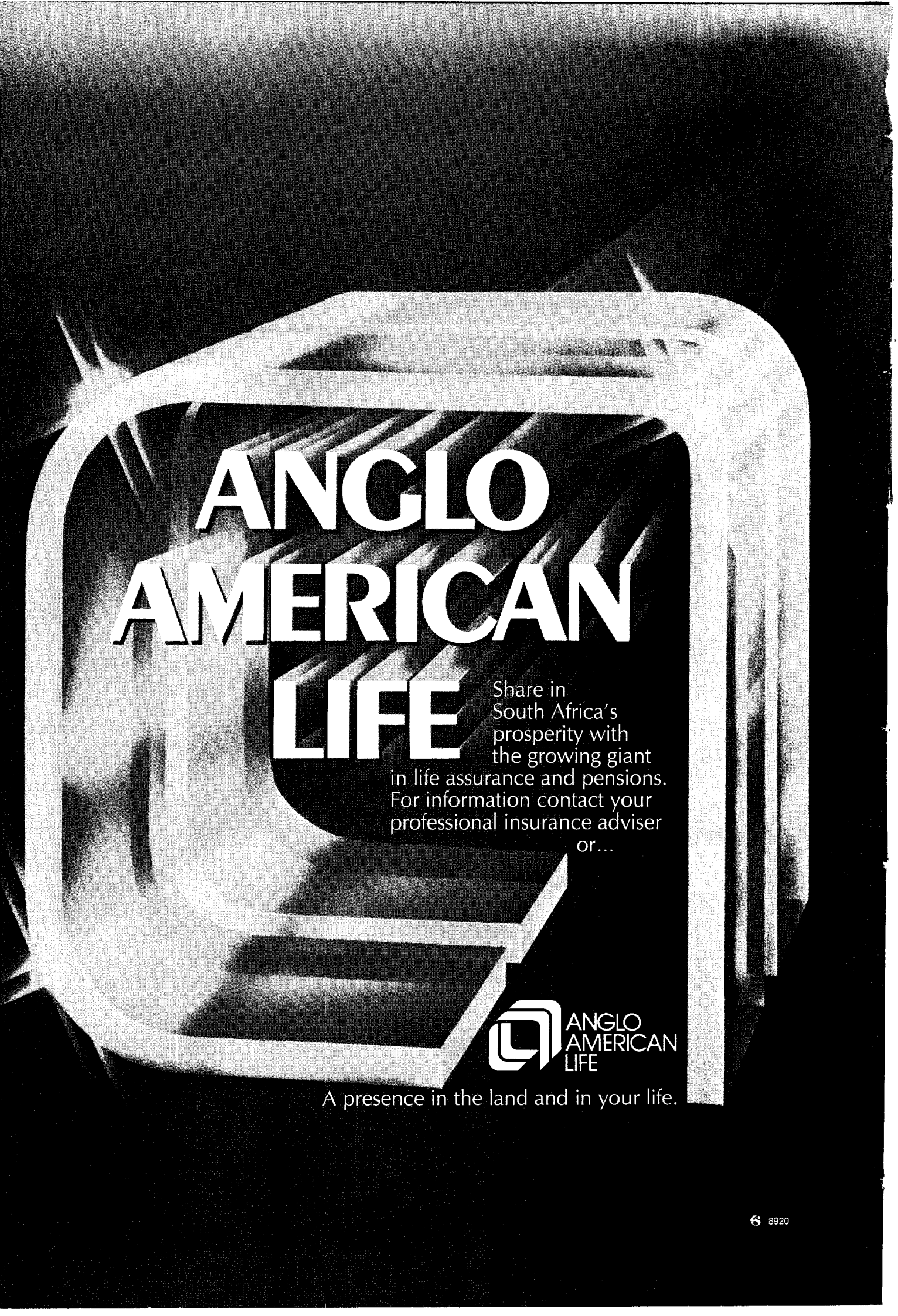
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Figure 4

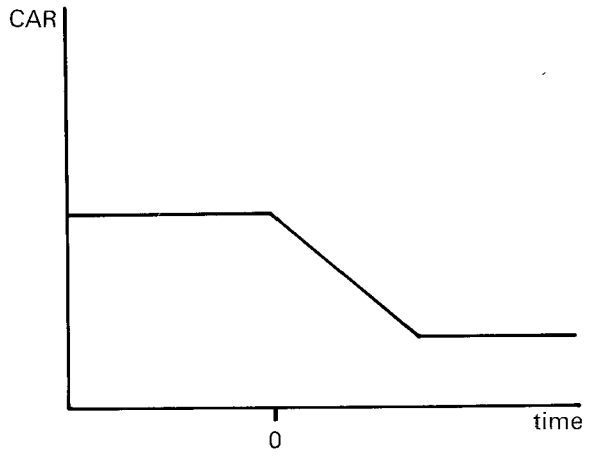


Figure 5

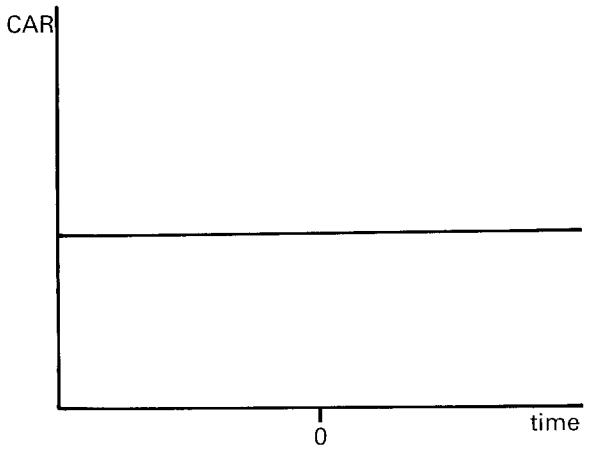


Figure 1 would occur if the market was efficient and there was positive informational value in the announcement. This follows since the CAR's are constant before the announcement and after the announcement they remain constant but at a higher level than previously. The market is clearly efficient because it adjusts to the informational content immediately and the informational content of the announcement is positive because the jump is upwards. Figure 2 has an identical interpretation except that the informational content is negative.

Figure 3 indicates a situation in which the informational content is positive (the CAR's rise after the announcement) but the market is inefficient. This follows since there is a gradual adjustment over several periods to the new equilibrium level resulting from the announcement. Thus the market is inefficient. Figure 4 displays the identical situation except that the informational content is negative.

Finally, Figure 5 indicates the situation where the informational content of the announcement is zero. This is the only case in which nothing can be said about the efficiency of the market.

It must be noted that Figures 1 to 5 indicate theoretical behaviour. In practice the plots of the CAR's will have some random variation around the straight lines. However, the informational content of the announcement and the efficiency of the JSE can be ascertained from the general shape of the CAR's.

3 THE DATA

A survey was undertaken to establish all the firms quoted on the JSE which employed LIFO at 14 November 1980. This resulted in the selection of some 32 firms (see Appendix A and B). However, only those firms meeting the following criteria were retained in the study:

(i) All shares must have been quoted continuously from 18 July 1969 to 14 November 1980 (590 weeks).

(ii) The firms must not have undergone substantial changes at any one particular time.

(iii) The firm must not only have announced a switch to LIFO but the effect must have been quantified. Any reversals on consolidation of LIFO effects would disqualify a firm.

(iv) Because the RDM 100 index was employed as a surrogate for the market, non-industrial firms were ignored.

(v) The announcement must have been made at least thirty-five weeks after 18 July 1969, i.e. since 20 March 1970 and before thirty-five weeks prior to 14 November 1980, i.e. before 14 March 1980.

These criteria resulted in a reduction of the population to twenty-one shares (see Appendix A).

Even firms making only partial changes to LIFO were considered, for it is the first change to LIFO that is of interest in this study of the accounting change. For example, a firm which converts 50% of its stocks from FIFO to LIFO in one year and the rest in the following year can be viewed as having had an accounting change in the first year only. The change of method in the second year is merely an application of a method already in use. This is further justified when it is considered that the initial change reflects management's partiality to the method.

The timing of the announcement

Unlike Sunder (1973) and Brown (1980) who used an arbitrary date of announcement in their studies of the NYSE, an attempt was made in the current study to establish unequivocally the exact timing of the release. This was achieved by direct contact with the board of directors of each company in the study. The date supplied by the company official was the date on which the firm had released an announcement of the change to the public. This varied from the date the interim results were released to Reuters (press) to the date of posting the annual financial statements. This date was then verified by reference to the source as claimed by the company and the date of the announcement (zero week in this study) was deemed to be the following Friday. Appendix A lists the firms in the study and the date of the announcement. Although it is acknowledged that all market participants will not have received the information simultaneously, by allowing a lag until the following Friday, it is considered reasonable that the information can then be deemed to be publicly available. Clearly, the problem of leakages should be borne in mind but unfortunately this factor could not be controlled in the current study.

In estimating $\propto$ and ß it is customary to omit several periods around the date of the announcement of a change to LIFO so that any unusual price behaviour in this period will not obscure the long-term relationship between R_t and $R_{M;t}$.

The difference between the actual return on the security and the return expected if relationship (1) holds can then be determined for each of the omitted periods around the date of announcement. This difference is called the abnormal return:

i.e.

$\hat{e}_t = R_t - \hat{R}_t$

where R_t is the actual return observed in period t;
$\hat{R}_t$ is the return predicted for period t by equation 1 (i.e. $\hat{R}_t = \hat{\propto} + \hat{ß}R_{M;t}$); and
$\hat{e}_t$ is the residual return in period t;

Note that $\hat{e}_t$ is often referred to as the abnormal return on the share because it is the return over and above the market return.

The second stage in the methodology seeks to examine the residual returns which may be attributable to the event being examined. To further reduce the effect of any price changes not caused by the announcement of a change to LIFO, an average residual is established for each time interval as follows:

$$\bar{u}_t = \frac{1}{N}\sum_{j=1}^{N} \hat{e}_{jt} \qquad t = -(x-1), \ldots, o, \ldots x.$$

where N is the number of securities examined;
(x−1) is the number of periods before the announcement of a change to LIFO which were omitted in the estimation of $\propto$ and ß;
x is similarly the number of periods after the announcement which were omitted; and
$\hat{e}_{jt}$ is the estimated residual of the j^{th} company in period t

Thus, for example, $\bar{u}_{-4}$ is the average, over all the securities examined in the study, of the residuals in the 4th week before their announcement of a change to LIFO. This helps further remove any market or industry effects because, for example, $\hat{e}_{1;-4}$ (the residual of the first company 4 weeks before **its** announcement of a change to LIFO) and $\hat{e}_{2;-4}$ (the residual of the second company 4 weeks before **its** announcement) are calculated at completely different calendar dates.

Finally, the average residuals are cumulated as follows:

$$Z_k = \sum_{t=-(x-1)}^{k} \bar{u}_t \qquad \text{for } t = x-1; \ldots; o; \ldots x.$$

$\bar{u}_t$ and Z_k both have expected value of zero and hence any movements away from zero in a plot of Z_k can be attributed to the announcement of a change to LIFO. It is important to note, however, that some random variation around zero is to be expected and it is only persistent or very marked deviations from zero that should be further examined.

The product of such an analysis is therefore 2x values of cumulative average residuals (CAR's) which are plotted graphically. If the event being studied (in this case the announcement of a change to LIFO) has any informational value, a movement away from zero would be expected at period 0 (the actual date of announcement). Hence, the plot of the CAR's can be used to test both the efficiency of the JSE **and** the informational content of the accounting change. This is best illustrated by reference to Figures 1 to 5.

Figure 1

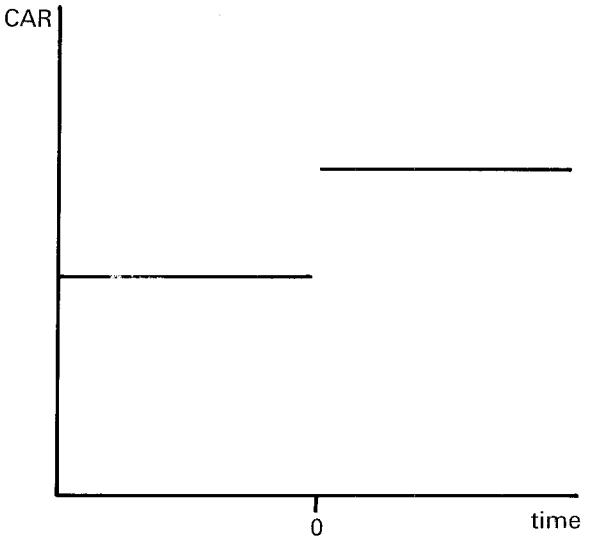


Figure 2

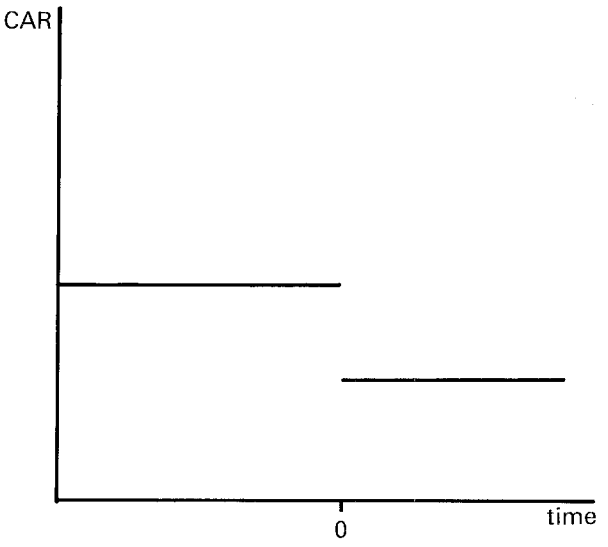
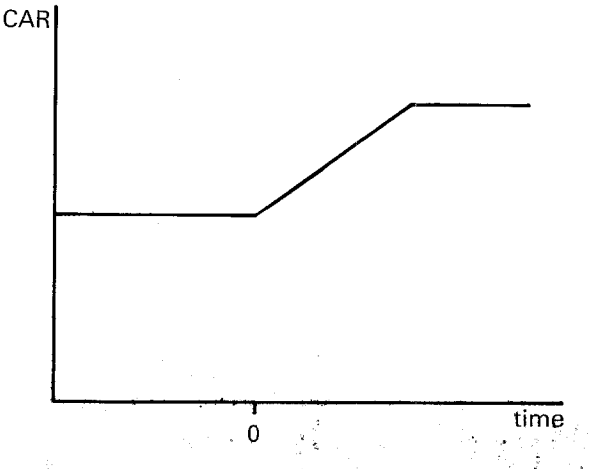


Figure 3



In order to ensure that the CAR configuration of the study group is peculiar to that group, a number of earlier studies have constructed a control group of firms which were not exposed to the event under observation. The objective of such control groups is to establish the randomness of the residuals in periods of non-occurrence of any particular event.

In order to overcome the problems of a non-equivalent control design the current study presents what it refers to as a quasi-equivalent control design. Acknowledging the difficulty in matching firms directly, the design addresses the problem of implicit matching. Thus the control group of non-changers were selected by matching each change firm with a non-change firm according to the following:

(i) The selection of a shadow firm from the same industry; and
(ii) Employing the selection method of choosing the firm in the industry with the closest valuation of inventories at the date of the change firm's switch to LIFO.

This procedure does not purport to suggest that an equivalent level of inventory holding will result in a similar impact of a change to LIFO if the shadow firm made the change. The implications of a change to LIFO depend on a number of factors including the extent of the change, the stock mix, the rate of price increase for various combinations of stock, etc. Thus no attempt is made to match equivalent firms and the level of inventory holding is really a random selection technique. Thus, the selection procedure must be emphasised as being random within the industry. Nevertheless, this approach should eliminate some of the inconsistencies of a non-equivalent control design.

A group of non-change firms was selected (see Appendix C) and the data collected in the same way as in the case of the study group. The shadow group was subject to the same procedures as the study group and the cumulative residuals were derived. The deletion period for each shadow firm was determined by the deletion period used for each partner in the study group.

Thus, the data used in the study consisted of the weekly closing price of the 42 selected shares (21 which changed to LIFO and 21 control group securities) from 18 July 1969 to 14 November 1980. Because only industrial shares were considered in the study the RDM industrial index was used as a surrogate for the market.

4 INITIAL RESULTS

Having selected the firms and constructed the data file, the method of ordinary least squares was used to estimate the parameters $\propto$ and ß in the market model

$$R_{jt} = \propto_j + ß_j R_{M;t} + e_{jt}$$

where R_{jt} is the return on the j^{th} security in period t;
R_{Mt} is the return on the RDM industrial index in period t; and
$\propto_j$ and $ß_j$ are the regression parameters for the j^{th} security.

The data used in the study comprised all weekly returns between 18 July 1969 and 14 November 1980 (590 observations) less 70 weeks around the announcement date which were deleted. The deletion period of 70 weeks consisted of 34 weeks before the announcement, the week of the announcement and 35 weeks after the announcement. These 70 weeks are omitted from the estimation data lest any unusual price behaviour in the weeks surrounding the announcement obscures the long-term relationship between R_t and $R_{M;t}$.

The actual weekly returns observed in the deletion period were then used to derive 70 residuals for each firm as follows:

$$\hat{e}_{jt} = R_{jt} - (\hat{\propto}_j + \hat{ß}_j R_{M;t}) \qquad t = -34, \ldots, o, \ldots 35$$

where $\hat{\propto}_j$ and $\hat{ß}_j$ are the OLS regression estimates of $\propto_j$ and $ß_j$ for share j. These residuals were aggregated and averaged cross-sectionally throughout the sample so that 70 average residuals denoted by $\bar{u}_t$ were derived for the entire group of 21 LIFO companies:

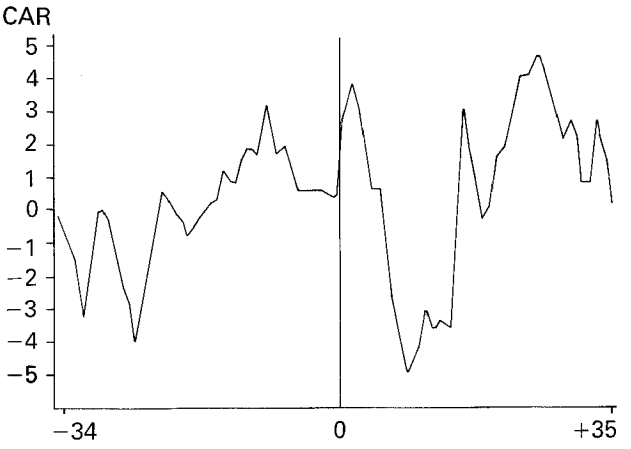
$$\bar{u}_t = \frac{1}{21} \sum_{j=1}^{21} \hat{e}_{jt} \qquad t = -34, \ldots -1,0,1,2, \ldots 35.$$

Finally, 70 cumulative average residuals (CAR's) defined by Z_t were derived for the group:

$$Z_t = \sum_{i=-34}^{t} \bar{u}_i \qquad t = -34, \ldots, -1,0,1,2, \ldots 35.$$

The CAR's were plotted and are presented in Figure 6 below.

Figure 6



The interpretation of the cumulative graph is not easy and the approach adopted in this analysis is set out below. The model employed and the aggregation of CAR's should distil confounding events so that the final CAR graph is likely to represent the impact of LIFO only. However, the assumption of the methodology may not be a complete description of reality and thus some of the CAR movement may be due to various other non-random effects albeit diluted on aggregation. In view of this possibility, although the full deletion period will be presented and analysed, the detailed interpretation and conclusion will concentrate on the twenty-one weeks surrounding the announcement of the change. Thus the graph will be reproduced with only twenty-two observations – the CAR's for weeks −11 through +10 (Figure 7). It is submitted that this time period is the most accurate description of the impact. Although arbitrary, the reduced period of examination further diminishes the possibility of confounding events disturbing the expected residuals.

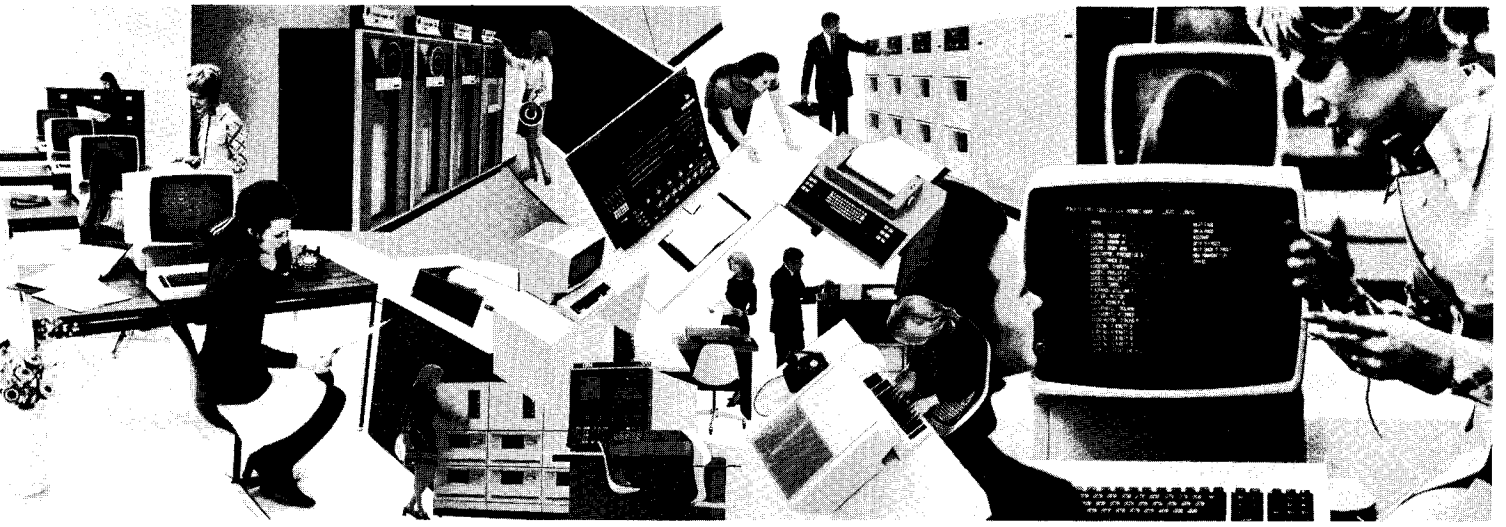


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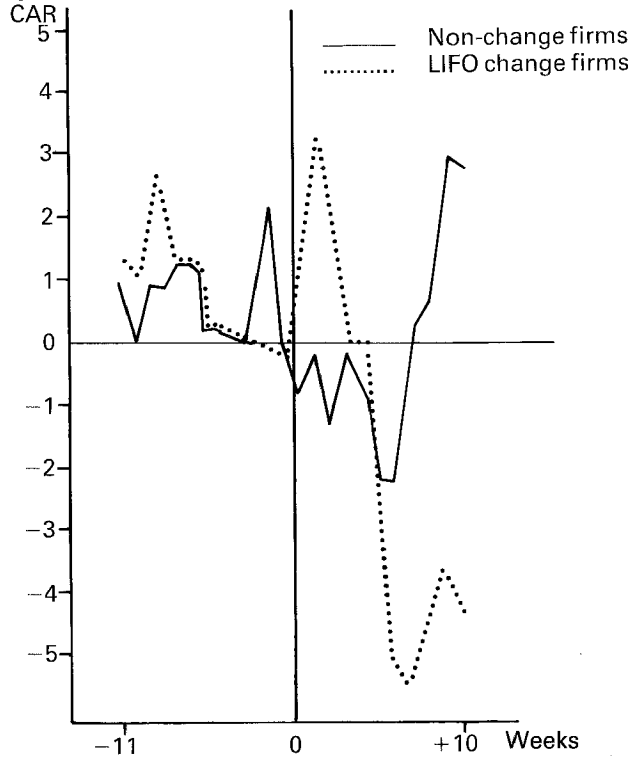
Figure 7



Little time will be devoted to trying to explain in detail the fluctuations observed during weeks −34 through −12 and weeks +11 and +35 as these may be due to spurious confounding events. The full deletion period is presented to give a full perspective only.

As the graphs are cumulative the absolute position of an observation in any particular week is irrelevant. What is of importance in a week-by-week analysis is the relative position to the previous week's observation because this measures the CAR for a particular week. Further, in this particular study the period after week 0 (the week of the announcement) is the most interesting. These two factors taken together justify the use of a sliding scale in the analysis of the reduced period graphs. Thus each category's CAR value was equated to zero for week −1.

In order to test the efficiency of the JSE and to ascertain the informational content of a change to LIFO only the graphs of the 21 LIFO firms need be studied. The graph of the quasi-control group in Figure 7 is only presented to show how the configuration of residuals is different for the change firms and the non-change firms. That is, the control group clearly shows through Figure 7 that the LIFO change group behave differently on aggregate to the rest of the market. Thus the announcement of a change to LIFO definitely does have an impact on share price and this is studied below.

Figure 6 indicates that initially the CAR's fluctuate between 0 and −4% settling back to 0 in week −15. These fluctuations are fairly random and the cumulative average residual at week −15 is at the expected zero level.

However, for weeks −14 through −9 there does appear to be a certain non-random behaviour. It seems that the change firms experienced a positive abnormal return for six weeks of cumulative value 3%. This is rather difficult to interpret. It may however be due to leakages of the impending announcement. Thus the trading activities of investors with prior knowledge of the switch to LIFO may be responsible for this non-random behaviour. It may however be an inexplicable confounding event. This cumulative abnormal return is lost in the following three weeks and the CARs settle back to the expected zero value for the six weeks up to the week of the announcement.

After the announcement there is a definite occurrence of abnormal positive return so that week +1 has a cumulative value of 3,4% however this is immediately followed by a number of successive weekly negative abnormal returns so that the CAR for week +2 is −3,8%! This indicates a very negative impact of a LIFO change considering the negative abnormal return of −7,2% for the period +1 through +12. Thereafter there follow rather volatile, although random, fluctuations of the cumulative residuals. It is considered inappropriate to interpret extensively the behaviour of the CARs beyond week +12.

Turning now to Figure 7 attention will be directed to the 11 weeks before the announcement and the 11 weeks after the announcement (including the week of the announcement). Effectively this assumes the fluctuations before week −11 and after week +10 to be random or not a function of the announcement. Obviously the longer the period of the analysis the greater the chance of confounding effects, obscuring the reaction to the announcement.

Apart from the possibility of a leakage effect, the behaviour of the residuals immediately prior to the announcement is as expected, i.e. a random movement along the zero line.

There is a definite reaction in the week of the announcement. Considering the model and methodology employed this can be confidently attributed to either the announcement of a switch to LIFO or to the fact that an announcement was made. There is a very rapid increase in abnormal return to 4,3%, however this is followed by a slow but very definite trend downwards moving steadily down to a low of −5%. Thus there was a cumulative negative return of 8,4% in 7 weeks after which the effect of LIFO dissipitates and the residuals level off. Movements thereafter are not attributed to the effect of a change to LIFO.

Thus it would appear that although there is an initial positive reaction it seems that there is an overall negative reaction to LIFO of about −4%. Further, it seems that the downward adjustment has taken at least 8 weeks.

The interpretation does not intend to be dogmatic. However it appears that the potential efficiency exhibited by the rapid initial upward movement is subsequently reversed by an overriding inefficiency which slowly impounds the signal negatively. The implication then appears to be that the market is inefficient in respect of this piece of information for two reasons:

(i) the market appears to be deceived by the negative impact on earnings despite the improved cash position; and
(ii) this negative impounding seems to take a long time.

The obvious implication of this is that an individual who sells short shares of a LIFO switcher would have earned an abnormal return of 4% based on publicly available information.

The movement of the residuals of a quasi-equivalent group of non-change firms followed a random pattern. Although a week-by-week comparative analysis between the two would be meaningless, the trend is apparent.

Finally, it must be stressed that the *raison d'être* of the shadow group, was merely to ensure that the results of the study were not a function of the model.

5 FURTHER ANALYSIS BY PARTITIONING

The results presented in the previous section were aggregate results for all of the 21 securities examined in the study. However there may be numerous other factors which might cause the share price of an individual company changing from FIFO to LIFO to behave somewhat differently. Therefore, to examine the effect of a change to LIFO more closely further tests were carried out.

The study group was thus partitioned into pairs according to the following criteria:

(a) High beta risk/low beta risk
(b) High earnings impact/low earnings impact
(c) Pre-1979 changes/1979 and post-1979 changes.

The procedure was to classify all firms with a beta above 0,75 as high beta firms and those with beta below 0,75 as low beta firms. Firms which reported earnings which were less than 80% of the earnings that would have been reported under the FIFO system were classified as high earnings impact firms, that is, firms whose FIFO earnings were reduced by less than 20% were classified as low earnings impact firms.

Finally, the pre-/post-1979 criteria refers to the date of the announcement and not the financial year of the firms.

The result was:
Two groups in category (a) of 11 (high ß) and 10 (low ß) firms;

Two groups in category (b) of 8 (high earnings impact) and 13 (low impact) firms;

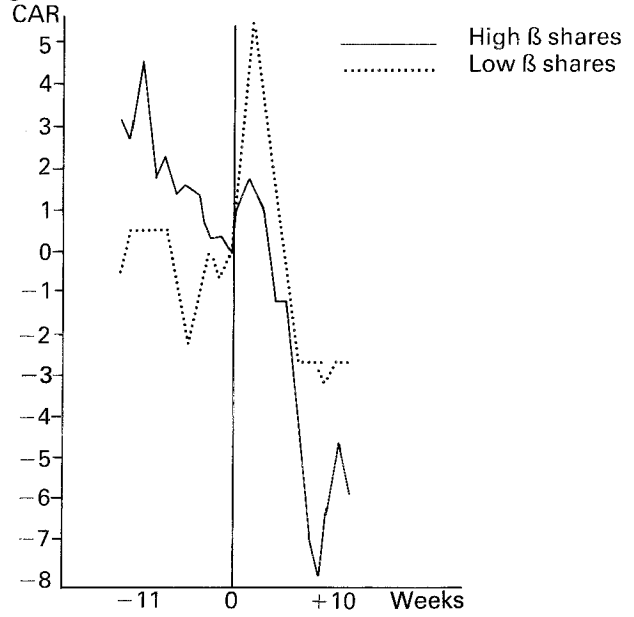
Two groups in category (c) of 10 (pre-1979) and 11 (post-1979) firms.

Appendix A shows the date of the change, the beta values and the percentage by which FIFO earnings were reduced for all firms in the study group.

(i) Relative risk

It can be argued that the relative risk of a firm is an exogenous intervening variable in the market's interpretation of a change to LIFO, i.e. an outside factor which effects the extent of the reaction. That is, there will be a differential market reaction to the announcement of a change to LIFO by high risk companies and low risk companies. This hypothesis can be examined with reference to Figure 8 below.

Figure 8



Prior to week 0 the high risk firms show a definite non-random pattern. Week −9 to week 0 was an almost continuous period of negative returns resulting in an abnormal negative return of 4,5%. In the same period the low risk firms exhibited fairly random residual behaviour. These differences in the pre-change period are extremely difficult to interpret, suffice to say that the abnormal negative return exhibited by the group as a whole prior to week 0 (Figure 7) appears to have been caused by the high risk firms.

Immediately after the change (i.e. after week 0) there appears to be differential reaction with the low risk firms showing an average abnormal return of 5,4% in the two week period comprising the week of change and week +1. During the same two weeks the high risk firms showed an average abnormal return of 1,6%. Thereafter there was a period of definite non-random behaviour when abnormal negative returns were earned for 6 or 7 weeks before levelling out.

The reaction in the first two weeks was considerably greater for the low risk firms, which suggests that the relative risk is an exogenous intervening variable. This could be explained by the fact that the market is more confident in the management of low risk firms. However, it should be noted that for the next six or seven weeks both firms experience almost identical abnormal negative returns. The interpretation is by no means obvious but it would appear that although the effect of LIFO was negative on both, the change seems to have had a less severe impact on returns in the case of low risk firms. This may be explained in terms of the market's interpretation of management's motives and expectations. Perhaps the market is sceptical of any changes made by high risk firms. Further, the market may feel the change represents a risky way for an already risky firm to raise extra cash.

It is interesting to note that the market took just as long to impound the information in both cases.

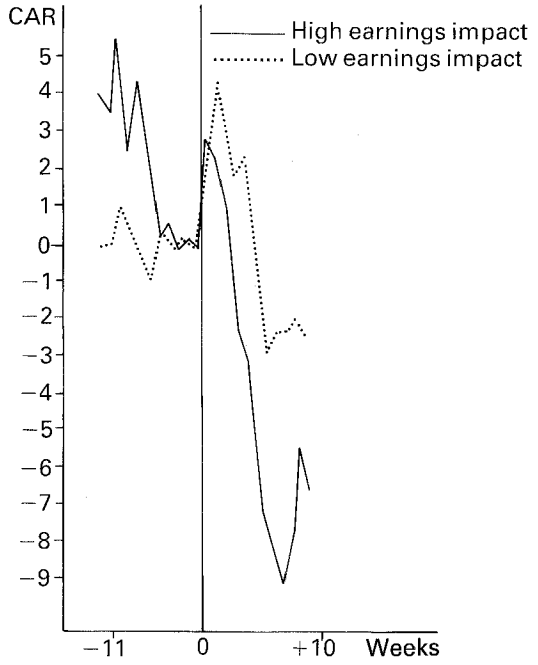
Thus it is concluded that relative risk seems to be an exogenous intervening variable, however the impact is negative for both high and low risk firms.

(ii) The effect of impact on earnings

It might be hypothesised on the basis of the results presented in the previous section that the market reacts in the direction of the impact on earnings of a change to LIFO and thus the magnitude of the reaction will be directly proportional to the magnitude of the impact on the earnings.

This aspect of the study can be examined with reference to Figure 9.

Figure 9



Again it is difficult to interpret the pre-change pattern and indeed it is probably pointless. However, this partition criterion results in two groups which display similar and fairly random configuration of CARs immediately prior to the week of change. This is to be expected in a period during which no common event with informational value impacted the firms. The pattern after the week of the announcement of a change to LIFO is quite different for each group.

The initial reaction to the announcement was about a 4% positive abnormal return in the case of the low impact firms while it was about 3% for the high impact firms. Thereafter there followed a period of abnormal negative returns for both groups. There was a startling negative abnormal return of approximately 11,5% for the period between week +1 and week +7 for the high impact firms whereas the negative abnormal return for the low impact firms for the same period was only about 7%! Admittedly by week +10 about 2,5% of this had been regained by the high impact firms. It must be emphasised, however, that the returns after week +7 may be part of the expected random return. Week +7 represents the end of a non-random period of abnormal returns, in both cases.

Thus, it appears irrefutable that the market reacts in the direction of the earnings figures and not in relation to the economic implication of the change.

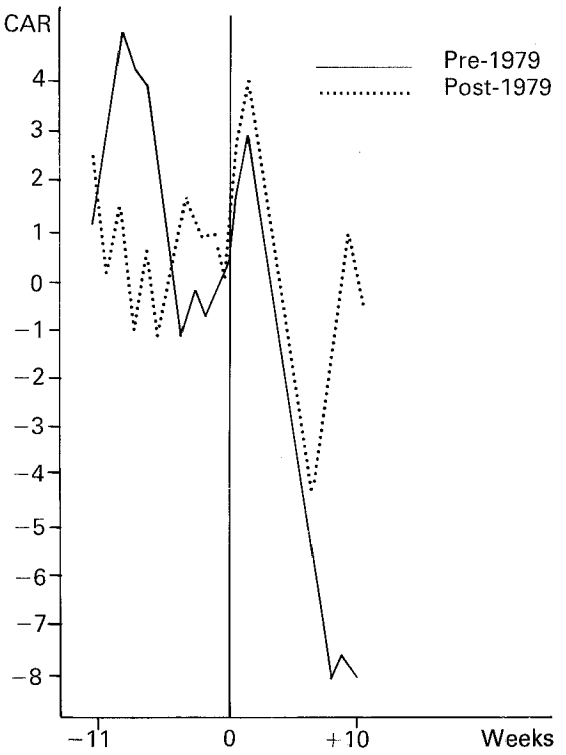
It is interesting to note that in the case of both groups the market once again took the same amount of time to negatively impound its reaction to an announcement of a change to LIFO.

(iii) The effect of time

The securities examined in this report changed from FIFO to LIFO at different times between 1975 and 1980. As more firms adopted the change so the average investor has become more aware of what the change involves and what it might mean to future dividends. Thus it is of interest to examine whether there has been any change in the market's assessment from the early LIFO switchers to the more recent switchers.

Figure 10 below presents the plot of the CAR for the pre-1979 change group and the post-1979 group.

Figure 10



As mentioned before, the pre week-0 period is very difficult to analyse and in the absence of clear proof to the contrary it must be concluded that both groups display fairly similar behaviour. But for the post week-0 analysis certain differences are apparent.

Both groups had the same initial positive reaction of the same magnitude for the same period. This reversed for both groups in week +2 (CAR +3%). The downward trend however persisted considerably longer for the pre-1979 change group and eventually bottomed out in week +11, having experienced a negative cumulative abnormal return of 10,8%. However, the post-1979 change group bottomed in week +7, thereafter a series of positive returns were earned (as there was for the pre-1979 group after week 11).

This is a very interesting result for it implies that in the case of the most recent changes to LIFO the market reaction has still been negative but far less severe. The net negative return between week 0 and week +7 for the post-1979 change group was around 4%, however the net negative return for the pre-1979 change group between week 0 and 11 was 7,8%! This implies that the market reaction has been almost halved in the most recent changes. This implies that the information consumption process may be changing. The other very interesting aspect of this result is that the market impounded the information in the case of the post-1979 change group nearly 40% quicker than in the case of the pre-1979 change group.

The result is extremely encouraging for it appears as if the market is becoming educated with regard to LIFO and although it still seems to be deceived by the accounting numbers it is impounding the information more quickly and less severely.

This may be explained by the fact that as more and more companies start changing to LIFO the market becomes increasingly aware of the implications of such. However, traditional concern over the accounting earnings figures still seems to prevail.

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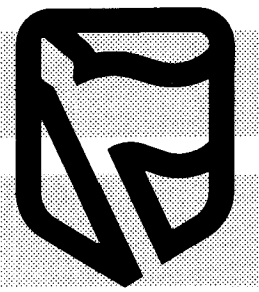

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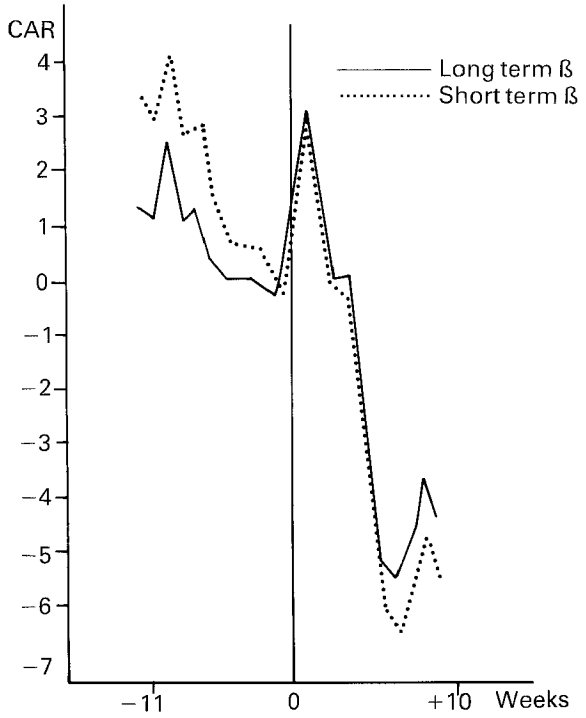
(iv) The effect of non-stationarity in the market model

The beta coefficients used in removing the overall market effect were estimated using approximately 10 years of past data. It is possible that if the beta coefficient is not stable over time (which seems to be the case – Affleck-Graves, Money and Carter (1981)), the use of a short-term beta estimate could result in a substantially different configuration of CAR's than those presented in Figure 7.

To examine this possibility the beta coefficients were re-estimated and the analysis of the previous section repeated using only short term periods of data, namely 70 weeks prior to a 70 week exclusion period. No data after the exclusion period were used in view of the potential risk changes that may accompany a change to LIFO. The CARs so derived are comparatively analysed with the CARs based on the long-term data and the results presented in Figure 11.

Figure 11



It should be noted that the graph of the long-term ß is merely a reproduction of Figure 7 for the reader's convenience.

Little formal analysis is required. It is patently obvious that the two graphs are almost identical and would certainly not lead to a different interpretation as to the impact of the announcement of a change to LIFO. Thus, the conclusion drawn is that results based on short-term data would not result in a significantly dissimilar configuration of CARs. For this reason the potential non-stationarity of ß is not considered to be problematic in the current study.

6 CONCLUSIONS

The results present some very interesting information, and taken as a whole provide a certain insight into the process of information consumption by the JSE. To summarise, it appears that the announcement of a switch to LIFO has a substantial negative impact on share returns. This negative impact seems to be directly proportional to the extent to which the FIFO earnings are reduced by the new valuation method. Thus it would appear that the market reacted to the accounting numbers rather than to the economic message inherent in a change to LIFO.

Further, this negative impact is impounded into prices rather sluggishly. This factor taken with the reaction to the accounting numbers which was counter-directional to the economic implications suggests the double inefficiency of the JSE. Not only was the market unable to see through the accounting numbers but it took a long time to adjust to the announcement.

However, there is a gleam of hope! The market seems in the case of the most recent changes to be impounding the informational content of a change to LIFO substantially more quickly and although still in sympathy with the earnings figures, the effect has been less drastic. Thus, the market appears to be 'learning' how to interpret the change to LIFO.

It is important to note that an alternative interpretation is possible. The negative abnormal returns observed in the post announcement period may not be caused by the announcement itself but may be a function of a selection bias. That is, only a certain type of firm may switch to LIFO, firms in which management anticipate a cash crisis and a change to LIFO represents an effort to avert such. This interpretation implies that the informational value of LIFO cannot be ascertained. However, it should be noted that the model was designed to obviate the effects of any confounding events and thus the important conclusion reached by the study is that the announcement of a change to LIFO does have a negative impact on the share price. Whether this is because of the economic implications of the change or because the investment public view the announcement of the change as an indication of a possible cash crisis, the model cannot determine.

As far as generalised conclusions on market efficiency, again a situation specific inference can be drawn, namely that the market is information inefficient in respect of the announcement of a change to LIFO. It could be argued that as only 21 firms have been studied, inferences cannot be drawn as to the efficiency of the market as a whole. It is submitted, however, that as the 21 firms represent the universe of LIFO changers (at the cut-off date for this study) and as there are no barriers to the purchase or sale of these shares on the market, the existence of a group of over-valued (according to this naïve market) shares for a number of weeks is unjustified in an efficient market. It is submitted that to be efficient a market must impound **all** relevant information quickly and unbiasedly so that no shares are over or under-valued according to the publicly available information set.

Thus, the overall conclusions of this study are twofold:

Firstly, the efficient market hypothesis is not valid for the JSE. This evidence should be of value to future capital market researchers. However, the market is 'learning' to interpret the change to LIFO but it cannot be determined whether this is as a result of a growing efficiency in the market itself or in a growing understanding of LIFO.

Secondly, the evidence is that a change to LIFO has a negative impact on share returns directly proportional to the negative impact on earnings. Thus the investing public appears to be more concerned with the magnitude of the accounting numbers than with the economic benefits which may accompany a change in accounting procedure.

Finally, it should be noted that the implications of an inefficient market for financial reporting, accounting policy decisions and standard setting are hair-raising. However a discussion on these implications is beyond the scope of the paper.

Appendix A

LIFO firms included in the study

Firm		Date of announcement	% reduction of FIFO earnings	ß
1	Anglo Alpha Cement Limited	1 March 1979	6	0,90
2	AECI Limited	11 March 1976	14	0,80
3	The Natal Chemical Syndicate Limited	23 August 1979	50	0,85
4	Seardel Investment Corporation Limited	31 August 1979	20	1,00
5	African Cables Limited	1 October 1976	13	0,35
6	Huletts Aluminium Limited	1 June 1977	24	0,55
7	National Bolts Limited	26 September 1975	50	0,35
8	Stewarts & Lloyds of S.A. Limited	22 November 1979	31	1,25
9	Vereeniging Refractories Limited	20 February 1980	9	0,55
10	Coates Brothers (S.A.) Limited	24 January 1980	23	0,60
11	Kohler Brothers Limited	15 February 1980	14	0,35
12	Metal Box S.A. Limited	1 June 1977	41	0,60
13	Sappi Limited	9 March 1976	7	0,65
14	Huletts Corporation Limited	1 June 1977	5	0,80
15	Romatex Limited	30 April 1979	8	1,20
16	Sterns Diamond Organisation Limited	13 June 1979	42	0,90
17	Trek Beleggings Limited	23 April 1975	8	0,85
18	Steelmetals Limited	27 September 1976	4	0,75
19	Metal Closures Group S.A. Limited	7 February 1980	13	0,70
20	Suncrush Limited	21 March 1975	7	0,50
21	B & S Steel Furniture Company Limited	31 May 1979	11	1,00

Appendix B

LIFO firms excluded from the study

Rustenburg Platinum Holdings Limited	Non-industrial
Haggie Limited	Reversed effect
Malbak Limited	Not quantified
Associated Engineering (S.A.) Limited	Always used LIFO for copper stocks
Sasol Limited	Used LIFO from date of flotation
Scottish Cables (S.A.) Limited	
Edgars Stores Limited	
Cullinan Holdings Limited	
The Union Steel Corporation of S.A. Limited	Change announced after cut-off date
Plate Glass and Shatterprufe Industries Limited	
Anglo American Industrial Corporation Limited	

Appendix C

Control (shadow) group of non-change firms

1 Everite Limited
2 Sentrachem Limited
3 Plascon Evans Paints Limited
4 Rex Trueform Clothing Company Limited
5 ASEA Electric South Africa Limited
6 African Oxygen Limited
7 Globe Engineering Works Limited
8 Dorman Long Vanderbijl Corporation Limited
9 Dunswart Iron & Steel Works Limited
10 Press Supplies Holdings Limited
11 Evelyn Haddon & Company Limited
12 Nampak Limited
13 Carlton Paper Corporation Limited
14 Lonrho Sugar Corporation Limited
15 African and Overseas Enterprises Limited
16 Gresham Industries Limited
17 Chemical Holdings Limited
18 Reunert & Lenz Limited
19 Trio-Rand (S.A.) Beperk
20 Uniewyn Beperk
21 Sam Steele Holdings Limited

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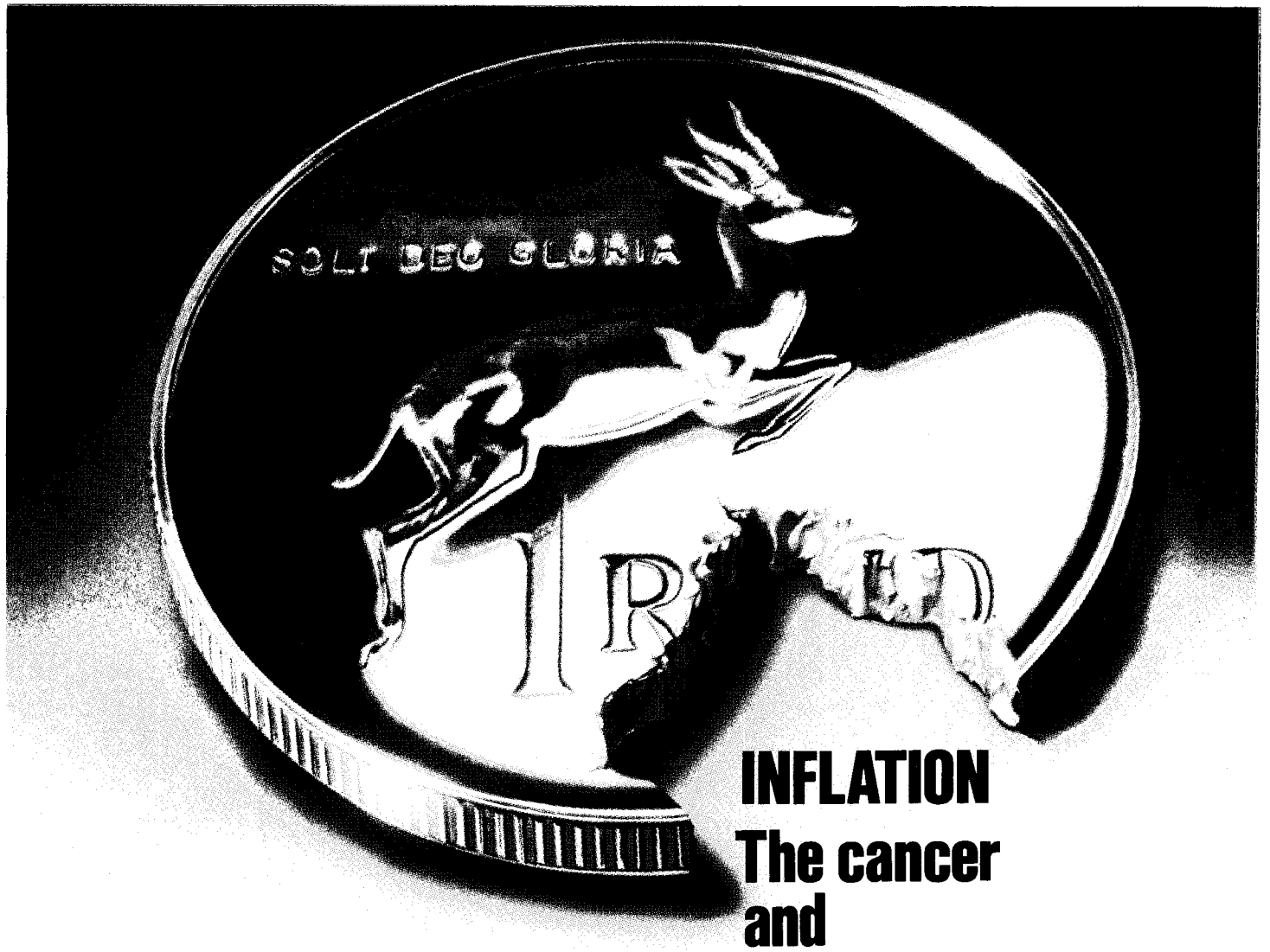

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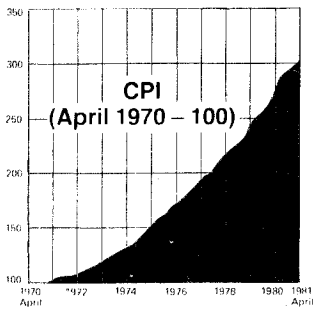

The graph illustrates the escalation in the cost of living since 1970 as measured by the S.A. Consumer Price Index.

	PRICE 1970	PRICE 1981	PRICE 1991
Litre of petrol	9,2c	61,0c	?
Small car	R2 315	R7 795	?
Loaf of bread	9,4c	42,0c	?
Carton of milk	12,0c	55,0c	?

Examples of the alarming rate at which the purchasing power of money has reduced.

Assuming	1981	1986	1991
7½ % pa	R10 000	R6 966	R4 852
10% pa	R10 000	R6 209	R3 855
12½ % pa	R10 000	R5 549	R3 079

The purchasing power of R10 000 will reduce as follows, assuming various rates of inflation.

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By P. J. C. Seneque and B. M. Gourley

Dividend policy and practice in South Africa

INTRODUCTION

For over twenty years the rationale underlying a firm's dividend decision has attracted the attention of financial analysts and academics and has led to an extensive body of theoretical and empirical research. In broad terms, this continuing interest has two sources, both based on the neo-classical theory of a firm's objective to maximise shareholder wealth. Firstly, what effect does a firm's dividend policy have on its valuation, and secondly, is the decision chiefly influenced by its financing policies or its investment policies? Divergent views have been and continue to be expressed. It is an inescapable fact, however, that dividends flow from the decisions of the firm's directors and that such decisions must reflect management's perception of their responsibilities and objectives. What are the factors which influence their decision? Within what framework or context is their decision taken? It is to these questions that this study is addressed.

This paper therefore examines the so-called pragmatic approach to a firm's dividend policy. To do this, we undertook a survey of a representative sample of South African companies quoted on The Johannesburg Stock Exchange. The survey took the form of a short questionnaire addressed to the financial executives of these companies. The first section of our paper gives a very brief introduction to the current literature and views extant on the dividend problem. We do this because some of the views published have influenced us in the design of our survey. Next, we formulate five hypotheses and this is followed by a discussion of the survey and the responses which it elicited. Finally, we summarise our findings and suggest some conclusions to be drawn.

THE DIVIDEND DECISION

There are two broad schools of thought to a firm's dividend policy – the theoretical (or normative) approach and the practical (or pragmatic) approach. The literature extant is overwhelmingly the work of academics and as a result is concerned with the theoretical debate. Much of the earlier works, a direct result of the input of neo-classical theory, such as that of Modigliani and Miller (1961), Gordon (1962 and 1963), Solomon (1963) and Walter (1967) revolved around the impact of the dividend decision on the valuation of the firm and the consequential relevance or irrelevance of this decision.

Protagonists of the school that support dividend relevance base their propositions on empirical investigations that have been carried out to identify the variables that influence share prices. These investigations seemed to indicate that current dividends alone explain a considerable proportion of variations in price. On the other hand, the classic dividends-irrelevance proposition of Miller and Modigliani was that, in a perfect capital market, dividend policy cannot matter. The important point here is that in a perfect capital market the value of any asset depends upon real economic considerations (earnings and investments) and not the manner in which the return from the asset is packaged (dividends and capital gains). However, the assumption of a perfect capital market is not consistent with reality. The two most important imperfections in the market which might systematically bias investors in favour of one specific form of return are:

1 transaction costs; and
2 differential income taxes (as between classes of investors and forms of return – dividends and capital gain).

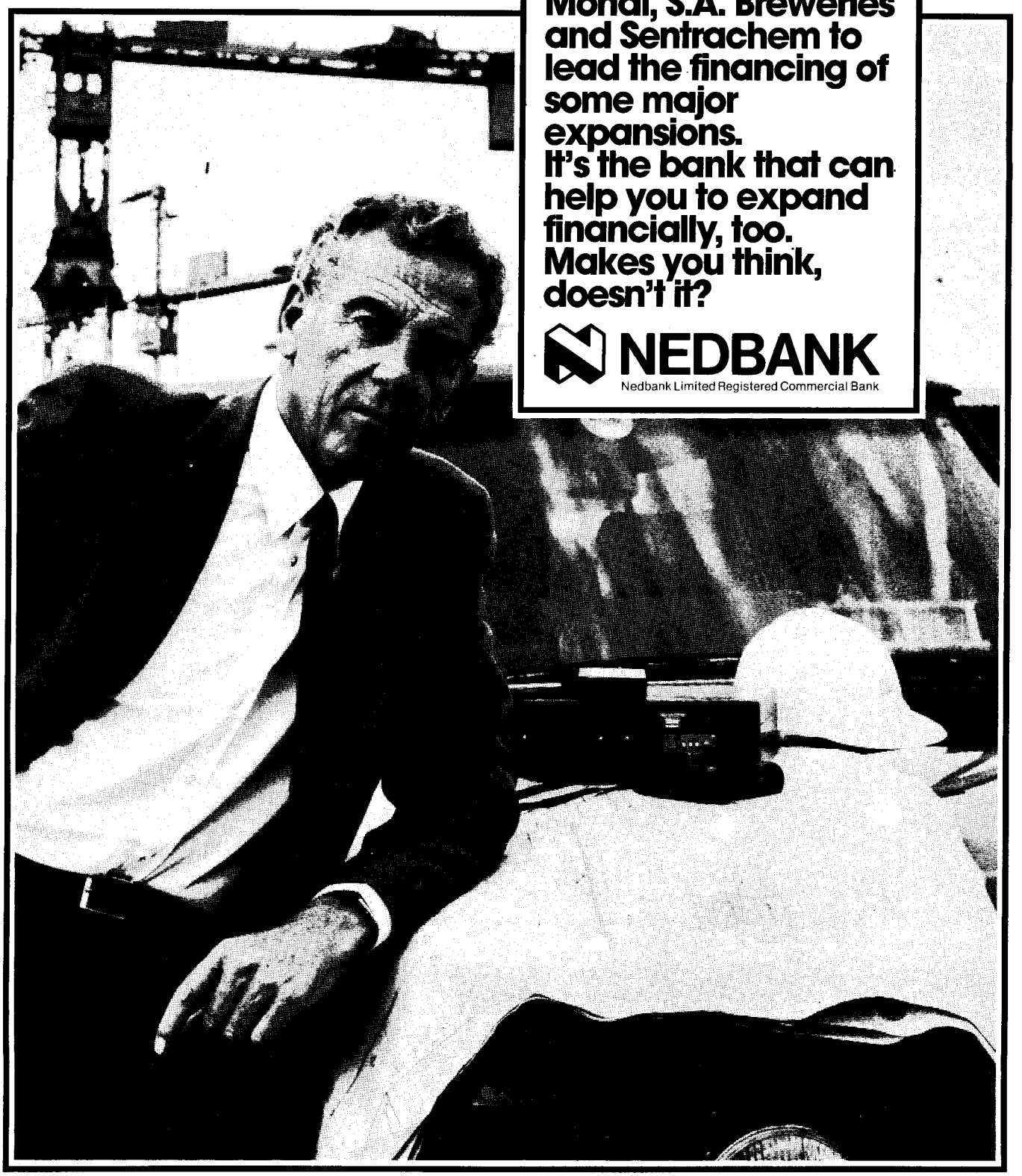
There are several researchers who have used the tenets of portfolio theory and efficient market theory to demonstrate that these imperfections do not alter the basic proposition. Black describes a rational investor as one who *"will buy a well diversified portfolio, and hold on to it. He will generally sell only to establish tax losses, or when he needs the money. He may borrow against his portfolio when he needs money, instead of selling, to avoid realising capital gains. He will minimise investment expenses, brokerage costs, and taxes" (1971, p.457).*

Thus, according to this theory a rational investor will pursue a passive portfolio strategy and similarly a rational management controlling a firm's funds in an efficient market would pursue a 'passive residual' dividend policy.

". . . 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 expected yield on internal investment is higher than the capitalisation rate for earnings of the quality expected. After all such investment opportunities have been exhausted, any internal funds remaining would be distributed to shareholders as cash dividends." (Solomon, 1963, p.139)

More recent research has concentrated on market imperfections being the underlying cause for whether dividends do not matter in practice. Elton and Gruber (1970), Black and Scholes (1974), Pettit (1977) and Miller and Scholes (1978) are examples of this type of research. Another area of recent interest has been that of the information content of dividend announcements in that dividend changes (or stability) act as signals from management to the market. Authors in this field include Laub (1976), Gonedes (1978) and Taylor (1979). Cadle (1981) contends that in fact the initial debate has been resolved and maintains *"the dividend controversy thus revolves around market imperfections – transaction costs, taxes and redistribution of wealth among security holders."* It is not our intention to review the debate but the results of the research studies are extremely important to the establishment of company dividend policy. What position do management appear to take?

The literature in respect of surveys of company dividend policies appears to be very sparse and we have been able to identify three in the past twenty-five years and these are by Lintner (1956), Thomson and Walsh (1967) and Hawkins and Walsh (1971). All three studies were conducted in the USA and thus reflect the American attitude. The Hawkins and Walsh study was undertaken for the Conference Board and we have been unable to trace the original work and have relied on Cadle's survey.



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No comparable survey has been undertaken in the UK but we understand one is presently being conducted by Theobald and Cadle of the University of Manchester. The results and conclusions of the three American surveys have a great deal in common and the major factors influencing the practices of USA companies may be summarised as follows:

1 The dividend decision is regarded as an active and primary variable and not as a passive residual.
2 The company's earnings and future prospects is a dominating influential factor.
3 The maintenance of a continuous record of dividend payment and a stable rate of dividend per share is a significant factor.
4 The company's cash flow, current liquidity and future cash needs are regarded as important considerations.
5 The needs and expectations of shareholders are given due recognition.
6 There is some evidence of consideration of a (long-term) target pay out ratio.
7 The availability of investment opportunities does not appear to be a matter for serious consideration.

As Thomson and Walsh (1967, p.688) state:

"For the most part the companies desire to give 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."

THE HYPOTHESES FORMULATED

The purpose of our survey was generally to gain some basic insight into the dividend policies and practices of South African companies and more specifically to determine whether the factors which influence dividend policies in South Africa were the same as those identified in the USA.

In addition, we wanted to establish to what extent a theoretical belief in or the acceptance of a theory, subject to the constraints inherent in that theory, would affect practice.

In our view, the South African economy and its industrial structures are not very dissimilar to those prevailing in the USA. South Africa has a complex capital market with a wide range of financial institutions, a broad section of sophisticated investors and an active and reputable stock exchange. There are, however, two differences to be mentioned. That is the nature and degree of exchange control regulations and the system of taxation. However, we suggest that these differences do not affect the major factors which are taken into consideration by management when making their dividend decisions.

Accordingly, we formulated the following hypotheses:

1 Management would follow dividend policy which can be described as an active variable. This is to say, irrespective of the number of desirable and acceptable investment opportunities which could be financed from the company's internally generated funds (retained earnings), the payment of a dividend would be of paramount importance.
2 That the majority of financial executives would not believe in the efficiency of The Johannesburg Stock Exchange as a capital market.
3 That those executives who did believe in the efficiency of The Johannesburg Stock Exchange would support (or advocate) a dividend policy which is a passive residual and they would hold the view that shareholders should be indifferent between dividend income and capital gains.
4 That in ranking those factors which influence a company's dividend policy continuity of payment of a dividend would be placed first followed by a stable rate of dividend payment.
5 That the most important factors influencing a dividend policy would be the company's past and prospective earnings.

THE SURVEY

Our survey was conducted in 1980. It consisted of a short questionnaire of six questions addressed to the financial executives of a sample of companies listed on The Johannesburg Stock Exchange. A copy of this questionnaire with a summary of the responses received is attached as an Appendix to this paper. The sample used was drawn from those companies used as constituents in the JSE Actuaries Index as at 30 April 1980. The constituents of the index number 145 companies out of 491 listed companies.

From this sample of 145 companies, responses were received from 70 companies (48%) but 8 of the respondents were clearly from the same group (with the same financial executive) and if all eight were included there would be an obvious bias. We have accordingly reduced our sample size by 7 to 138 companies and our number of respondents to 63. These respondents were from 25 separate sectors of the stock exchange. Thus, we have a response rate of 46%. We regard this as satisfactory and the respondents as sufficiently representative of South African companies. It will be noted that the questionnaire was short and simple and this was done in the knowledge of the heavy demands already made on senior executives' time. We would like to express our thanks to those who responded so readily to our survey.

We will now comment on the responses.

1 Dividend policy pursued

In order to establish whether management view the dividend as relevant or irrelevant perhaps the most direct way of finding out is to pose the question *"Is the dividend policy pursued by your company best described as an actual variable or a passive residual?"* This was question 1 of our questionnaire.

Of the 63 valid respondents, 57, that is 90%, stated that their companies pursued a dividend policy which is an active variable. This is a very high proportion but nevertheless in line with our expectations. It also confirms our first hypothesis. In our opinion, this very high response is significant in that it indicates that companies' managements see dividends as having a positive role in investors' perceptions of a company, an indication which is supported by many of the respondents' replies to questions 4 and 6.

Of the six companies whose financial executives stated they pursued a dividend policy which can be described as a passive residual only one gave completely consistent responses to the remaining questions. That one respondent believed in the efficiency of The Johannesburg Stock Exchange, believed that shareholders should be indifferent as between dividend income and capital gains and also in question 5 gave the most important

ranking to *"the opportunities for investments"* with *"anticipated need for funds"* second. Although all the other five respondents believed in the efficiency of The Johannesburg Stock Exchange, none believed that shareholders should be indifferent between dividend income and capital gains and only one ranked as the two most important factors *"the opportunities for investment"* and *"anticipated need for funds"*.

2 The efficiency of markets

Reference to the copy of the questionnaire (see Appendix) will show that question 2 was divided into four parts. The question was designed to test hypotheses 2 and 3. The responses were perhaps surprising in view of the answers to the first question – 53 of the respondents (84%) believed in the efficiency of the capital markets of which 47 (75%) also believed The Johannesburg Stock Exchange to be efficient in the sense of the semi-strong form of the efficient markets hypothesis. Of these 47 respondents, 41 were companies that viewed the dividend as an active variable. Thus, it would appear that while directors do believe a dividend should be an active variable they do not consider this belief as inconsistent with their belief in The Johannesburg Stock Exchange being efficient. Some of the reasons for this can be found in the responses to the next question where, of the 47 respondents who believed the exchange to be efficient, 42 (90%) believed that shareholders should **not** be indifferent as between capital gains and dividend income. In question 2(iv) 17 (40%) of the 42 respondents elaborated on the reason for their response. The reasons given are enlightening and highlight the imperfections in the market:

"directed by controlling company" (Property Constituent)
"our majority shareholder expects a dividend income" (Electronics, Electrical and Batteries Constituent)
"our upstream shareholders are investment companies requiring dividend income" (Sugar Constituent)
"eventual owner is a US multinational that prefers international type acquisitions and requires funding through dividends equalling profits" (Building and Construction Constituent)

These imperfections do not affect the concept of market efficiency in the sense that such imperfections are all publicly available information and would have been impounded into share prices.

It is clear from the responses to question 2 that hypothese 2 and 3 are rejected. It would seem company executives are of the opinion that while the market is efficient it is not perfect and that these imperfections result in the fact that an active and positive dividend policy satisfies the needs of (the majority?) shareholders. Thus, the existence of imperfections take priority over possible investment opportunities, a decision which may not be consistent with the objective of maximising shareholder wealth.

3 Factors affecting dividend policy

Questions 3 and 5 were designed to test hypotheses 4 and 5. Recall that the USA findings indicated that *"continuity of payment of a dividend"* followed by *"a stable rate of dividend"* were ranked top of the scale and in our hypothesis 4 we reflected this scaling in South Africa. Similarly, in the USA the determining influence factor was a company's *"earnings and future prospects."* This is also reflected in our hypothesis 3. The results were unequivocal. The question 3, on a percentage first ranking basis, 60% placed *"continuity of payment"* first, 19% *"stability of rate"* and 6% *"stability of amount"* second. Thus 85% placed continuity and stability as the most important factors. If the ranking is done on a point scale with 5 points for the first ranking and 1 point for the fifth ranking, then the rating is – *"continuity"* 31%, *"stability of rate"* 24% and *"stability of amount"* 23%, a total of 78%.

Question 4 asked respondents to give their reasons for the top ranking in question 3. Only 4 out of the 63 respondents failed to comment. All the responses were related to shareholders' attitudes and needs. For example, the phrase *"to maintain shareholder confidence"* appeared most frequently, followed by *"shareholders expect a cash return"* and *"continuity of dividend payment necessary for share to have a high rating"*. It would appear that management believe most strongly that dividends are relevant to the market's valuation of their company's shares. Furthermore, in our opinion the responses reflect the managements' *"clientele"* view of investors; that investors hold shares in a specific company because it meets their individual needs.

The rankings of question 5 were just as conclusive. On a percentage of first rankings the scores were – *"past and future earnings"* 39%, *"amount of cash available"* 21%, "shareholders' desire for cash income" 19% and *"anticipated need for funds"* 14%. Not surprisingly, in view of the replies to question 1, the *"opportunities for investment"* was at the bottom of the scale with 2,5% (on the same point scale, the rankings were the same with respective scores – 24%, 21%, 19% and 19%).

It is clear from the results of these responses that our hypotheses 4 and 5 must be accepted.

4 Desired relationship between dividends and earnings

Question 6 was used to evaluate not only a company's attitude to a pay out ratio but also represented a veiled hope on our part to see whether respondents would relate dividend cover to the problems of inflation. In this respect, we refer to the work by Archer (1981) where he discusses the significance of dividend cover during periods of inflation. Within the context of his methodology, Archer states:

"Dividend cover has an important role to play. When a company is affected to a large extent by inflation the danger of an adjusted dividend cover of less than one, if the historical cover is not high enough, is very real" (p. 29).

57 of the 63 respondents commented on question 6. Of these 15 referred directly and several indirectly (about 26%) to the problem of inflation and the need for an adequate dividend cover. Perhaps more interestingly, 36 respondents (66%) quantified their target dividend cover. These ranged from 1,4 to 1, to 5,3 to 1, with a mean of 2,5 and a mode of 2. Unfortunately very few respondents (only 7) referred to the cover in **'real'** terms. It would appear that maintenance of 'capital' is not an issue! These responses would indicate that respondents are conscious of the need for a positive policy of dividend cover and this too is interesting in view of the fact that very few companies publish a stated policy of dividend cover.

SUMMARY AND CONCLUSIONS

There is little doubt that the results of the survey suggest that South African managements display the same attitudes to dividend policy as do the USA counterparts described by Cadle (1980). They, thus, follow an active and positive dividend policy and are chiefly influenced by recorded earnings and the prospect of future

earnings. Furthermore, the implementation of their dividend policy is dominated by the two factors of continuity of payment and stability of the dividend.

A substantial majority of executives believe in the efficiency of the stock market and do not believe this to be inconsistent with their dividend policy described above. They appear to believe in the information content of an active dividend policy but are not prepared to substitute **'indirect'** information with direct information. The efficiency of markets (and for that matter economic efficiency) is dependent upon information. In financial terms, including annual financial statements, information refers to the full disclosure of **relevant** information. Much of the accounting literature, for example Arnold and Hope (1975), is replete with the benefits to be gained by investors from the disclosure of forecast information. The criticisms of disclosure of forecasts is also well documented but disclosure of intent could be equally useful and relevant information to investors. Intent is related to policy decisions whereas forecasts are related to expectations. If a company reduces or passes its dividends in order to avail itself of sound opportunities and disclosed all relevant information to investors we believe such a dividend decision would not adversely affect the market's valuation of a company and would be consistent with the objective of maximising shareholders' wealth. If a company foregoes investment opportunities because of certain (incorrect?) beliefs in shareholder understanding, then in the long term shareholders' welfare is not being maximised. We believe managements, or more particularly the accountants responsible, should ensure that investor understanding is improved by full and fair disclosure of all relevant information.

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Questionnaire to selected sample of financial executives Subject: Dividend policy and practice

JSE Section

Question 1

This question refers to the general policy to which your company subscribes. Do you believe in a policy such that irrespective of the number of desirable and acceptable investment opportunities which could be financed from retained earnings (and funds) your company considers the payment of a dividend as of overriding importance? In other words you regard **the dividend decision as an active variable?** Alternatively do you believe in a policy that the declaration and payment of a dividend should only be considered when all desirable and acceptable investment opportunities have first been financed from available retained earnings (and funds)? That is to say you regard **the dividend as a passive residual?**

Is the dividend policy pursued by your company best described as:
(Please mark with an "X" in the appropriate square)

An active variable?	57	90%
or		
A passive residual?	6	10%

Question 2

This question is in three parts. Please answer subsequent parts only if your previous answer is "**Yes**"

The first part of the question refers to what is known as "efficient capital markets", which implies that the prices of securities in such markets fully reflect all publicly available information about such securities.

(Please place an "X" in the appropriate square)

Part I

Do you believe that capital markets, such as stock exchanges, can be efficient in the above sense?

Yes	53	84%
No	10	16%

Part II

If your answer to Part I is "**Yes**" then do you believe that The Johannesburg Stock Exchange is efficient?

Yes	47	90%
No	5	10%

Part III

If your answer to Part II is "**Yes**" then do you believe investors should be indifferent as between capital gains and dividend income (especially as in South Africa capital gains are not taxed)?

Yes	5	11%
No	42	89%

Part IV

If your answer to Part III is "**Yes**" do you then believe that your company should pursue a dividend policy that is a **passive residual?**

Yes	3	60%
No	2	40%

If your answer to Part IV is "**Yes**" but your company does not **or** if your answer to Part III is "**No**" could you please elaborate briefly?

_____

_____

_____

_____

Question 3

Please rank the relative importance of the following factors which influence your company's dividend practice
(1 = most important).

	First running	Point scale
Continuity of payment	60,3%	31,1%
Stability of *rate* of div.	19,1%	24,0%
Stability of *amount* of div.	6,4%	23,0%
Importance of *size*	4,7%	14,0%
Other (please specify)	9,5%	8,0%

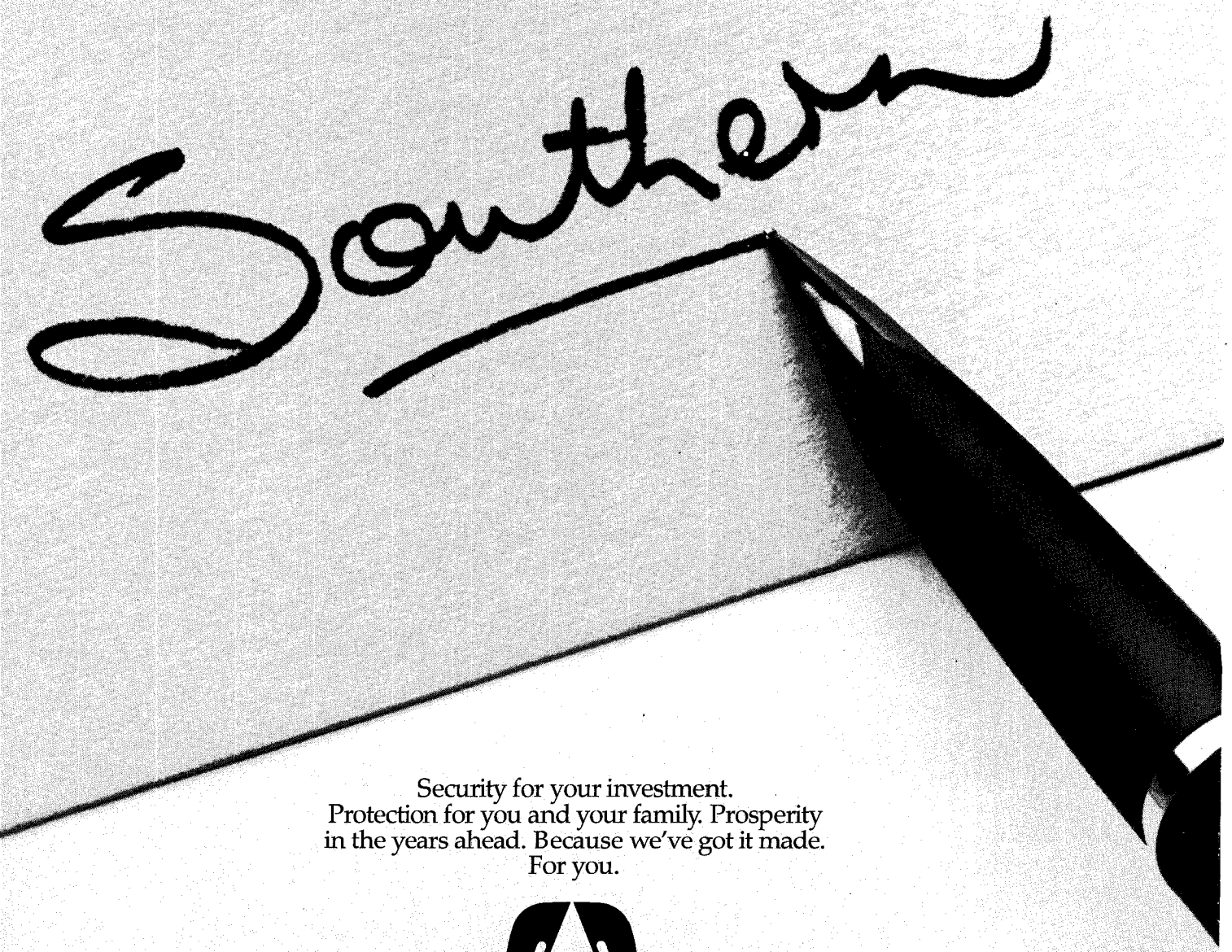
Question 4
In respect of the item given the top ranking, could you please give your reasons for this ranking.

Question 5
Could you please indicate the relative importance attached to the following factors in influencing your dividend practice. (Please put an X in the appropriate square.)

	Most important				Not important	Point scale
	1	2	3	4	5	
The amount of cash available		21,3%				21%
The anticipated need for funds				13,8%		19%
Company's past and prospective earnings	38,7%					24%
Shareholder's desire for a cash income			18,7%			19%
Opportunities for investment					2,5%	14%
Other (Please specify)					5,0%	3%

Question 6
If there is a desired relationship between the amount of dividends paid and the earnings of your company, please briefly describe the desired relationship.

QUICK.
ONE WORD THAT MEANS SECURITY, PROTECTION AND PROSPERITY.



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By Narendra Bhana

The valuation of take-overs by companies listed on The Johannesburg Stock Exchange

INTRODUCTION

There are a multitude of activities preceding the final consummation of a take-over. Some of these are: seeking out a likely prospect, investigating the particular prospect, negotiations with the prospective acquiree company, valuation of the prospective company, as well as the preparation of documents to be released to the shareholders of the prospective company. A great deal of planning is involved in the take-over of a company. It has been shown that there is a direct relationship between the degree of planning and take-over success[1]. The correct valuation of a take-over prospect is essential for planning a successful take-over. The objective of this paper is to determine the different methods of valuing take-overs by the Top 100 Companies listed on the JSE.

THE USE OF DISCOUNTED CASH FLOW IN CAPITAL BUDGETING

Investment literature highlights the importance and the complexity of capital budgeting techniques, such as discounted cash flow (DCF). A large percentage of companies listed on the JSE are using such techniques for decisions relating to internal expansion [2]. However, Bierman and Smidt [3] have observed that the use of DCF and other capital budgeting techniques were strongly resisted by management when they were introduced. The valuation process for a take-over is no different than that for any other capital project and capital budgeting techniques, such as DCF analysis, are the correct methods of valuing a prospective take-over. However, a study by Newbould[4] found that very few acquiring companies in his United Kingdom study used DCF and other capital budgeting techniques for valuing take-overs. A pilot study preceding the actual study revealed that none of the responding companies made consistent use of DCF and related techniques in valuing prospective take-overs. The actual study was directed towards all companies ranked in the FM Top 100 Companies survey during the period 1966-76[5].

Question 1 asked the responding companies if it was company policy to make use of DCF analysis before proceeding with a take-over. An interesting and surprising observation is that none of the responding companies indicated the use of DCF analysis as a basis to proceed with a potential take-over. Question 2 asked the responding companies if they had made occasional use of DCF analysis in valuing any of their take-overs. The implication of this question is that, even though the DCF was not the primary method of valuation, it was used as subsidiary information relating to certain take-overs. Only 14 out of a total of 92 responding companies replied positively to this question. It appears that only 15,2 per cent of the responding companies made occasional use of DCF analysis for the valuation of take-overs.

The take-overs undertaken by the 92 responding companies show a wide distribution in the rate of take-over activity. It can be expected that the frequency of take-overs would have an influence on the use of DCF analysis in valuing take-overs. Companies involved in frequent take-overs would be better organised in planning the various aspects of take-overs, and therefore these companies can be expected to make greater use of DCF analysis. An analysis was undertaken to determine if the frequency of take-overs influences the use of DCF analysis in the valuation of take-overs. With the eleven year study in mind, it was decided that up to 5 take-overs represented a low take-over rate, between 6 and 10 take-overs an average rate, and above 10 a high rate. The following hypothesis was tested:

Hypothesis 1: The use of DCF analysis varies in direct relation to the intensity of take-overs.

The results of the cross-tabulation are shown in Table 1[5].

Table 1: The relationship between intensity of take-overs and the use of DCF analysis in take-over valuation

	Take-over rate					
	Low		Average		High	
	Number of companies	%	Number of companies	%	Number of companies	%
Using DCF analysis	3	7,3	2	8,3	9	33,3
Not using DCF analysis	38	92,7	22	91,7	18	66,7
Total	41	100,0	24	100,0	27	100,0

Chi-square = 9,73317 with 2 degrees of freedom
Level of significance = 0,0077

The above table reveals that companies that are active in take-overs make greater use of DCF analysis than those that are less active. Companies which belong to the high take-over group are 29,4 per cent of all companies, yet they are 64,2 per cent of companies using DCF analysis. The results of the chi-square test indicate that there is a statistically significant direct relationship (at a 0,0077 level) between take-over intensity and the use of DCF analysis in take-over evaluation. Based on the results of this study hypothesis 1 is accepted. In view of the small number of acquiring companies actually using DCF analysis, however, the above results are not reliable and should be viewed with caution. Further tests using larger samples should be conducted to confirm the finding of this study that there is a statistically significant direct relationship between take-over intensity and the use of DCF techniques.

METHODS OF VALUATION USED BY ACQUIRING COMPANIES

Question 3 of the questionnaire asked the responding companies the predominant basis for the valuation of take-overs. It was expected that an acquiring company uses one of five different valuation bases for individual take-overs. The responding firms were asked to indicate which of the five methods of valuation listed were used. Provision was also made for other methods of valuation. The distribution of the various methods of valuation is shown in Table 2[5].

The method of valuation most used is based on the current market price of the prospective take-over. This method was used by 33,7 per cent of the responding companies. The price earnings ratio and the net asset value was used by 23,9 per cent and 22,8 per cent respectively of the responding companies. These are surprising results when one considers that the financial literature strongly recommends an analysis of the profitability, growth, and risk as a basis of valuation for both internal and external forms of expansion[6]. It is submitted that future earnings and profitability are the more relevant criteria for valuation. Only the last three bases of valuation shown in Table 2 satisfy this criterion, which was used by 16 companies, representing 7,4 per cent of the total response.

The fact that a large percentage of the Top 100 Companies use irrelevant methods is disturbing. This must be seen in light of the fact that an incorrect valuation can have serious effects on the future profitability of the acquiring company. The responding companies represent some of the largest companies in South Africa. Having sufficient human resources as well as financial expertise, they need not rely on such superficial methods of valuation as: the current market price, the current price earnings ratio, and the net asset value.

Table 2: Methods of valuation used by acquiring companies during the study period

Method of valuation	Number of responding companies	Percentage of total	Cumulative frequency
Current market price	31	33,7	33,7
Price earnings ratio (P/E ratio)	22	23,9	57,6
Net asset value	21	22,8	80,6
Price of similar company acquired	2	2,2	82,6
Take-over price in relation to profitability	14	5,2	97,8
*Profitability potential and related criteria	1	1,1	98,9
*Earnings and assets employed	1	1,1	100,0
*Listed as an alternative by respondents	92	100,0	

A probable reason for the use of the less relevant criteria in the valuation of take-overs is the ease of obtaining such information. Information on the current market price, price earnings ratio, and net asset value is readily available from published sources, such as stock exchange reports and company financial statements. On the other hand, the relevant valuation criteria requires information on the profitability, growth, and risk of the prospective take-over. Such information is not readily available from published sources and therefore special investigation is necessary. Such investigations are usually expensive and time consuming. The highly active acquiring companies can be expected to make greater use of the easily obtained but less relevant valuation criteria. The less active acquiring companies, with more time to make detailed investigations of take-over prospects, are in a position to make greater use of the relevant criteria.

In view of the importance of the correct method of valuing a take-over it was decided to investigate if companies having different take-over intensities show differences in the methods of valuing a prospective take-over.

The following hypothesis was tested:

Hypothesis 2: The use of relevant criteria in the valuation of take-overs is influenced by the intensity of the take-over activity. The use of relevant criteria varies inversely with the intensity of take-overs.

The results of the chi-square test to test hypothesis 2 are shown in Table 3[5].

Table 3: The relationship between the intensity of take-overs and the different methods of valuation of the prospective take-over

Group	Method of valuation	Take-over rate: Low — Number of companies	Low — Total %	Average — Number of companies	Average — Total %	High — Number of companies	High — Total %
(a)	Current market price	12	29,3	7	29,2	12	44,5
	Price earnings ratio	11	26,8	4	16,7	7	25,9
	Net asset value	10	24,0	8	33,3	3	11,1
	Price of similar company acquired	0	–	0	–	2	7,4
	Sub-total	33	80,5	19	79,2	24	88,9
(b)	Price in relation to profitability	7	17,1	5	20,8	2	7,4
	Profitability and related criteria	1	2,4	0	–	0	–
	Earnings and assets employed	0	–	0	–	1	3,7
	Sub-total	8	19,5	5	20,8	3	11,1
	Total	41	100,0	24	100,0	27	100,0

Chi-square = 12,16997 with 10 degrees of freedom
Level of significance = 0,2738

In terms of our classification group (a) represents less relevant valuation methods and group (b) relevant methods. The results indicate that companies in each take-over intensity group are making greater use of the less relevant valuation methods. Companies in the low and average intensity group do, however, show a tendency towards using the relevant valuation methods. The results of the chi-square test indicate that the inverse relationship between intensity of take-over and the use of relevant valuation methods is not statistically significant. Therefore, the alternative hypothesis that the use of relevant valuation methods is not influenced by take-over activity has to be accepted.

CONCLUSION

An investment in a take-over is no different than a direct investment in a capital project. No responding company reported the use of DCF analysis as a primary method of evaluating take-overs. Only a small percentage of responding companies make use of DCF analysis as secondary information. There is an inconsistency in the use of DCF analysis for internally developed capital projects and for take-overs. It would seem that acquiring companies do not regard take-overs as an alternative to direct investment in capital projects.

A consideration of the future earnings and profitability of a prospective take-over is an important indicator of take-over success. The majority of the companies listed on the JSE are more concerned with less relevant criteria such as the current market price and price earnings ratio of the take-over candidate. An insufficient consideration of profitability-related criteria contributes towards the risk of take-over failure.

It is recommended that the companies listed on the JSE adopt a more sophisticated approach to the valuation of take-overs. This can be achieved by greater usage of DCF and other capital budgeting techniques. Furthermore, they should also devote greater attention to future earnings and profitability criteria when considering take-overs.

References and footnotes

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2 Lambrechts, I. J. The Practice of Capital Investment decisions-making in South Africa. *The Investment Analysts Journal,* August 1976, pp. 27-31.

3 Bierman, H. and Smidt, S. *The Capital Budgeting Decision.* London: The MacMillan Company, 1972, 3rd edition.

4 Newbould, G. D. *Management and merger activity.* Liverpool: Guthstead Limited, 1970.

5 All listed companies that had been included in the Financial Mail Top 100 Companies survey during the period 1966-76 and had been involved in take-over activitiy were asked to respond to the questionnaire. Of the 124 listed companies that were approached, 16 companies did not respond to the questionnaire. Of the 108 replies received, 92 indicated that they had undertaken take-overs during the study period. All research data used in this paper have been adapted from:

Bhana, N. *The financial and management aspects of mergers and acquisitions of selected South African companies during the period 1966-1976.*

Unpublished Ph.D. thesis, University of Natal, Durban, 1982.

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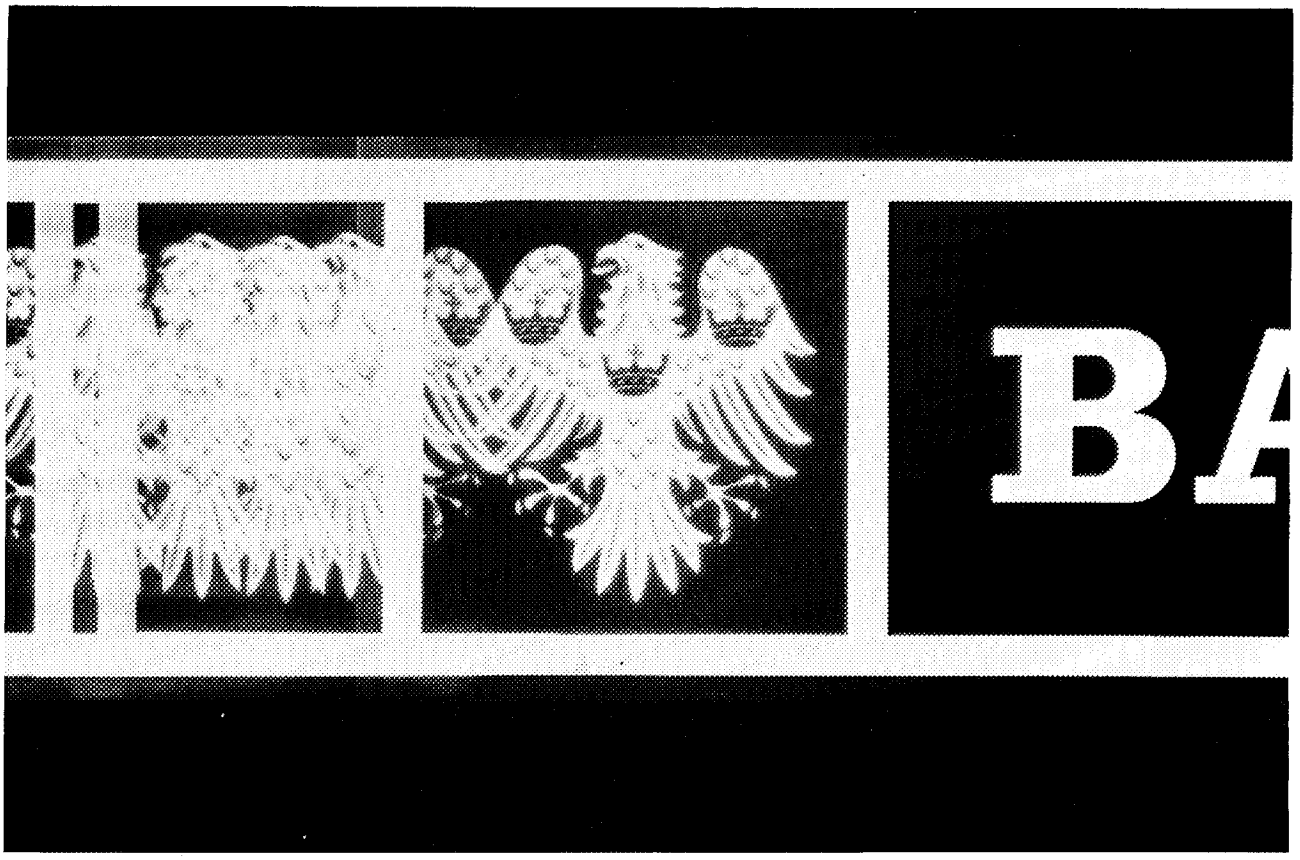

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By I. S. Davies

Investment basics – XII
An introduction to gold mining tax

Part 2

In Part I we looked at a simple lease and tax calculation for a mine which was making profits and had been paying tax in the past. Let us commence Part 2 by looking at the more complicated example of a new mine. As in the previous example we will use formulae of $Y = 15 - \frac{120}{X}$ for lease and $Y = 60 - \frac{480}{X}$ for tax with capital allowance rates of 6% and 10% respectively. Assuming revenue, profit and capital expenditure as set out in the table below we can calculate the annual liability for lease and tax.

Year	1	2	3	4	5
Revenue	–	–	100	400	600
Profit	–	–	50	220	400
Capital expenditure	100	100	50	10	10
Lease calculation					
Unredeemed capex b/f	–	100	200	200	–
Total capex for redemption	100	200	250	210	10
Unredeemed cap. allowance b/f	–	2,75	11,67	25,75	29,58
Capital allowance on:					
Unredeemed capex b/f	–	6,0	12,0	12,0	–
Unredeemed C.A. b/f	–	0,17	0,7	1,55	1,77
Current capex	2,75	2,75	1,38	0,28	0,28
Total C.A. for redemption	2,75	11,67	25,75	39,58	31,63
Profit for x of lease formula	–	–	–	–	390
x %	–	–	–	–	65,00
y %	–	–	–	–	13,1538
Profit subject to lease	–	–	–	–	358,37
Lease payment	–	–	–	–	47,73
Tax calculation					
Unredeemed capex b/f	–	100	200	200	–
Total capex for redemption	100	200	250	210	10
Unredeemed cap. allowance b/f	–	4,58	19,62	43,87	58,72
Current capital allowance	4,58	15,04	24,25	24,85	–
Total C.A. for redemption	4,58	19,62	43,87	68,72	58,72
Profit subject to tax	–	–	–	–	283,55
x %	–	–	–	–	47,2583
y %	–	–	–	–	49,8431
Taxation	–	–	–	–	162,53
Profit after tax	–	–	50	220	189,74
Less: Capex	100	100	50	10	10
Available for distribution	(100)	(100)	–	210	179,74

We have now gone through the standard lease and tax calculations which apply to most mines. The main exception is mines that are classified as State assisted but before we examine that let's look at what happens in the case of small mines. The formulae again conform to the pattern of $Y = a - \frac{ab}{x}$ where b is again equal to 6 for pre-August 1966 mines and 8 for post-August 1966 mines but the value of 'a' varies. If taxable income for the year does not exceed R40 000, 'a' has a value of 20, giving formulae of:

$y = 20 - \frac{120}{x}$ for pre-August 1966 mines

and

$y = 20 - \frac{160}{x}$ for post-August 1966 mines

When taxable income exceeds R40 000 the value of 'a' increases by 1 for every completed R2 500 by which the taxable income exceeds R40 000. The formula for post-August 1966 mines can be written as:

$y = (20 + w)(1 - \frac{8}{x})$.

Note: for pre-August 1966 mines replace the 8 by 6.

where w represents the number of completed multiples of R2 500 by which the taxable income exceeds R40 000.

It will be seen that when w = 40, i.e. taxable profit = R140 000 or more, then a = 60 and the large mine formula applies.

Let us now pass on to the position of assisted mines. The Gold Mines Assistance Act was introduced in 1968 when, with a fixed gold price of $35 an ounce, a number of old marginal mines were in danger of closing down and flooding neighbouring mines. To qualify for State assistance a mine must have a remaining life of 8 years or less with a significant increase in life resulting from State assistance. Assisted mines pay tax according to the formula:

$$y = 68 - \frac{601}{x}$$ or the standard formula of

$$y = 60 - \frac{360}{x}$$ whichever results in the lower tax before

addition of the surcharge to the standard formula. Note that no surcharge is payable when the State assistance formula applies but should the tax calculated using the standard formula excluding surcharge be less than that calculated using the assistance formula, the standard formula will apply, even though the addition of the surcharge may result in a higher total tax payment than would result if the assistance formula were used. Loan levies are applicable to both formulae. It is worth noting that when x = 30 the two formulae give approximately the same tax rate (48%). This may not seem to have much to do with the mine receiving assistance but if you substitute a value of 8,838 (we will see how that is divided later) for x in the assistance formula the resultant value of y is zero. As x falls below 8,838, y becomes negative and the calculated negative tax amount is paid tax free to the company as a tax credit. This tax credit is subject to a maximum of 25% of gross revenue from minerals for that year.

The only other aspect of assisted mines which requires comment is capital expenditure. Like all gold mines, assisted mines may redeem their capital expenditure in the year in which it is incurred. Any unredeemed balance on commencement of assistance is added to any accumulated assessed loss, but this loss does not enter into any tax credit calculation. However, it is allowed to reduce any current assessed taxable income to the level at which no taxation is payable. Conversely, if a taxable profit is made and the assistance formula results in a tax credit, such taxable profit is used to reduce the accumulated assessed loss. The redemption of current capital expenditure in any year is limited to that amount that increases the tax credit payable to the maximum of 25% of revenue from the sale of minerals, and the balance is carried forward to the next year and treated as current capital expenditure in that year.

In addition the Government Mining Engineer may not allow all capital expenditure to be included in the State assistance calculation. In general, capital expenditure necessary to maintain the existing operation will be allowed but expenditure on expansion programmes and major replacement of facilities may not be allowed.

That completes the coverage of the calculation of lease and taxation payments by gold mines. In Part 3 we will look at some shortcuts and examine the implications of the formula method of taxation.