The Investment Analysts Journal

Die Beleggings-Navorsers Tydskrif

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Inhoud

This issue in brief

Why expectations matter

On 23 June 1982 Ludwig M. Lachmann, Professor Emeritus at the University of the Witwatersrand and since 1975 visiting Professor of Economics at New York University, addressed a meeting of The Investment Analysts Society of Southern Africa in the auditorium of The Johannesburg Stock Exchange. His subject was "Why expectations matter". This is a transcription of his lecture. Lachmann has long emphasised the centrality of expectations not only to economic planning (be it at a national or a corporate level) but, also to any consideration of economic analysis. The problem, however, resides in the fact that expectations are indeterminate and, therefore, pose a problem to those wishing to construct quantitative models. His message should be of enduring interest to investment analysts and portfolio managers as well as to all economists.

Ownership and control of large companies in the RSA

Trends towards industrial concentration and the separation of ownership and control which have characterised the development of industrialised market economies in North America and Western Europe this century are to be found also in South Africa albeit with some differences. Fiona Halse, a lecturer in the Department of Business Administration of the University of Natal, Pietermaritzburg, discusses them using as her base, data relating to the FM Top 30 Companies ranked by total assets in April 1982. The study has an important message for all students of business economics in South Africa.

The take-over objectives of South African acquiring companies

The neoclassical theory of the firm postulates that profit maximisation is the principal objective of the modern business corporation. Is such an assumption valid having regard to the behaviour of private sector undertakings in South Africa? Narendra Bhana, a senior lecturer at the University of Durban-Westville, comes to the conclusion that it is not in a study of the differing objectives of our major companies most actively engaged in take-over activity. Moreover, her research suggests that an excessive preoccupation with growth as opposed to profitability could lead towards a conflict between the interests of management and shareholders, and even have undesirable socio-economic consequences.

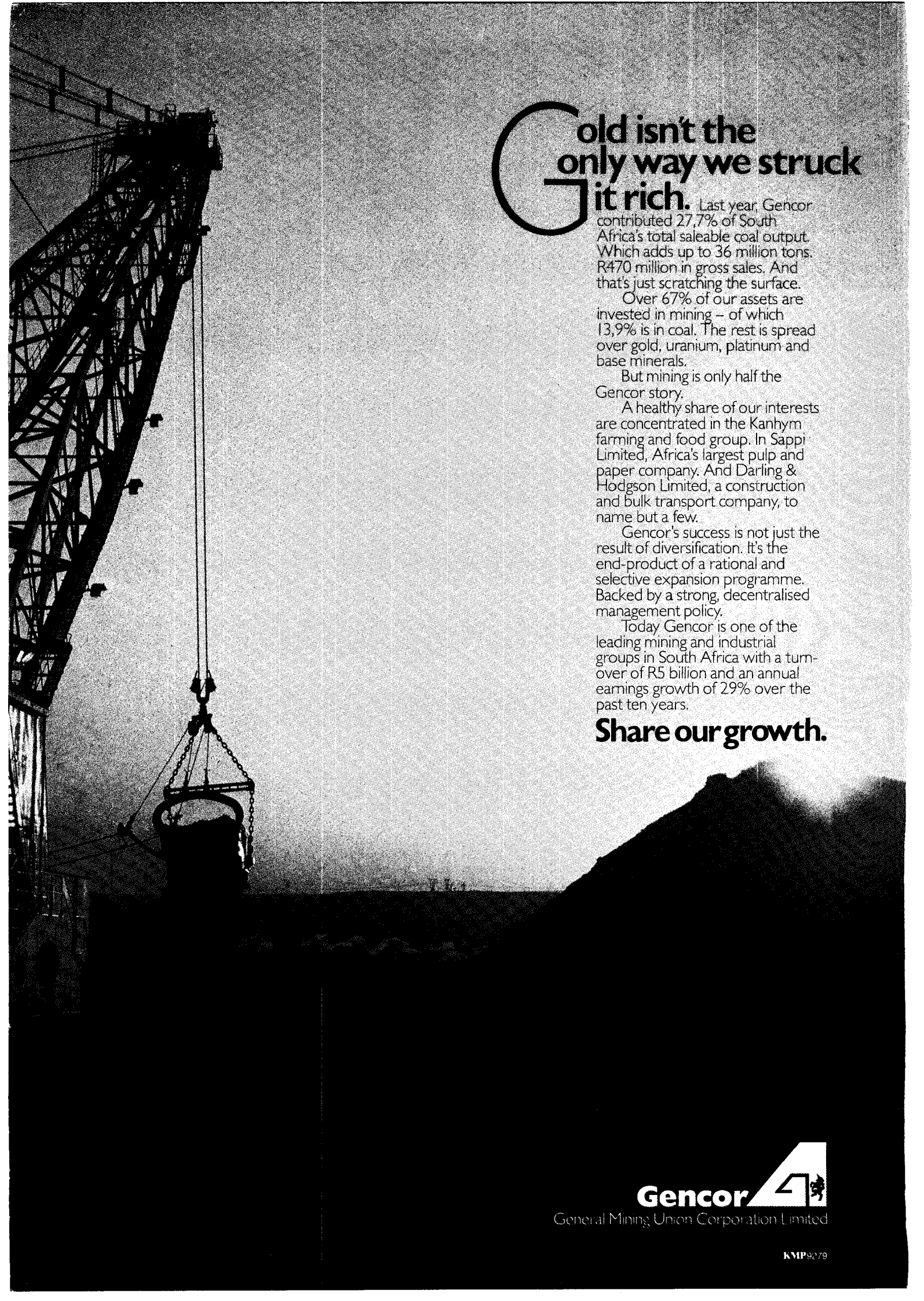## Some thoughts on the availability and uses of accounting information

The author, Mr D. Konar, is a lecturer in accountancy at the University of Durban-Westville and recently completed a Master of Accounting Sciences degree at the University of Illinois on an American Fulbright Scholarship. In this article he sets out to discuss the use that can be made of financial ratios in the evaluation of corporate performance, bond rating and financial distress prediction.

The performance of South African mutual funds

This is an updated version of an earlier unpublished study on the performance of South African mutual funds. Here Brian Gilbertson has teamed up with Martin Vermaak and their findings are challenging and also surprising. While studies of mutual fund performance in the US have been generally supportive of the efficient market hypothesis, the evidence of this study raises new doubts. At least one fund has been able to outperform others fairly consistently and this poses questions about the pricing mechanism for shares listed on the JSE.

An introduction to gold mining taxation

Ian Davies, in the first of a three part series for our investment basics section, discusses the mechanics of South African gold mining taxation. Numerical examples are included to facilitate illustration.

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The Investment Analysts Journal

Die Beleggingsnavorsers Tydskrif

We are privileged in this tenth anniversary issue of The Investment Analysts Journal to carry a transcription of the lecture given on 23 June 1982 by Professor Ludwig M. Lachmann to The Investment Analysts Society on the subject "Why expectations matter." It was a memorable occasion and the auditorium of The Johannesburg Stock Exchange was filled to near capacity. This was a tribute to Professor Lachmann himself and a measure of the esteem in which he is still held here ten years after his retirement as head of the Department of Economics at the University of the Witwatersrand. Many in the audience had come from Pretoria to listen to him. However, it was also a measure of the importance of the subject that Professor Lachmann chose for his address. Expectations have long been a problem not only for economic theorists but also for hardnosed market participants and, no doubt, the large audience reflected a desire amongst many for a clarification of thought on the subject. The trouble with expectations is that they represent the forward thinking of market participants based on information available and they, thus, provide an additional dimension within the bounds of which investment decisions have to be made. In short, expectations equate to being forecasts, upon the forecasting of which successful investment depends. One is reminded of the famous passage from Keynes' General Theory wherein professional investment is likened to those newspaper competitions requiring competitors to pick out of a hundred photographs, the six prettiest faces, the prize being awarded to the competitor whose choice most closely corresponds to the average preferences of the competitors as a whole. Clearly, in such a case, the trick is to pick not the faces that one finds the prettiest oneself but those which one thinks will catch the fancy of other competitors, all of whom are approaching the problem in the same way. "It is not a case of choosing those which, to the best of one's judgement, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligence to anticipating what average opinion expects the average opinion to be."

This, of course, applies to stock markets and other markets where the process of clearing does not concern a matching of actual consumption and physical production. However, even in goods markets, the problem of expectations is central. Where supply depends on production and production takes time, decisions to produce have to be made before decisions to consume are made. This requires that expectations be formulated as to what the future relationship of demand and supply is likely to be before plans can be finalised and action initiated, aimed at their realisation. What concerns the producer, however, is not merely what consumers will be demanding when the output he plans is available, but also what other producers will be supplying, each one of whom is again compelled to approach the problem in a like fashion. In short, much of the information that producers need in order to fulfil their task efficiently cannot be available when they require it, so that decisions have, perforce, to be made on the basis of incomplete knowledge.

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The special nature of expectations puts them into a different category from the other data of economic analysis. These generally relate to the needs and preferences of consumers, on the one hand, and material resources and states of technology, on the other. Such data are usually treated as exogenous to the immediate problem, i.e. they are incorporated into a model as items that are either given or assumed and from which other variables can then be determined. Expectations cannot be so regarded. While they are a cause of economic events and are also determined by them, they are influenced as well by other factors which may be both non-economic (e.g. social and political) and unobservable. In short, expectations are indeterminate and defy any attempt we may make to quantify them. It has been Lachmann's contribution to economic thought that he has focused on these issues and drawn attention to the difficulties that must inevitably be associated with any attempt (as in the case of rational expectations) to explain how expectations might be generated endogenously.

Lachmann's contribution to thought, however, needs to be seen in perspective. It has not been isolated either in time or place. Born in Berlin in 1906, he grew up in the Germany of the Weimar Republic obtaining a doctorate at the University of Berlin in 1930. In 1933 he left Germany for Britain where he studied under Von Hayek at the London School of Economics. Hayek was then, as he remains, a major proponent of the Austrian School. In his own right, Lachmann is today recognised as a leading figure in Austrian economics and has contributed widely to writings on the subject. The unique characteristics of the Austrian School are its emphasis on subjectivism, i.e. on the micro-economic origins of causality, and on its rejection of the notion of **general** equilibrium as a useful tool in the development of theoretical models because of its inherent lack of realism. Subjectivism places its emphasis on the importance of the autonomous individual in the market economy and can be contrasted with the macro-economic approach both of Keynesian economics and neo-classical monetarism. Whereas both these assume general equilibrium, or underlying forces in its direction, for their theoretical justification, the Austrian School argues in favour of the view that the market is something whose dynamics do not permit such abstractions. The accumulation of the effects of change, particularly of **unexpected** change, make disequilibrium, and the mal-investment associated with it, important and require that they be explained. In short, the market is a process that must be seen in the context of time and it can only be analysed as such. It can no more be stopped to facilitate study than time itself can be suspended to allow us an opportunity to rearrange our thoughts.

This is an approach that ought to have a basic appeal to all those who are eager to bring a greater realism into matters of economic and financial analysis.

The editor

wyse te benader. Kortom, heelwat van die inligting wat produsente nodig het om hulle op doeltreffende wyse van hulle taak te kwyt, kan nie beskikbaar wees wanneer hulle dit nodig het nie, met die gevolg dat besluite noodgedwonge gegrond op onvolledige kennis geneem moet word.

Die besondere aard van verwagtinge plaas hulle in 'n ander kategorie as die ander data van ekonomiese navorsing. Oor die algemeen hou laasgenoemde verband met die behoeftes en voorkeure van verbruikers aan die een kant en materiële middele en tegnologiese toestande aan die ander kant. Dié data word gewoonlik eksogeen ten opsigte van die onmiddellike probleem behandel, d.i. dit word by 'n model geïnkorporeer as items wat òf gegewe òf veronderstel is en na aanleiding waarvan ander variante dan vasgestel kan word. Verwagtinge kan nie op dié manier beskou word nie. Hoewel dit 'n oorsaak van ekonomiese gebeure is en ook daardeur bepaal word, word dit ook beïnvloed deur ander faktore wat nie-ekonomies (bv. sosiaal en politiek) sowel as nie-waarneembaar kan wees. Kortom, verwagtinge is onbepaald en kan eenvoudig nie vasgepen word nie. Lachmann se bydrae tot ekonomiese denke was dat hy die aandag gevestig het op dié kwessies en die probleme wat onvermydelik verband hou met enige poging (soos in die geval van rasionele verwagtinge) om te verduidelik hoe verwagtinge endogeen gekweek kan word.

Lachmann se bydrae moet egter in perspektief gesien word. Dit was nie van tyd of plek afgesny nie. Hy is in 1906 in Berlyn gebore en het in die Duitsland van die Weimar-republiek grootgeword. In 1930 behaal hy 'n doktorsgraad aan die Universiteit van Berlyn en in 1933 verlaat hy Duitsland om in Brittanje onder Von Hayek by die London School of Economics te studeer. Lachmann word vandag beskou as 'n hooffiguur in die Oostenrykse ekonomie en het 'n omvattende bydrae tot werke oor die onderwerp gelewer. Die kenmerkende eienskappe van die Oostenrykse Skool is die beklemtoning van subjektivisme, d.w.s. van die mikro-ekonomiese ontstaanspunte van oorsaaklikheid, en van die verwerping daardeur van die begrip van algemene ewewig as 'n nuttige middel by die ontwikkeling van teoretiese modelle, as gevolg van die inherente gebrek aan realisme daarvan. Subjektivisme benadruk die belangrikheid van die outonome individu in die markekonomie en kan teenoor die benadering van Keynesiese ekonomie sowel as neoklassieke monetarisme gestel word. Terwyl albei dié skole algemene ewewig of onderliggende magte in dié rigting ter regverdiging van hulle teorieë veronderstel, voer die Oostenrykse Skool argumente aan ten gunste van die beskouing dat die mark iets is waarvan die dinamika nie ruimte laat vir sodanige abstraksies nie. Die akkumulasie van die uitwerkings van verandering, veral onverwagte verandering, maak onewewigtigheid en die wanbelegging wat daarmee gepaard gaan belangrik en vereis dat dit verduidelik word. Kortom, die mark is 'n proses wat in 'n tydkonteks gesien moet word, en dit is slegs as sodanig wat dit ontleed kan word. Net so min as wat die tyd self tot stilstand gebring kan word om ons kans te gee om ons denke te herorden, net so min kan die markproses tot stilstand gebring word om die bestudering daarvan te vergemaklik.

Dit is 'n benadering wat in sy wese aanklank behoort te vind by diegene wat graag 'n groter mate van realisme in sake rakende ekonomiese en finansiële ontleding teweeg wil bring.

Die redakteur

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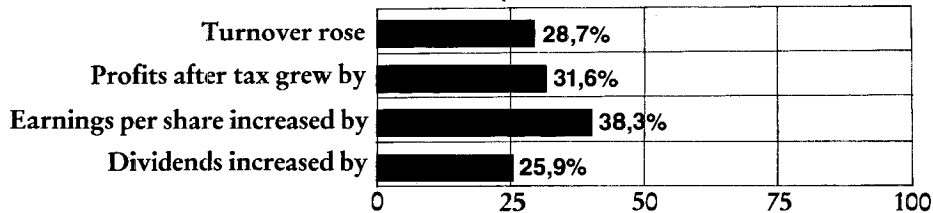
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VZ82/52930

By Professor L. M. Lachmann

Why expectations matter*

Thank you very much Mr Chairman for your kind words. I note and appreciate the honour you have bestowed upon me in inviting me to address your Society this afternoon. At the same time, let me confess frankly that when I received your invitation about four weeks ago, my first impression was one of bewilderment. What is one to do when one is invited to talk about the question, "Why expectations matter"? Surely, we are all actors and actresses in our own way. We know that all our actions concern the future, hence in all our actions we have to form expectations. Everyone of us knows all about it. So, what, then, is an economist supposed to do when he is to address his fellow men on the question "Why expectations matter"? What can one say about it that would go beyond the bounds of common sense?

I've been an economist long enough, of course, to know that economics and common sense don't necessarily go together. Hence, I said to myself that if, as an economist, I begin to talk within the bounds of common sense, that might be a surprise. Also, it might give rise to raised eyebrows in certain quarters. All the same, I thought, investment analysts are practical people, they deal with expectations every day, every one of them knows more about it than I do, so what is the point in talking to them about "why expectations matter"?

On second thoughts, however, I reflected (and it is a reflection that may be quite familiar to you), that practical people may not always understand all the implications of what they are doing daily. I am old enough to remember a time when bankers asserted that they couldn't possibly create money or credit, that money or credit was just there and they were dealers in it. I also remember how, in the days when I grew up in the Germany of the Weimar Republic, a banker-economist of genius, the Frankfurt banker Albert Hahn, way back in 1920, wrote a book in which he explained that banks can and indeed do create money. The personal consequences for him, alas, whatever his rising fame as an economist, i.e. the consequences for his relations with his fellow-bankers in Frankfurt and elsewhere, were by no means favourable ones.

We also all know only too well the kind of businessman who, when his firm is confronted with some difficult problems, will at once call for State help without considering the wisdom of the old saying that "he who sups with the devil has to use a very long spoon". Nor would it be at all fair to confine such a remark to businessmen. Are University administrators any better when it comes to asking for State help?

What is perhaps an even more important consideration than the one just mentioned, it is one thing to make statements which will win general approval since they seem to be within the bounds of common sense; it is quite another thing to draw conclusions from them. Possibly this will, then, be my task, perhaps this should be my task this afternoon, i.e. making a few statements about expectations within the bounds of common sense, statements which I might hope will win general approval, and then to draw conclusions from them. The conclusions, however, may be matters for dispute, and I have a pretty

shrewd idea that some of the conclusions I am prepared to draw this afternoon from what I regard as common sense statements may become matters of dispute.

All the same, the reflections I have just presented to you have not entirely dispelled my misgivings about talking here as an economist on "why expectations matter". If a large number of the ladies and gentlemen in front of me should feel at the end of my talk, "Surely this is nothing new, we have known it all the time. It was a lost afternoon after all," I can assure them in advance of my sympathy with them. I would probably feel the same if I were in the audience.

Let us start, then, with a few common sense statements. All action consists of the making and carrying out of plans; that is to say, all action is concerned with the future, hence is necessarily based on expectations. All action, we have known ever since Aristotle, involves means and ends. Men have to fit means to the ends they wish to pursue. You all probably know Robbins' definition of the content of economics in terms of means and ends. It is a matter of some importance to us that the ends of our actions always lie in the future, and since they lie in the future they are always problematic.

Nor is this true only of ends. You may think that you have certain means at your disposal. You may hope that these means will carry you through to the achievement of the ends you see in front of you, but, of course, they may not, because it may turn out that the means now at your disposal are not what you thought they were, not quite as useful in pursuing the aims as you thought. Or possibly, other means, that at some time might have been within your reach, but at that moment no longer are, might have been better means to the same end. What I am trying to bring out is that even the means/end calculus, which to be sure is fundamental for all action, involves expectations at almost every step. It involves expectations, for one thing, since clearly you must expect your ends to be such that they are achievable, otherwise why make efforts to pursue them? You must also expect that the means which either are at your disposal now or which you hope to be at your disposal between now and the conclusion of your course of action, will be such means as will carry you through to the end desired. That is to say, it is impossible to reflect upon action, making plans of action, which are not suffused by expectation. It is altogether impossible to act without expectation.

This, as I said, is common sense. But perhaps the most important statement one can make about action in general is easily summed up in saying that the future is unknowable but not unimaginable. Knowledge refers necessarily to the past and perhaps to the present. All our knowledge is derived from certain conditions of the past in which we have found ourselves, or the authors of books we have read have found themselves, or certain other people have found themselves. **It is impossible to have knowledge of the future.** On the other hand, it is possible for human beings, but doesn't seem to be poss-

We Know Where We're Going
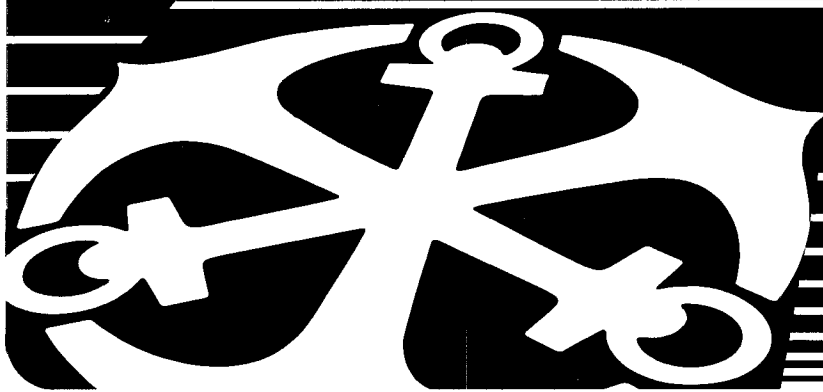
It's at times like these that Expertise Counts

OLD MUTUAL

ible for objects, even creatures other than human beings, to imagine a future that is different from the present. This simple fact that the future is imaginable, although not knowable, marks out the realm of human action as a realm that is different from, for instance, the realm of nature where such a phenomenon evidently doesn't exist.

In other words, when talking of human action, or when in practice we make plans in order to achieve certain ends, we must be aware of the fact that we are living among millions of our fellow men and women who also pursue ends, who all of them are in the same position. They must make plans which concern the future, a future they know no more than we do. In the same way as we, they have to choose between courses of action, and the courses of action our fellow men will choose, will then, in their turn, help to shape the conditions in which we ourselves have to pursue our plans.

We face here problems in which the expectations of different individuals are connected. Our expectations must concern, for instance, the willingness of certain people to work for us, for if they are not willing to work for us, we can't pursue our particular investment project, but their future willingness to work for us will depend on their own expectations of the future. In other words, the mere fact that human beings have choices in itself constitutes one particularly good reason why it is impossible to know the future since, that our fellow men are free to make choices means that they may choose one course of action or another. They will do that in the future and we cannot know now what choices they will make. To deny this would really be denying the freedom of the human will. To the extent to which we think it possible to deny the freedom of the human will, we might think that we can know what our fellow men will be doing.

Next, all action depends on knowledge. Knowledge, in a way, is a means of action. One of the problems that arises here (and that, I dare say, since Popper, is well known) is that it is impossible in the present to have future knowledge, since if today we could have future knowledge, such knowledge would actually be present knowledge. On the other hand, it is clear that all human action is prompted by knowledge. Here we encounter another one of the reasons why the future is unknowable though not unimaginable. It is that the future, which will largely be the product of the actions of our fellow men, will depend on what knowledge these our fellow men will have at various points of time in the future, and such knowledge as our fellow men will have in the future it is impossible for us to have today. This is one of the strongest arguments I know for the general proposition that the future is unknowable though not unimaginable.

My next point, and we are still, I hope, within the bounds of common sense, is this: Who says expectations, says divergent expectations. It is one of our most common experiences that different men will entertain different expectations about the future. I rely on this being accepted as a common sense statement. There is, however, a consequence of this divergence to which I would like to draw particular attention. One of my reasons for doing so is the fact that some economists seem eager to espouse theories which involve convergent expectations. For the time being, let me merely stress the divergence of human expectations as a necessary feature of any human society of which we can conceive.

Next, let me point out that in the capitalistic market economy in which we are living there are certain institutions, fairly central institutions of it, which could not possibly

function the way they do but for the divergence of expectations. I refer, in particular, to such institutions as at the moment we are geographically very near to, the stock exchanges and the futures markets. Without "bulls" and "bears" such markets cannot exist. Every transaction that takes place in the stock exchanges and futures markets of the capitalistic world does take place because of a certain divergence of expectations between buyer and seller. If such expectations were not divergent, it could happen that at the opening of a certain session of the stock exchange, perhaps in Utopia or Cloud Cuckoo Land, when dealers arrive in the morning, they find that they all have exactly the same kind of expectations. There would be no difficulty about fixing prices then, since the prices would reflect universally held expectations, but there could be no actual dealings. In other words, if convergence of expectations existed, certain central markets of the capitalistic economy could not possibly function in the way we know they do.

It seems, therefore, that we have to treat with some reservation all economic theories which are evidently based on convergent expectations, and also all those theories which say that it is a function of the market to make expectations converge. This is a matter of some practical consequence, and that is why I am dealing with it here. Certain economists who seem eager to defend the market economy and the general principle of a free market are inclined to make claims that I think it might be difficult to sustain.

It seems to me that the common sense truth about such markets concerned with the future (like stock exchanges, which are essentially markets for titles to future income streams, or ordinary futures commodities markets for delivery of future goods), is that they tend to co-ordinate divergent expectations. (I shall argue later on that one of the defects of a socialist economy is that it necessarily lacks instruments for doing that.)

I would say that in a capitalistic market economy stock exchanges and futures markets do co-ordinate divergent expectations, but that more they cannot do. Any suggestion, in particular, that such markets could either foresee the future or help people foresee the future, are assertions that we had better refrain from. What such markets actually do is that they invite anybody who wishes to express his expectations to do so. In such markets everybody, i.e. an indefinitely large circle of potential economic agents, is constantly invited to pit his own expectations against those of other people and to gain from doing so if he can.

But that, I think, is all one can claim. We should refrain from making statements that such markets, because expectations are co-ordinated in them, could overcome the void which lies between the present in which we are acting and that future concerning which we must now make arrangements, concerning which we must, to be sure, now make decisions the outcome of which we cannot possibly know. Statements, for instance, that markets such as the stock exchange are "efficient", are, I think, quite harmless and, in fact true, if all that is meant by it is that whatever information there is will become diffused. To be sure, if some people have information that others have not got, those who have it will, of course, act in such a way as to profit from it. By the very fact that they are acting in such a way as to gain from it, they will diffuse knowledge, because their actions become manifest. In that sense it is perfectly true to say that markets are efficient in diffusing information, and that is, of course, an important property of markets. (Again, all socialist socie-

ties necessarily suffer from the absence of such provisions.)

But, we must stress that such information as becomes diffused in markets is information about what is or what took place some time ago. There can be no such thing as information about the future for reasons which I have now argued at some length. I feel that economists, however praiseworthy their intentions, who present arguments in defence of the capitalistic market economy which imply that what is being diffused is anything more than information about the past, are not really serving the cause of economic freedom and the market economy, for the same reason that it is unwise to make promises that one cannot be sure one will be able to keep. I have a feeling, Mr Chairman, that at the present stage of the discussion on such matters, the cause of the market economy is sometimes more endangered by the, shall we say, careless and ill-thought-out arguments of some of its friends than by the efforts of its enemies. This, of course, is not a new situation in history.

So far I have made statements within the bounds of common sense. But what are those conclusions of which I warned you they may be somewhat more disputable? The most important of these emerges when we raise the question which we have to, now, in the light of the situation as I have tried to sketch it in the last ten minutes, i.e.: What can men do, what is beyond them to do, what can we reasonably expect, what is it that would be unreasonable to expect? Very briefly, we are all forecasters, no man can live without being one. Forecasting is, indeed, indispensible. But forecasting is one thing, and prediction, in the sense of a scientific activity, is quite another.

Prediction, as an applied scientific activity, is not possible for the reasons that I gave earlier. The simplest way of showing this is, I think, to compare the human world, in which both forecasting and prediction have to be undertaken, with the kind of world which, consciously or not, has served as the background of some of the more important sciences. The fundamental question here is: Are we dealing with a system that constitutes a recurrent pattern of events such as, typically, the solar system? It was, after all, on the study of the solar system that classical physics concentrated. It is from the successful study of the movements of bodies in the solar system that the scientific method, as we know it, derived. Now, within the solar system, it is, indeed, possible for us today to predict the position of the planet Mercury three hundred and three years eight months and six days from today. The reason why we are able to make such a prediction about the position of the planet Mercury on that day is that we know all the forces in the system. We know the present position of the planets, and we know all the forces in the system that are capable of changing the position of the various bodies in the system.

It is only slightly different when we approach medicine and the human body. The generations come and go, of course, and no individual human body survives for longer than a certain period. Human bodies produce other human bodies and the experience of well over four hundred and fifty years in medicine proves that these bodies have sufficient similarities to enable us to think that the more we learn about some bodies the more we also learn about others. Careful as we have to be about it, owing to the facts of evolution, we may say that the human body, as an object of study, doesn't change, or, so far as we know, has not changed for at least four hundred and fifty years. So it is not unreasonable to expect that the next generation of human bodies won't be very different from those of the known past. It is unlikely that in the next generation there will be born human beings with organs which haven't existed before and which would constitute a source of ignorance.

Human history, on the other hand, is completely different. It is, as I tried to show earlier, of its very essence that new elements will appear. This is so simply because the future is unknowable. We know that in the future some human beings will have knowledge that we haven't got. That is to say, human society cannot possibly be regarded as a system embodying a recurrent pattern of events in a way in which the solar system can.

Next, I have to show that if this is the position, then probability is no way out of it. In other words, I have to show that it is insufficient to say "Oh well, yes, the future is uncertain, but then we can, as it were, master those problems which arise in human society from the uncertainty of the future by means of probability reasoning."

My best way of dealing with this will be to read a passage from George Shackle, an article of his in the Greek Economic Review in 1980, which, I think, is the answer to the question, "Why not deal by means of probability reasoning with problems of uncertainty?"

Here I should warn you that Shackle is using the word 'unknowledge', not to be found in the Oxford Dictionary or any other dictionary of the English language. I think he wants to avoid the derogatory connotations of the English word 'ignorance'. This is what Shackle says:

"All invocations of probability to describe varieties and gradations of unknowledge have one thing in common. All of them **assume away,** perhaps tacitly and even unconsciously, the idea that unknowledge can be part of the fibre and essence of the human situation, the inherent nature of things. It goes against the grain of our culture, especially in the scientific age, to admit that there is any aspect of mundane human affairs that we cannot know. Yet I would say, we have an election to make between supposing ourselves to be, in some not irreverent sense, true authors of our own history, no matter how chaotically it eludes our intentions, and being able to know in advance the content of time-to-come. If the content which probability calculations seek to grasp is **non-existent;** if the void of time waits, not for its content to be discovered, but for that content to be **originated,** then, perhaps, "probability", whatever we mean by it, does not encompass the best means of understanding the exploitation of unknowledge." (G. L. S. Shackle, Imagination, Unknowledge and Choice, *Greek Economic Review,* August 1980, Vol. 2, No. 2, pp. 101-2).

I will only have a little time to spend on a theory with which some of you may be familiar, the so called "rational expectations hypothesis", which seems to have aroused the interest of a number of economists in recent years. I wouldn't want to go quite as far as, inspired by Shackle's thought, I might and say, as I think a Shackelian would have to say, that rational expectations are a contradiction in terms. But I will say this: We can bring our reason to bear upon that which we know, not upon that which we don't know. Whatever we know derives from the past. From the very fact that we cannot know the future, it follows that it is impossible to say, now, what is a rational expectation and what isn't. Shackle would go even further, has gone even further, to say that "time is alien to reason". For a number of reasons, which happily I do not have to explain this afternoon, I wouldn't want to go as far as that. I can't see why time and reason are necessarily elements alien to each other.

On the other hand, I find it difficult to see why the rational expectations hypothesis appears to have aroused the enthusiasm of certain economists. As I understand their argument, they are not denying that individuals will have expectations that are not rational. They don't deny, they say, the divergence of expectations, from which it seems to follow that if different men hold different expectations, as there are dozens of different expectations, some of them evidently cannot be rational. Rational expectation, presumably, would have to be the same for everybody. It seems to me, therefore, that whoever wishes to uphold the rational expectations hypothesis must, first of all, deny the reality of divergent expectations. Or, as I believe some of its upholders do, while not actually denying the divergence of expectations, which I described as an element of common sense, they must think that if in the real world expectations are divergent, it doesn't matter. They must think that by some kind of force that operates, or is supposed to operate, in a market economy, the divergent expectations are turned, perhaps only ultimately, into convergent ones. This seems to me at least what must be meant by rational expectations. There must be some kind of economic force which turns the divergent individual expectations of the real world, into that ultimately convergent and rational expectation. It seems to me that the burden of proof here is entirely on those who assert that there is some such force, and one would like to see it demonstrated.

In conclusion, let me say this: The freedom to express one's expectations and to make gain from such expression, if one can, is part of economic freedom. In socialist economies the unfortunate citizens of such societies suffer a number of disabilities only too well known today. But possibly their greatest disability lies in their inability to express expectations in such a way as to make gain from them, as it is, of course, typical of planned economies that there exists a difference between the official planners, who embody their expectations in their plans (as all men are compelled to embody their expectations in their plans), and, on the other hand, the rest of the population whose expectations do not matter, so that evidently the quality of economic planning in a planned economy must ultimately depend on how good the officially appointed planners are at forming their expectations. By contrast, it is an important characteristic of the capitalistic economy that the number of those who are capable of giving expression to expectations is in no way defined, or limited; the door is always open to them. In a market economy the speculators always are an "open group".

It has occurred to me that perhaps a socialist economy (which, we are always told, need not operate without market forces of some kind) could best employ its finest talents by letting them play "stock exchange" rather than by letting them make plans. That, I think, would possibly be a form of simulation that may be far more successful than the pursuit of the kind of economic plans that we have had in the past. And now, Mr Chairman, it seems to me that I've carried the conclusions, the disputable conclusions of which I spoke, far enough. No doubt one could draw other conclusions from the statements within the bounds of common sense that I mentioned earlier. I think, Mr Chairman, we leave it at this for today.

By F. E. Halse

Ownership and control of large companies in the RSA

Despite the many protective and restrictive government regulations affecting its industry, South Africa is often considered part of the "industrialised West". Is this justified having regard to trends affecting those countries?

John Scott in his book "Corporations, Classes and Capitalism", claims that "the major trend in advanced industrial capitalism has been towards the concentration of more and more areas of economic activity in the hands of the largest companies".[1] There is little doubt that South Africa has followed suit. Recent merger mania has led to the following situation: in April of this year, the market capitalisation of the Top 10 industrial companies represented 45% of the total market capitalisation for the Top 100, that of the top twenty 61% of the total and that of the top thirty 70% of the total.[2]

Another sign of the intense concentration of assets is the size of the parties in the recent mergers. Concentration is no longer a case of the take-over of a small company by one of the larger groups. Instead, it frequently involves an amalgamation of one kind or another between **two** of the Top 100 companies. The big fish are no longer chasing the minnows, they are eating one another in a manner consistent with trends overseas.

What of the other peculiarities of industrialised nations which do not appear so obviously in South Africa? "The central feature of industrial capitalism is, undoubtedly, the large business corporation. In its more advanced stages, the system appears to develop two strong characteristics in relation to the large business corporation viz. the separation of ownership from control, and the dominance of finance capital over real capital".[3]

The first of these concepts, the separation of ownership from control, is a difficult trend to measure quantitatively. Ownership is defined by Scott as the right to benefit from the company's operations, while he defines control as the right to determine policy.

"Before the rise of the corporation, the owner of industrial property had full rights of both use and benefit over his property but in the era of the joint-stock corporations, this has changed. Stocks and shares give their owners an interest in an enterprise, but they are not necessarily associated with the control of the assets".[4] This trend is seen as a result of three factors, viz. growing popularity of the limited liability company as a form of investment, the rapid growth of the pool of funds available for investment (particularly since the Second World War), and the vast capital needs of the megacorporations which could not be met by just a few shareholders.

There have been a number of studies attempting to measure the degree of separation that has developed between ownership and control, most of them carried out in the USA. To what extent has SA moved along this path, if taken within the framework of Scott's book?

Scott has identified three different modes of control in corporations, any of which may have replaced the original owner-manager form of control.[5] The first is control through a majority ownership of the shares, either by another company or a family/individual. The other two he has identified as minority control where a small group

holding less than a majority of the shares has "working control" owing to the absence of any other holdings large enough to oppose it, and finally, management control. The last form is said to exist when no stock interest has sufficient shares to gain a majority and so the members of the board (who may only have minimal holdings in the company) will be a self-perpetuating control group almost totally divorced from legal ownership.

Against this background, the top 30 industrial companies were looked at in terms of their shareholdings. Of these, 57% appeared to be controlled by a majority shareholder, usually a larger organisation. Of this 57%, only about 10% came near to the typical "owner-manager" type. With the remaining companies, 33% appeared to be controlled through a minority shareholding. In one or two of these cases the "controlling" company owned slightly fewer shares than an institution which, however, evinced no real interest in dictating company policy.

Only 10% of the companies could possibly fall into the third category, that of control by management in the absence of any one dominating share-ownership. On this evidence, it appears that South Africa has not developed significantly along the road to industrial capitalism where the dominating trend is towards management control. But there are two possible explanations for the apparent deviation from this trend. The first lies in the earlier history of the companies – they have in many cases developed from multinational branches. So while the overseas parent may "own" the company on paper, much of the control may well be vested closer to home.

The second explanation relates to the theme of this article, the concentration of assets in fewer hands. Because of the intense cross-holdings between the top 30 companies themselves, it is suggested that many of them could in fact be grouped under one umbrella as only one corporation. This would result in far fewer than thirty major companies, and it could well be that the form of control operating in these few "holding companies" would be closer to the diluted form, management control.

What of the second characteristic of industrial capitalism mentioned by Scott, that of the dominance of "finance capital" over "real capital"? He describes the trend as the fusing of monopolised capital in banking and manufacturing into "finance capital", i.e. capital which is not restricted to one particular sphere of activity. This proceeds by way of fusions and coalitions of industrial and financial organisations, interlocking directorships, cross-shareholdings, and the control of corporations centralised more and more in knots of financial power.[6]

Figures 1-5 indicate the degree to which the top 30 South African companies are moving with this trend. Figure 1 shows that only 13% of these companies are **not** represented on the board of a financial institution, either a bank or a building society, through interlocking directorships. 13% of them have between 1% and 10% of their board also sitting on those of a financial institution, 28% of them have between 10% and 20% on the board of a financial institution, etc. At the top end of the scale, 3% of the companies have almost half of their board of direc-

tors also represented on the boards of financial institutions.

Figures 2, 3 and 4 represent the degree of interlocking directorships between the top thirty companies. Figure 2 represents the weakest form of cross-control viz. when a company has one board member on the board of a number of other companies. The degree of cross-control increases through Figure 3 to Figure 4 which illustrates the percentage of companies having three board members represented on the boards of a number of other companies (the top of the scale found to be three other companies).

While the data in Figure 4 is interesting, it is not wholly convincing. Of greater significance is where exactly the concentration of cross-holding exists. So Figure 5 looks also at the strongest form of interlocking directorships but limits the examination to the top **twenty** companies. Here the concentration of power is more obvious. A quarter of the companies have 3 or more directors on the board of one other top 20 company, 10% on the board of two other top 20 companies, and one-fifth on the board of another three top 20 companies.

The conclusion is, therefore, that South Africa is certainly following the trends discernible in the industrialised Western countries. Control of most of the large industrial corporations in this country may be said to be concentrated in relatively few hands, and the link between this controlling core and the financial institutions is strong. A large proportion of investors, thus, benefit from the ownership of their shares, but have little or no true control over the policy and direction of the companies themselves.

The question to ask at this point is whether or not such a state of affairs is desirable? Perhaps most investors have happily relinquished their right to decision making and involvement and prefer to be able to withdraw their funds from a doubtful company rather than be involved in putting things right. The evidence from overseas is certainly that large institutional shareholders prefer to stay out of management decisions.

An economist might also argue that this concentration is the result of market forces which have apportioned scarce resources to those places in which they will be most effectively utilised. However, this would imply both that "big" is always "efficient", and that market forces are doing the allocating of resources. In an economy riddled with regulatory legislation, oligopolies and even monopolies, such a view holds no water.

In fact, the higher the degree of inter-locking directorships, the less time and specialised expertise a director is able to devote to each of his many concerns. A significant number of South African directors sit on the board of at least six different companies operating in very diverse industries. Many of them, as shown above, are also represented on the board of one or more financial institutions. The consensus from overseas sources is that this type of situation can too easily lead to a conflict of interest, competitive advantages for "related" companies, and distorted conditions for entry into an industry.

Awareness of the negative effects due to an over-concentration of assets, has stimulated a more recent development in the highly industrialised countries. There is currently active encouragement by most of these governments for establishment of small businesses, based on the belief that a healthy economy is one in which not all the companies are giants.

If South Africa has followed the trends of the industrialised West thus far, it seems likely that this is the route we will go. But even a gradual reversal of the current asset concentration drive is unthinkable at this time, and possibly the only strong enough incentive will have to come from the market. It is after all the investors who rate the Barlows and the Anglos at a premium, not caring or not noticing that they are possibly encouraging the giants to get fatter all the time!

Top 30 companies (April 1982)

Ranked by total assets

1. Barlows	16. Premier Group
2. South African Breweries	17. Highveld Steel
	18. OK Bazaars
3. Sasol	19. SAPPI
4. Remgro	20. Murray & Roberts
5. AMIC	21. Triomf
6. AECI	22. Anglo Alpha
7. C.G. Smith	23. Dorbyl
8. Fed Volks	24. Kaapwyn
9. Sentrachem	25. Pretoria Portland Cement
10. Anglo Tvl. Industries	
11. Safmarine	26. Nampak
12. Tiger Oats	27. Greatermans
13. De Beers Industrial Co.	28. Stewarts & Lloyds
	29. Plate Glass
14. Huletts	30. Afrox
15. Tongaat	

Figure 1

% of top 30 companies (cumulative)
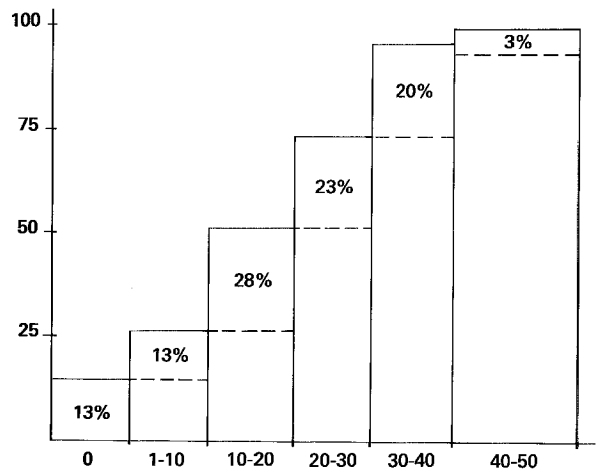
% of directors also on board of one or more financial institutions

Figure 2

% of top 30 companies
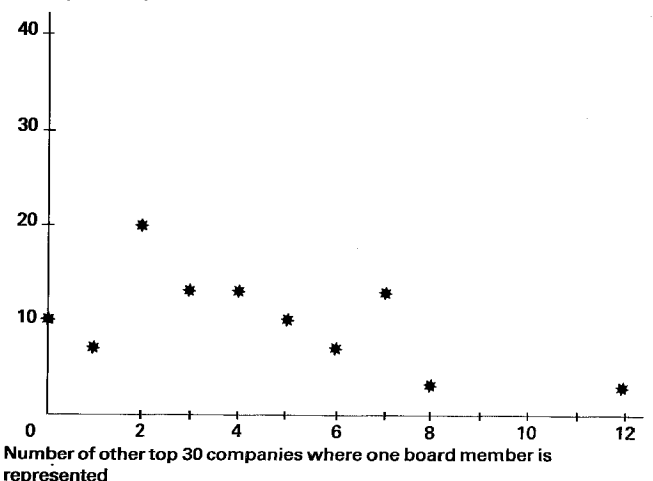
Number of other top 30 companies where one board member is represented

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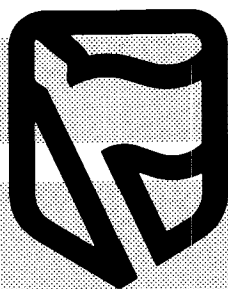
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Figure 3
% of top 30 companies
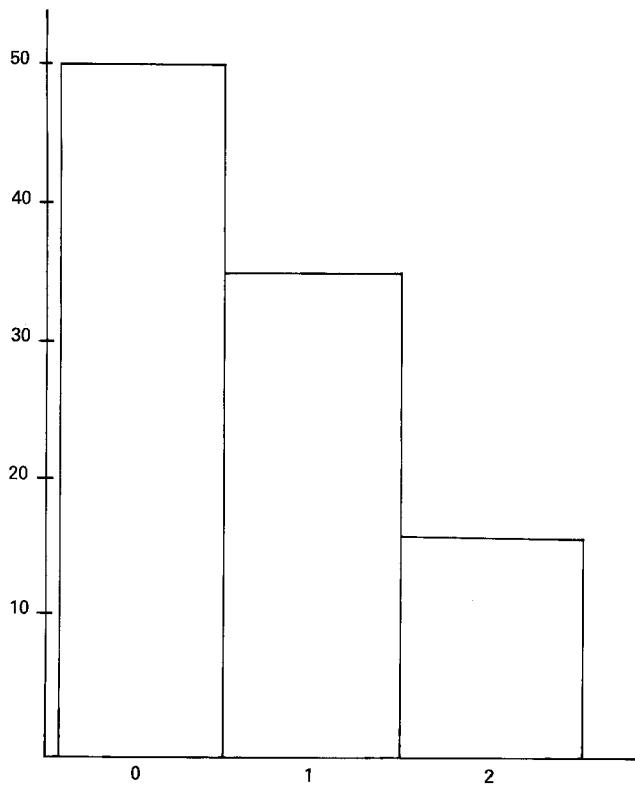
Number of other top 30 companies where two board members are represented

Figure 5
% of top 20 companies
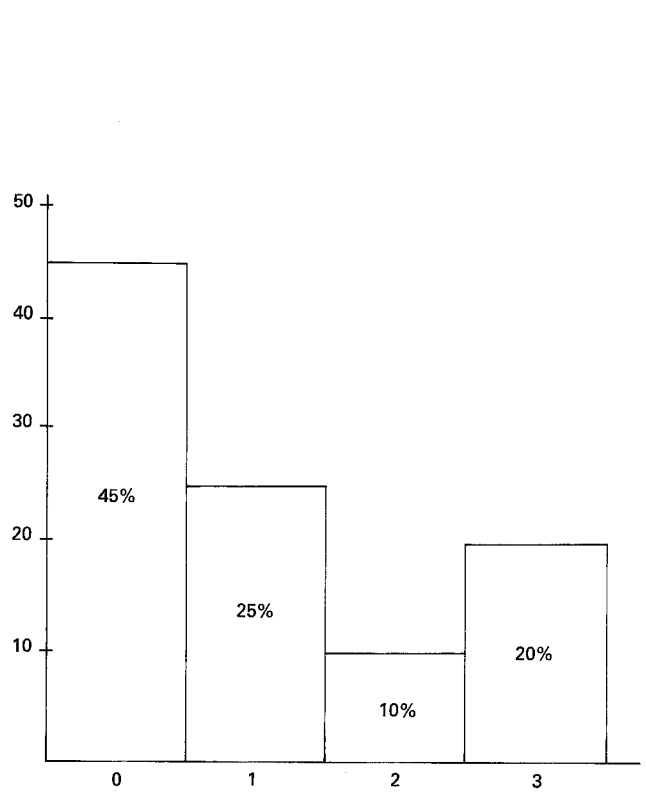
Number of other top 20 companies where three or more board members are represented

Figure 4
% of top 30 companies
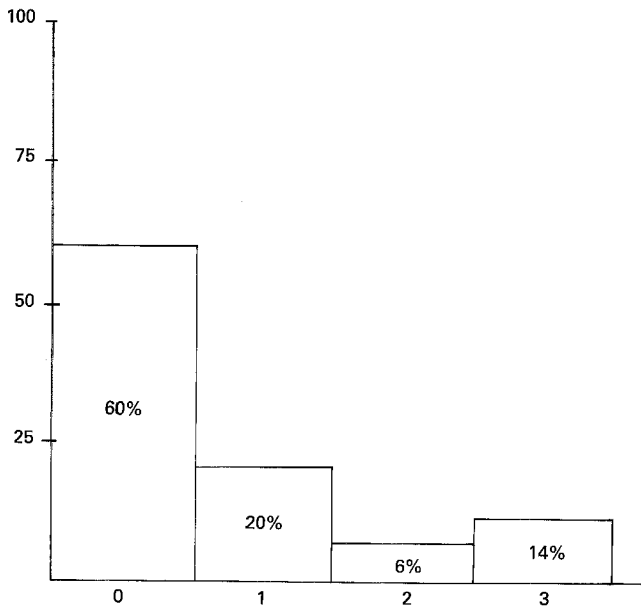
Number of other top 30 companies where three or more board members are represented

Footnotes
1   Scott, J. *"Corporations, Classes and Capitalism"*, p. 16.
2   The top thirty South African industrial companies were chosen according to the Financial Mail Top Companies Survey, 30 April 1982, which ranked them according to total assets. The list excludes the large mining houses (see appendices for list).
3   Scott, J. Op. cit., p. 24.
4   Ibid., p. 32.
5   Ibid., pp. 38-42.
6   Ibid., pp. 24-29.

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INFLATION
The cancer
and
the cure

CPI
(April 1970 – 100)
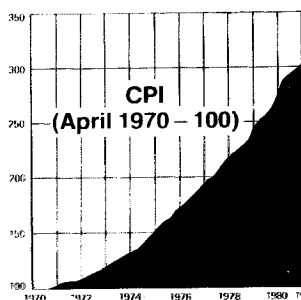
The graph illustrates the escalation in the cost of living since 1970 as measured by the S.A. Consumer Price Index.

Litre of petrol	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	17,0c	65,0c	?

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

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By Narendra Bhana

The take-over objectives of South African acquiring companies

INTRODUCTION

Several research findings have suggested that the objectives of shareholders and management differ in large companies. The companies listed on the JSE represent some of the largest companies in South Africa. Furthermore, the listed companies are predominant in take-over activity. It was decided to determine the take-over objectives of the listed acquiring companies in South Africa. Further investigation was conducted to determine if there existed an inconsistency between the objectives of management and shareholders, predator firms in the South African context.

THE NEOCLASSICAL THEORY OF THE FIRM

The neoclassical theory of the firm postulates that profit maximisation is the objective of the firm.[1] This is because both ownership and control over the firm is provided by the entrepreneur. The emergence of large public companies has necessitated a revision of the economic theory of the firm. In large companies, the functions of ownership and control, previously provided by the entrepreneur, are now provided by two groups. The capital is provided by shareholders who do not exercise control. Control passes into the hands of the professional managers who have very little ownership in the company. This tendency towards the separation of ownership and control raises the question whether the profit maximisation objective assumed by the neoclassical theory is valid.

SHAREHOLDERS' INTEREST: MAXIMISATION OF PROFIT

The shareholders of a public company are not homogeneous. Despite the variation of interests among individual shareholders there is general agreement that each is interested in maximisation of profit to himself. In the literature of finance there is agreement that shareholders, as a group, are primarily interested in growth in earnings per share and, by implication, growth in the market value of their investment.[2] Shareholders are more likely to invest in companies whose shares are expected to show a growth in market value than in those companies whose share price is not expected to perform favourably.

INTERESTS OF PROFESSIONAL MANAGEMENT

Several studies have shown that the professional managers of today may not necessarily have profit maximisation as their major objective for the firm.[3] These studies have shown that management often have maximisation of the firm's sales, assets, number of employees, and the size and growth of business activity as major objectives. It has also been observed that the management of large companies is frequently preoccupied by growth.[4] Reid[5] has identified variables that represent management's interest. The growth in sales, assets, and number of employees are more representative of management's interest than maximisation of profits. It has been suggested that management is more interested in the maximisation of growth and size, because management "utility" is best served by them.

The stock market provides a discipline to listed companies in the form of take-over bids from other companies. Those companies that are inefficiently managed or whose assets are not used for sufficiently profitable purposes, will have to contend with take-over attempts by other companies. Singh[6] conducted a study to determine the relationship between profitability and probability of take-over. It was observed that no such relationship existed for companies with average and above average profitability. Singh therefore subjected his study to further analysis to determine if the size of a company influenced the take-over process. It was observed that the discipline provided by the stock market in the form of take-overs applies mainly to small companies with below average profitability. Large companies may avoid being taken over even if their profitability is low. This suggests that the strategy to avoid a take-over will differ according to the size of the company. A small company with low profitability should strive to improve its profit level to above the average for the industry. A strategy for a large company is to increase the size of the company, even if it means reducing the profitability.

THE OBJECTIVES OF SOUTH AFRICAN ACQUIRING COMPANIES

A United States study[5] has shown that the larger acquiring companies were most concerned with growth, as measured by increase in sales, assets, number of employees, etc. Based on overseas findings it can be expected that the South African acquiring companies would also show a tendency to concentrate on growth instead of profitability. The following hypothesis was tested:

Hypothesis

A major objective of take-overs by acquiring companies is to maximise the growth in size of the company rather than the increase in its profitability. The greater the take-over intensity the greater the tendency towards growth maximisation.

To determine the take-over objectives of South African acquiring companies it was decided to study the companies listed on the JSE. Listed companies generally have far greater resources available than non-listed companies and the former are expected to be predominant in take-over activity. It was, therefore, decided that companies ranked in the FM Top 100 Companies Survey[7] constituted a reliable sample for establishing the take-over objectives of South African acquiring companies.

The responding companies were asked to state one or more of the objectives which influenced their decision to take over other companies. A point was allocated for each objective stated by the responding companies. The responses are summarised in Table 1.[7]

Table 1

The distribution of points allocated for company objectives for take-overs

Company objective	Points accu- mulated	Percentage of total	
Growth maximisation	71	27,5	
Sales maximisation	46	17,9	51,6%
Increase in assets	16	6,2	
Increase in earnings per share	63	24,4	
Profit maximisation	52	20,1	48,4%
Wealth maximisation	10	3,9	
	258	100,0	

The above table shows that growth maximisation is the largest single objective reported by the responding companies, representing 27,5 per cent of the total responses. Increase in earnings per share and profit maximisation make up 24,4 per cent and 20,1 per cent respectively of the total response. The first three objectives in Table 1 could be said to represent the "management interest" and are size related. By increasing sales and assets – as well as concentration on growth – management's chances of retaining control over the firm are improved. This is because the larger the size of the firm the less the likelihood of it being a target for a take-over. The last three objectives listed in Table 1 could be regarded as representing "shareholders' interest" because, by increasing profits and earnings, both dividend income and capital gain on investment are improved. These are profitability related. The size related and profitability related criteria make up 51,6 per cent and 48,4 per cent respectively of the total response.

The high rating given by the acquiring companies to the size related criteria is surprising. There is no justification for having size related criteria as objectives for take-overs. The economic viability of the firm as a whole is best served by pursuing the profit related criteria for take-overs as well as other forms of investment. The management of acquiring companies could lower the market value of shares if growth is not compatible with profitability. The findings of this study confirm the trend in overseas countries where the larger companies are more concerned with maximising company size rather than profitability.

THE INFLUENCE OF TAKE-OVER INTENSITY ON TAKE-OVER OBJECTIVES

Having established that South African acquiring companies have growth maximisation as a major take-over objective, it was decided to establish if there was any relation between take-over intensity and predisposition towards growth maximisation. Companies involved in frequent take-overs can be expected to grow faster than those companies concentrating on growth by internal expansion. Furthermore, companies involved in frequent take-overs can be expected to grow at a faster rate than less active acquiring companies. The highly active acquiring companies can be expected to show a greater concern for growth maximisation objectives than less active acquiring companies. With the eleven year study in mind, it was decided that up to five take-overs represented a low take-over rate, between six and ten take-overs an average rate, and above ten a high rate. The results of the cross-tabulation between take-over objectives and take-over intensity are shown in Table 2.[7]

Table 2

The relationship between the intensity of take-over and the objectives of the firm

Take-over objective	Take-over intensity						Chi-square	Level of significance
	Low		Average		High			
Sales maximisation	19		9		18		4,7195	0,0009
Growth maximisation	26	41,9%	19	49,1%	26	66,67%	10,0650	0,0065
Increase in assets	4		0		12		20,4706	0,0001
Wealth maximisation	5		4		1		2,3379	0,3107
Profit maximisation	32	58,1%	10	50,9%	10	33,33%	14,0578	0,0009
Increase in earnings per share	31		15		17		1,7438	0,4181
Total	**117**	**100%**	**57**	**100%**	**84**	**100%**		

Based on points accumulated, see Table 1.

It can be seen from Table 2 that as the take-over rate increases from low to high there is a tendency towards the satisfaction of "management interests" at the expense of "shareholders' interests". All the results are not statistically significant, but they do show a trend towards maximising "management interest" as the intensity of take-over increases. However, there is a statistically significant positive relationship between growth maximisation, increase in assets and take-over intensity. There is also a statistically significant inverse relationship between profit maximisation and take-over intensity. The findings of this survey tend to support the hypothesis that the greater the take-over intensity, the greater the tendency towards growth maximisation objectives. However, not all the variables representing management interest and shareholders' interest are statistically signifi-

cant. These results must be interpreted with caution as further research is necessary.

The investment community recognises the emphasis on growth by the highly active acquiring companies. During boom periods the earnings multiples (P/E ratios) of the highly active acquiring companies such as conglomerates increased at a faster rate than companies not actively involved in take-overs.[8] However, the share prices of highly active acquiring companies are exposed to substantial downward adjustment in recessionary periods. The earnings multiples of conglomerates declined at a faster rate than companies not actively involved in take-overs during the post-1969 recessionary period.[8] The share market discounts the higher risks of acquiring companies which cannot be expected to sustain the high growth rates of the past.

It is submitted that there need be no inconsistency between the interests of management and shareholders. Larger companies, as well as companies active in acquisitions and mergers, may concentrate on growth and sales maximisation in the short term. As a result of strengthening the company position the chances of increased profits in the long term may be improved. It is further submitted that over the long term the management of acquiring companies must have profitability as the main objective. If the company is not profitable then neither the shareholders nor the management can have a future. An undue reliance on growth at the expense of profitability is undesirable from a social welfare point of view because it can result in a misallocation of resources.

CONCLUSION

This study has shown that South African acquiring companies are following the example of their overseas counterparts by being more concerned with growth than profitability. This could result in a conflict between management and shareholders if growth is not compatible with profitability in the long term. An undue concern for growth by following an injudicious take-over policy could be detrimental to the viability of the resulting enlarged group of companies.

It has also been shown that the conflict between management interests and shareholders' interest increases with take-over intensity. The highly active acquiring companies in South Africa are showing a greater tendency towards growth maximisation in pursuing take-overs. Shareholders investing in conglomerates and highly active acquiring companies should devote particular attention to the business cycle. Depending on the state of the business cycle the potential for increase or decrease in share prices are magnified for the active acquiring companies.

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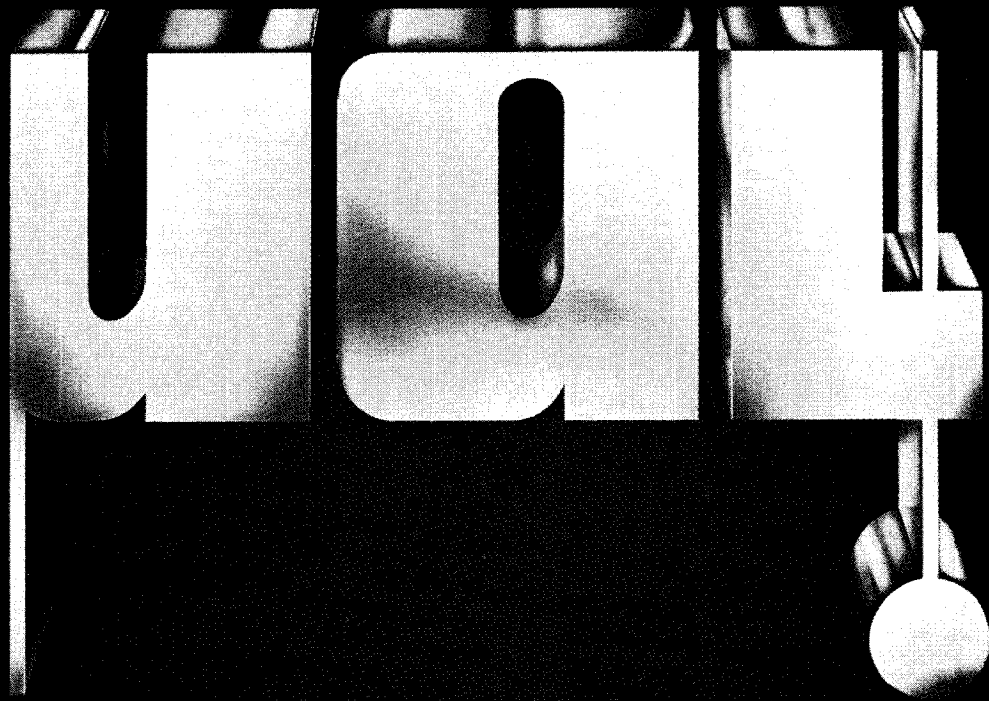
Union Acceptances Limited
The Merchant Bank for the 1980s.

By D. Konar

Some thoughts on the availability and uses of accounting information

I INTRODUCTION

In recent times, discussion of the performance of a company has been largely dominated by a "bottom-line" net income or earnings per share figure. There is some research evidence that suggests that the evaluation of an enterprise's performance can and should be undertaken on the basis of analysis of a number of information elements. The use of a number of ratios is a good approach for incorporating many information elements in an evaluation of an enterprise. The purpose of this paper is to highlight the use of ratios in investment, bond rating, financial distress prediction and credit decisions, based on an evaluation of the financial report. This paper does not extend to an in-depth analysis of all the possible ratios in use or their constituent variable components – those are tasks which have been performed, with greater or less thoroughness, many times before.

Financial statement analysis has as its major objective the provision of company related data to decision makers. The uses of common financial ratios are practically unlimited in the business world; new ratios are sometimes synthesised in order to fit into certain specific areas of study. Meaningful ratios serve best to highlight changes in direction and patterns of change, which in turn may indicate risk and opportunities for the business under review. The advantage inherent in using ratios for financial statement analysis is that it expedites "the analysis by reducing the large number of items involved to a relatively small set of readily comprehended and economically meaningful indicators."[1] The financial ratios are basically representations of a company's or industry's (for industry studies) balance sheet and income statement. The purpose of deriving ratios is to judge the relative magnitudes of selected key elements and to determine any trends towards improvement or worsening of performance. The ratios serve to summarise the financial information, to integrate the information in the balance sheet and income statement, and to become representations of the financial entity for comparison purposes. The ratios would usually be compared to either past data or to current data (e.g., comparing a company's ratios to the industry ratios). Ratios are not an end in themselves. Lev has succinctly stated that "financial ratios are not intended to provide definite answers; their real value is derived from the questions they provoke. Ratios are therefore symptoms of the firm's economic condition intended to guide the analyst in his financial investigation".[2]

II GENERAL USES OF FINANCIAL RATIOS

In a decision framework, the financial ratio becomes an invaluable tool. The ratio is a summary figure and it enables an analyst to answer a question on a certain company without delving into a voluminous annual report. Unfortunately, ratios are not available in financial volumes in South Africa. Organisations such as Moodys, Standard and Poors, and Barrons publish financial ratios in volumes in the USA. Costs would therefore have to be incurred in obtaining and analysing financial statements for these ratios. As users get a better understanding on how to use ratios in a decision making context, they will most likely be made more accessible by the companies themselves. Computer packages, such as the Compustat Tape in the USA, might also become available for the purpose of ratio analysis and research. The only constraint and expense involved in ratio analysis today is the time and the mental capacity of the analyst used to recognise the importance of ratio variances that do occur. As tools, they can be obtained, but the user must have an understanding of their benefits and limitations.

A Ratios in a decision framework

It must be realised that information cannot be acquired without cost and it may sometimes be necessary to take a decision without acquiring all available information.

In any business organisation, too much information could be just as costly as too little information. Most decision-makers invest in acquiring or analysing accounting information because they believe they will make better decisions with such information rather than without it. For example, an analyst burdened with voluminous data may have to expend many hours prior to reaching a decision as to which information is pertinent to the problem at hand. The search time could be costly and emphasises the need for effective information planning. According to Foster,[3] such planning is essential from the start and should proceed as follows:

Step 1   Establish a goal or objective in making the decision.

Step 2   Determine the set of collectively exhaustive and mutually exclusive actions available to the decision maker.

Step 3   Determine the set of collectively exhaustive and mutually exclusive states of nature or outcomes.

Step 4   Determine the probabilities of each available state.

Step 5   Determine the end-of-period wealth for each state of nature, conditional upon a particular action being taken.

An illustrative case which recognises the above steps in effective information planning appears below.

Illustrative case

Exe Limited, a cement manufacturing company, approaches Wye Bank for a loan of R100 000 for one year at a 12% interest rate. Exe Limited provides its audited financial statements since incorporation four years previously as well as its forecasted financial statements for the next financial year.

After a preliminary analysis of Exe Limited's financial statements, and based on their prior experience with similar firms, Wye Bank makes the following assessments: The probability that Exe Limited will default on the loan is 0,25; in the case of default, it is estimated that R10 000 would be spent on legal fees, etc., in realising assets pledged as collateral for the loan and any accrued interest on the loan.

Wye Bank's best alternative use of R100 000 is an investment in a risk-free one-year government bond at a 10% interest rate.
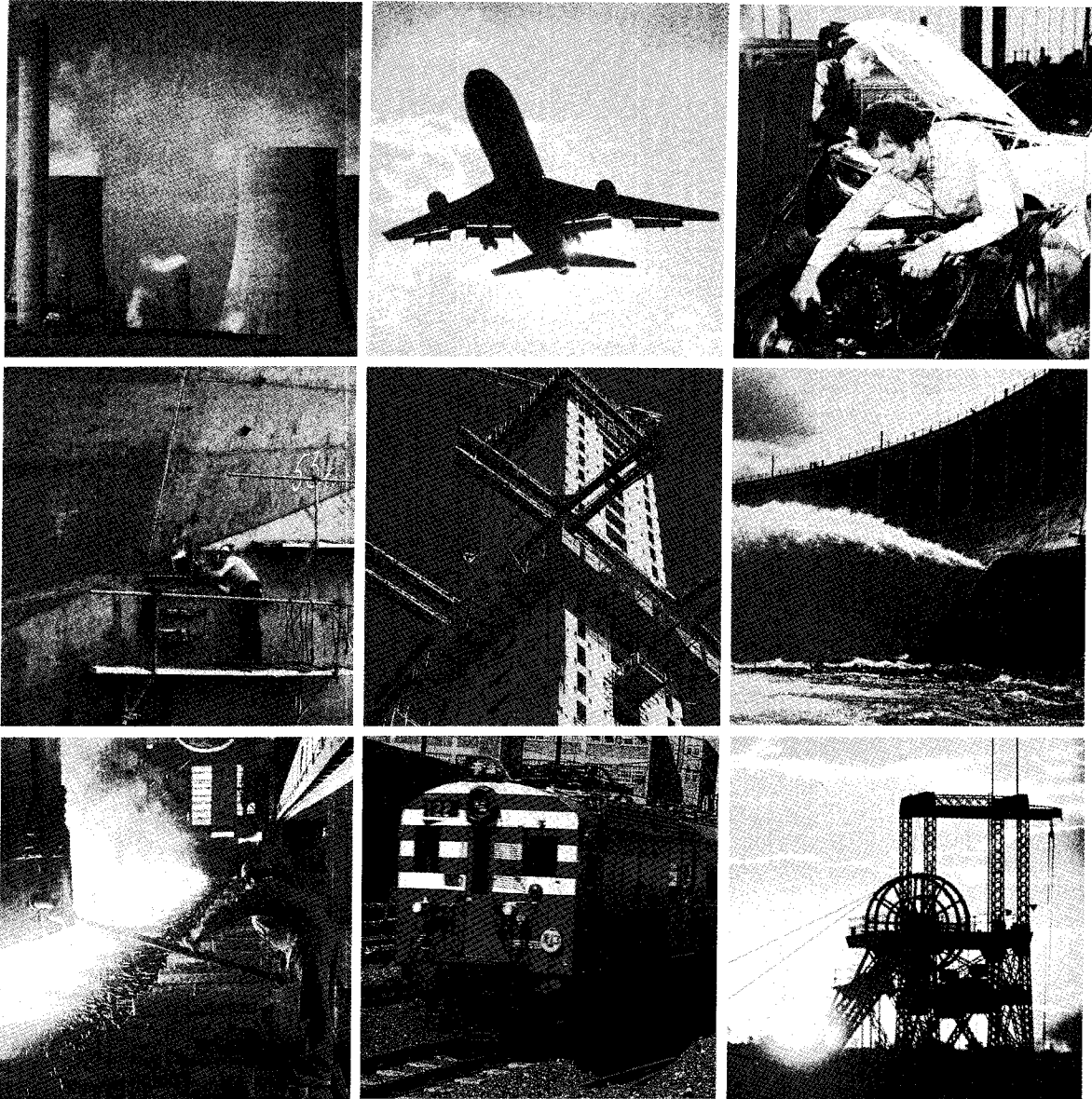
While you're out there helping to build South Africa, don't forget yourself.

We're here to help you.

United

Building Society

Your biggest, surest helping hand in the land

𝒰 Assets exceed R4 600 million. Reserves exceed R116 million.

Two possible outcomes are associated with the decision taken by the bank: whether the loan will be repaid or whether it will be defaulted.

A decision analysis approach to the lending decision in terms of the five steps listed above appears below:

Step 1 The bank's objective is assumed to be to maximise expected utility (monetary payoff).

Step 2 The bank can take one of two possible actions:
x_1 – grant the loan to Exe Limited
x_2 – invest the R100 000 in 10% risk-free government bonds

Step 3 Two possible outcomes are associated with the bank's lending decision:
y_1 – loan and interest will be repaid
y_2 – loan will be defaulted, and the bank will have to spend R10 000 to recover the principal and interest

Step 4 The probabilities associated with each available state are as specified in the case:
$\phi(y_1) = 0,75$
$\phi(y_2) = 0,25$

Step 5 A payoff matrix is used to summarise this information:

Table 1

Outcomes of lending decision

Action	Outcome	
	Repayment (y_1)	Default (y_2)
Grant the loan (x_1)	R112 000	R102 000
Invest in risk-free bonds (x_2)	R110 000	R110 000

If the bank lends to Exe Limited (x_1) and Exe Limited defaults (y_2), it will receive R102 000 (the R112 000 principal and interest accrued less the R10 000 required to recover the R112 000).

The above steps can be used to enable the bank to make a decision. If the loan is granted and repaid, the bank will realise the interest on the loan as well as recover the principal advanced. If the loan is granted and the borrower defaults, the bank will lose R10 000 in attempting to recover the principal and the interest. If the loan is not granted and the company remains solvent, the bank will lose the marginal interest that could have been earned and possibly even future business with the customer.

As the expected utility to the bank is to be determined, it is necessary to introduce some more notations. Let $E(U/x_j)$ be the expected utility of action j. It then follows that

$E(U/x_j) = \sum_{i=1}^{s} U(y_i, x_j) \cdot \phi(y_i),$

where $U(y_i, x_j)$ is the utility of the payoff to the bank if y_i occurs and x_j is taken. The preferred action can now be determined.

$E(U/x_j) = U(y_1, x_j) \times \phi(y_1) + U(y_2, x_j) \times \phi(y_2)$
$E(U/x_1) = (R112\ 000 \times ,75) + (R102\ 000 \times ,25) = R109\ 500$
$E(U/x_2) = (R110\ 000 \times ,75) + (R110\ 000 \times ,25) = R110\ 000$

As the bank's objective is to maximise expected utility (monetary payoff), the preferred action would be to invest the R100 000 in 10% risk-free government bonds.

However, a note of caution must be introduced here. The bank lending officer must be able to differentiate a good decision from a good outcome: if the bank does not grant the loan and the company remains solvent, the bank's goodwill will be slightly impaired and it may possibly lose future business with the customer as well.

At every point in the analysis, the availability of information is essential. Is adequate information available to "solve" the problem to the satisfaction of the user? Even if **all** information was available, will such information aid in reducing uncertainty of the outcomes? The use of information, including ratios, will therefore be determined by the value of its content. As long as the marginal returns of information use exceed the costs of collecting and analysing the information, the analysis will most likely be profitable. Stated in terms of utility, "the demand for information is **derived** from the increase in utility a decision maker expects to obtain from its acquisition in a specific decision context(s)".[4] The value of information can be calculated by the user as illustrated above.

B Value of ratios

The value of a ratio is dependent on two variables. Firstly, the impact of the ratio on the prior odds before a decision is undertaken needs to be measured and, secondly, the accuracy of this predicted impact is important. If the presence of a ratio is found to be accurate in predicting future outcomes such as financial distress, bankruptcy or default, this ratio becomes valuable.

C Basic types of financial ratios

There are several different types of ratios. Four fundamental types are identified in the accounting literature. Each type is used for different decision processes as will be explained later in this paper. Briefly the four types are:

1 Liquidity ratios, which indicate the firm's ability to meet its short-term financial obligations.
2 Leverage ratios, which measure the extent to which the firm has been financed by debt.
3 Activity ratios, which measure how effectively the firm is using its resources.
4 Profitability ratios, which are designed for the evaluation of the firm's operational performance.[5]

Each of the above categories of ratios contains numerous components. Discussion of the ratios contained in each category will not be undertaken in detail here unless they apply directly to the decision being considered. For reference purposes, a summary table of the commonly used ratios in each category appears in Table 2.

III VALID USES OF RATIOS IN DECISION MAKING

Financial ratios may be used in the examination of various issues, such as the relationship between financial data and equity characteristics, the prediction of bankruptcy and bond ratings, the relationship between return on equity of the entity and its competition, the structures of costs and output (economies of scale) in various industries, and the relationship between intangibles (advertising, expenditures, research and development) and corporate values. It has been submitted that a major reason for using financial variables in the form of ratios is to control for the systematic effect of size on the variables under examination.[6]

An investor may be searching for a company with high leverage and steady growth while the bankers may feel more secure dealing with a lower leveraged company that would perhaps have a lower chance of bankruptcy. The common types of business decisions and/or questions are presented below with an explanation as to how the ratios should be used in the analysis.

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Table 2
Summary of financial ratio analysis

Ratio	Formula for calculation
Liquidity	
Current	$\dfrac{\text{current assets}}{\text{current liabilities}}$
Quick, or acid test	$\dfrac{\text{current assets} - \text{inventory}}{\text{current liabilities}}$
Leverage	
Debt to total assets	$\dfrac{\text{total debt}}{\text{total assets}}$
Times interest earned	$\dfrac{\text{profit before taxes plus interest charges}}{\text{interest charges}}$
Fixed charge coverage	$\dfrac{\text{income available for meeting fixed charges}}{\text{fixed charges}}$
Activity	
Inventory turnover	$\dfrac{\text{sales}}{\text{inventory}}$
Average collection period	$\dfrac{\text{receivables}}{\text{sales per day}}$
Fixed assets turnover	$\dfrac{\text{sales}}{\text{fixed assets}}$
Total assets turnover	$\dfrac{\text{sales}}{\text{total assets}}$
Profitability	
Profit margin on sales	$\dfrac{\text{net profit after taxes}}{\text{sales}}$
Return on total assets	$\dfrac{\text{net profit after taxes}}{\text{total assets}}$
Return on net worth	$\dfrac{\text{net profit after taxes}}{\text{net worth}}$

Source: Weston and Brigham. *Managerial Finance,* Sixth Edition, Table 2-4, p. 37.

A Use of ratios in investment decisions

A person who is thinking about investing or who has invested in a company uses ratios as a measure of performance and as a predictor of future returns. The investor is usually looking for strengths and weaknesses in all four financial ratio categories mentioned in Part II(C) above. Assuming a less than efficient market, the investor hopes to receive early warnings of losses and gains in the price of the shares. (An efficient market is one in which market prices adjust rapidly to all publicly available information available at that time.[7])

The use of ratios can extend between two extremes. For example, at one extreme a technical analyst may base all of his decisions strictly on ratio analysis. At another extreme, analysts may rely completely on the efficiency of the market and only use ratios for diversification purposes. Most investors are cognisant of both arguments and make use of indices and ratios available in the annual reports.

A complete investigation of an investment may call for both a cross sectional and time series study on all four ratio categories. The cross sectional study may provide a complete comparison to other companies in the market (perhaps in the same industry) while the time series study could be used in an attempt to predict future earnings and stock prices.

Several research studies suggest that the time series technique is inappropriate for predicting share prices. Most indications point to the theory that, in an efficient market, share prices and earnings follow a random walk. I. M. D. Little and A. C. Rayner came to the conclusion that changes in earnings for British corporations followed a random walk.[8] In order to corroborate the British results, American data were studied by such researchers as Murphy, Lintner, Glauber and Brealey. Changes in American earnings, like changes in British earnings, were found to follow a random walk.[9] According to these studies, ratios (especially if at least one component of the ratio is an earnings figure) should probably not be used to predict the future share prices since these predictions seem to carry little value. In other words, future share prices are independent of past share prices.

The use of ratios in a cross sectional study, however, may have its benefits. Such studies can be used for the simple purpose of providing a basis for diversification. High risk securities can be mixed with low risk securities to diversify the risk of the total portfolio. The risk would need to be measured through the use of financial ratios and other financial information. Categorising shares into high and low risk can be done partially by the use of ratios. Computation of financial ratios focusing upon the profitability, liquidity and solvency of the firm is an important source of information on risk. The portfolio theories of Harry Markowitz and William Sharpe indicate that such diversification of risk is possible.

B Use of ratios in rating bonds and other investments

Related to the cross sectional study idea presented above is the rating function (where bonds are categorised as AAA, etc., which indicates that they are judged to be of the best quality or carry the smallest degree of investment risk) performed by such American companies as Moody's and Standard and Poor's. Studies undertaken by Hastie in 1972 and Fisher in 1959 have shown correlation between default risk and marketability risk and risk premiums offered on municipal and corporate bonds. Measures of default risk are formulated through the use of such ratios as times interest earned, debt to equity, and net income to total assets. Both profitability and leverage measures are most important in bond rating and valuation models. A model formulated by Altman and Katz in 1976 was able to predict the actual electric utility bond rating 77% of the time using 14 variables. A model by Pinches and Mingo in 1975 predicted the correct industrial bond rating 75% of the time.[10] The use of ratios to predict bond ratings, default, and risk premium seems to be valid but is in need of further research aimed at determining whether correlation exists between the speed of the reaction in the bond market to company announcements such as annual and interim earnings.

C Use of ratios for financial distress prediction

Lending institutions, auditors, and several government agencies find value in the prediction of financial distress. The Penn Central Transportation Company bankruptcy and resulting financial disaster in the USA emphasises the importance of trying to come up with some type of early warning system. It is submitted that models for predicting financial distress could also be important in legal decisions; useful information can be provided to management and investors of a corporation and, where early warning signals of bankruptcy are observed, direct and indirect costs may be reduced by reorganisation or a merger.

The early warning models of bankruptcy can be classified into two categories: univariate and multivariate. The univariate approach to predicting financial distress involves the use of a single variable in a prediction model.

This approach is based on two assumptions:

1 The distribution of the variable for distressed firms differs systematically from the distribution of the variable for the non-distressed firms. (A firm is in a state of distress when there is a probability that it will not be able to meet its financial obligations. The mean or the variance of the distribution of the ratio between the distressed and non-distressed firms differs, e.g., the distressed firm might spend more on average per rand of operating revenue on expenses than the non-distressed firm.)

2 These systematic differences can be capitalised on for prediction purposes. (The financial ratios of the distressed and non-distressed firm appear markedly different and can indicate bankruptcy prior to it actually occurring, so that remedial measures can be undertaken.)[11]

Through several studies, Beaver[12] has shown that ratios do carry predictive ability in relation to bankruptcy. He has discovered differences between the key financial ratios of bankrupt firms and non-bankrupt firms up to five years before the bankruptcy occurred.

In his study Beaver compared the mean financial ratios of failed and non-failed firms. Bankruptcy, bond default, an overdrawn bank account, or non-payment of a preference dividend designated a firm as failed or not. In the profile analysis undertaken, the means of 30 financial ratios were computed for the failed and non-failed firms in each of the five years before failure. The mean ratios of the two sets of firms were compared and it was found that there was a marked difference in the behaviour of the mean financial ratios of the two groups. The following ratios indicated marked differences: cash flow to total debt, net income to total assets, total debt to total assets, working capital to total assets and the current ratio. Beaver has shown that the ratio's ability to predict failure is heightened as the bankruptcy date approaches. One year before failure, his model carried a 13% misclassification rate. Years 2, 3, 4 and 5 carried misclassification rates of 21%, 23%, 24% and 22% respectively. (Misclassification occurs when a failed firm is classified as non-failed and vice-versa.)

Exhibit I reflects the differences in mean ratios of failed and non-failed firms.

Exhibit I

Profile analysis: Mean ratios of failed and non-failed firms
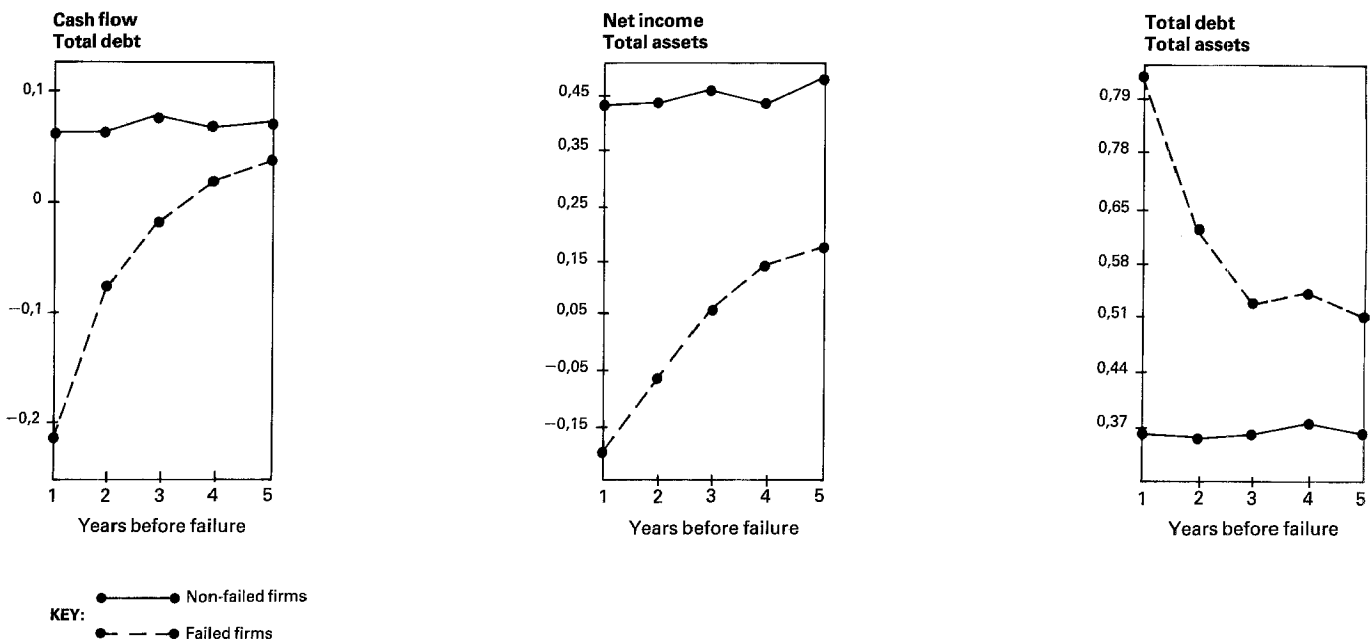
Source: Foster, *Financial Statement Analysis,* Figure 14.1, p. 470.

The multivariate approach involves creating a weighted index of ratios in order better to predict failure. Rather than count on just a simple univariate relation, some theorists feel that the multiple ratio approach will sidestep the biases of the single ratio. The more complete index should theoretically eliminate the biased ratios. How effective is the multivariate model? In 1968, Altman[13] constructed an index model for predicting corporate bankruptcy. This index was made up of (1) Working capital to total assets, (2) Retained earnings to total assets, (3) Earnings before interest and taxes to total assets, (4) Market value of equity to book value of total debt, and (5) Sales to total assets. One year prior to bankruptcy, Altman's model misclassified only 5% of the time, while two

years prior, his model misclassified 17% of the time. The multivariate method indicates better performance than the univariate method. The results generated would seem to permit financial regulatory agencies to construct simple but effective early distress prediction systems. However, Foster[14] cautions that the results may have been "manufactured" to this end as he states that the results could reflect:

1 Population differences in the financial ratios of non-bankrupt and bankrupt firms,

2 Sample characteristics exhibited by the specific firms examined, and

3 Search bias that may have arisen from using several variables and then choosing five that "worked best" on the estimation sample.

I believe that the biases involved in choosing and com-

bining the "best fit" index illustrate the difficulty involved in creating an index. Even though the multivariate model did "predict" better, the univariate model seems to contain more information value and an acceptable correctness rate. Until a more proven index is provided, the univariate models should be used.

D Use of ratios for credit decisions

The loan officer of a bank needs a measure such as the financial ratio to compare one company to the next. It is on the basis of these comparisons that he judges the creditworthiness of a lender. According to Foster,[15] some of the questions he tries to answer concerning the lender include:

1 Is the bank's share of risk clearly unreasonable?
2 Does the firm have enough current assets?
3 Are the firm's current assets sufficiently liquid?
4 Is the firm financially profitable?
5 What is the credit rating of the applicant?

Banks typically make use of credit scoring systems to help answer the questions presented above. The level of different ratios are objects of judgment in these credit scoring systems.

In a recently completed study into "The Use of Financial Ratios in Credit Downgrade Decisions" Backer and Gosman[16] determined that financial ratios were of moderate to strong importance as a financial measure by the raters of trade credit and bank loans. Financial ratios that were considered to be most significant by banks in seasonal lending decisions were accounts receivable turnover, current ratio, quick (or acid test) ratio, inventory turnover and total debt to tangible net worth. The total debt to tangible net worth ratio was also used in decisions concerning long-term bank loans, trade credit and bonds. The study found that almost all the ratios stressed in interviews they had had with US credit and bond rating agencies and banks did exhibit significant deterioration prior to their being downgraded. In addition to the use of ratios for credit evaluating decisions, the interviewees stated that they also took cognisance of the general economic conditions prevailing, the market as well as the future for the products of the company, and the quality of its management.

The analytical proofs as to how well the credit scoring models predict default or not are not widely available. Commercial banks do not publicise the criteria used for obvious reasons: they do not want the applying businesses to manipulate their statements for the purpose of trying to obtain a loan. They also do not want to be questioned when they reject a loan even though the company meets minimum requirements. The banks or other borrowers need to be aware of the ratio manipulation and of the accounting policy tricks some companies might try to use. More than one ratio needs to be checked and compared in order to prevent such manipulation.

IV TREATMENT OF OUTLIERS

The treatment of outliers is an important yet little discussed problem. An outlier can occur as a result of a few high or low values for firms in particular circumstances. The extreme values serve to exaggerate the differences between the particular firm and the firms with which it is being compared. It may be appropriate to "pull in" the extreme value toward an ordinary value. This can be done by defining a lower and upper limit for the descriptor and adjustments (such as truncation) may be made to transform the descriptor to equal the upper or lower limit. Outliers can have a substantial impact on ratio

analysis. Determining whether extreme values of a financial ratio represent extreme states of the underlying characteristic or exaggerate the differences between the firm and the population of firms with ordinary values is a judgmental decision. Factors which should be considered include the following:

1 The degree of diversity of the firm's operations compared to others included in its industry.
2 The underlying economic aspects of the firm compared to other firms included in its industry e.g. all other firms might capitalise their leases whilst the firm with the "extreme" ratio might not, but rather have footnote disclosure.
3 Any extraordinary events that were peculiar to the firm with the "extreme" ratio and not to the industry.
4 Different methods in inventory valuation (e.g., FIFO vs LIFO) in a continually increasing inventory cost framework.

A specific factor that would be considered in evaluating the alternative approaches to handling outliers is: the cost of the various approaches described above; it may be less expensive to exclude the outlier than adjust a firm's ratios for differences in accounting techniques.

V INVESTORS' INFORMATION SOURCES

There is general agreement that the basic objective of a company's financial statements is to provide useful information to present and potential investors in making rational investment decisions. Often, the relative importance of investment objectives such as: maximum return in the long-run from dividends and appreciation, satisfactory dividend yield, maximum appreciation in the short-run and maximum gains from market fluctuations, are ignored. In analysing a company for investment purposes cognisance must be taken of the future growth potential, managerial ability, profitability, financial condition, stability and financial policy. All these factors affect the operating performance of the company and to reduce the analysis solely to profitability ratios would unnecessarily and involuntarily restrict the scope, as well as impact upon the results of the analyst's decision.

Investors seeking information may obtain important indicators of future growth performance such as research and development expenditures, rate of growth of market share, gross revenue, net income, total assets and earnings per share from the audited financial statements. What is of significant importance but is often not contained in financial statements is the company's growth in major markets; such information may be obtained from interviews, trade publications or competitors' share of the major markets.

Ratios such as return on equity and ratio of net income before interest on invested capital may indicate the managerial ability of the enterprise. In addition, growth of the company, reputation of key personnel, financial condition, net income and market performance of stocks will also indicate the ability of management. These factors as well as indicators of profitability, should be taken into account in making investment decisions, as their impact upon the performance of the enterprise may be profound.

As mentioned earlier (Part II(A)), voluminous available information may make it difficult for the analyst or investor to absorb all of it. Overlapping information may result in an inefficient allocation of the investor's time when analysing duplicate information. It is imperative that some evaluation must be made of the usefulness of the various information alternatives so as to enable the in-

vestor to select only that information impacting on his investment decisions. Information may be made available at certain specific times or on a continual basis. Exhibit II illustrates some of the sources of information available for investors.

Exhibit II

Sources of information for investors

(a) Types of available information

Direct sources	Indirect sources
Annual reports (audited)	Company interviews
Interim reports	Financial analysts
News releases	
Earnings announcements	
Industry reports	
Economic reports	
Market reports	

(b) Timing of information availability

Continuously released information	Non-continuously released information
News releases	Earnings announcements
Industry reports	Annual reports
Economic reports	Interim reports
Market reports	

An investor would have to select that source which is likely to provide the most interest and the best opportunity for significant findings.[17]

The usefulness of information contained in annual financial statements has been thoroughly researched and subjected to serious criticism. The relevance of historical cost statements has been questioned and suggestions have been made for an alternative form of report. One of the accounting profession's most noted critics, Abraham J. Briloff,[18] has contended that accounting reports have been based upon several myths, like "depreciation" and "fairly represents". According to him, placing reliance upon the statements generated from such a mythological basis can result in making incorrect, and often disastrous investment decisions. Research must be undertaken to determine the usefulness of accounting reports for external users.

In a study undertaken to compare the prediction of bankruptcy based on ratios computed from general price level (GPL) financial statements to the prediction based on ratios computed from traditional historical cost financial statements, Norton and Smith[19] found that both GPL and traditional ratios exhibited the ability to predict bankruptcy. Although sizeable differences existed in the magnitude between GPL and historical cost financial statements, little difference was revealed in the bankruptcy predictions. The study showed that GPL data was neither more nor less accurate than historical cost data for predictions of bankruptcy.

VI CAUTIONS

Traditional financial statement analysis relied on ratios to a very significant degree in corporate decision making. In analysing financial statements ratios are not the sole accounting technique. Common size financial statements is another cross sectional technique of financial statement analysis. In addition to ratios, time series techniques may be used to predict future earnings, sales or ratios.

Several cautions must be given before ratios are used in any type of decision framework. Firstly, the usefulness of any particular ratio is governed by the objectives of the analysis; they are not absolute criteria. Ratio analysis is

meant only to assist the business judgment process. Secondly, it must be realised that an appraisal of performance deals with past data and conditions, from which it may be difficult to extrapolate future expectations. It is known that it is the future that can be affected by decisions – the past is gone and cannot be changed.[20] Thirdly, the ratios may be manipulated in such a way as to make the statements look more favourable than they really would be under normal accounting procedures. Fourth, different accounting and operating practices may distort comparisons. For example, if one firm leases a substantial amount of its productive equipment, then its assets will be low relative to its sales because leased assets may not appear on the balance sheet but appear in footnotes in accordance with current generally accepted accounting practice. This off-balance sheet financing must be captured by the analyst. Fifth, it is imperative that the footnotes to the financial statements must be carefully reviewed to capture an elaboration of financial statement transactions. Finally, the user must be aware of the objective of his decision before choosing the ratios to be put under consideration. The tools need to match the job.

VII CONCLUSION AND RECOMMENDATIONS

In financial statement analysis it must be remembered that ratios are useful only in evaluating favourable or unfavourable developments by comparing trends for a firm with (1) trends in ratios of the firm's competitors, (2) trends prevailing in industry ratios, and (3) arbitrarily determined rule of thumb standards. As income determination of firms is based on estimates of **future** returns, **exact** measurement of financial position and net income appears to be impossible (e.g. inventory values are often dependent on technological or style changes, or depreciation measurement is dependent on estimates of remaining useful life).

The manifestation of pronounced inflation also challenges the accounting assumption that the rand is a stable measuring unit. According to Causey,[21] bias in accounting measurement is introduced whenever management selects, from alternative accepted accounting practices, those practices which present perceptions of truth in accordance with management's self interest.

As "knowledge of the predictive ability of accounting data provides knowledge of the usefulness of accounting data in the facilitation of decision making",[22] it is submitted that information on ratios should be one of the highlights of a company's financial report as it would enable decision makers to make judgments and decisions on the basis of comparative information uniformly reported by all enterprises. This is especially important in a setting where research has indicated that the stock market is not efficient, and uniformly reported comparative information may possibly lead to the creation of an efficient market.

Performance measurement of business results is complex and difficult, since it must deal with the effectiveness with which capital is employed, the efficiency and profitability of operations, and the value and safety of various claims against the business – ratio analysis is an invaluable tool in such performance measurement and appraisal.

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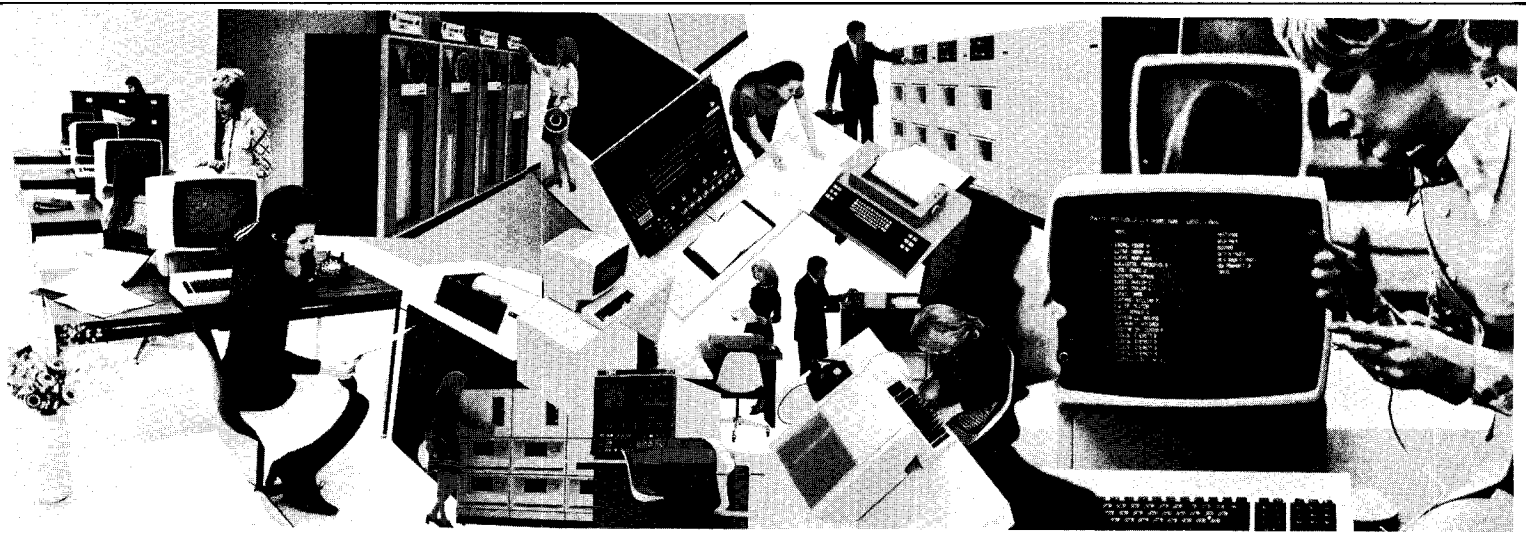
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By B. P. Gilbertson and M. N. Vermaak

The performance of South African mutual funds: 1974-1981

ABSTRACT

This report analyses the performance of eleven South African mutual funds over the eight-year period 1974 to 1981. It is found that the returns achieved by the funds ranged from 15,9% per annum to 22,5% per annum (compounded monthly); these returns are generally lower than those achieved by three stock market indexes. However, when risk adjusted measures of performance are used, it is found that the mutual funds generally outperformed the three indexes. There is also some evidence that at least one mutual fund consistently and significantly outperformed the indexes as well as the other funds. These findings are not consistent with the efficient market hypothesis and suggest instead that a degree of inefficiency exists in the pricing mechanism for shares listed on the JSE.

1 INTRODUCTION

The economic process that determines the prices of ordinary shares has been the subject of research and controversy for more than twenty years. The debate revolves around the so-called "efficient market hypothesis", which is usually expressed in one of three forms[1,2]:

(a) The weak form, which asserts that successive changes in share prices are independent.

(b) The semi-strong form, which asserts that share prices fully reflect all public information.

(c) The strong form, which asserts that share prices often fully reflect even information that may not be generally known.

Substantial evidence has been produced from American research to show that the weak and the semi-strong forms of the hypothesis are "adequate descriptions of reality"[1,2]. Insofar as that research has been replicated for the smaller markets the results have generally also supported the hypothesis. However, in some cases – and specifically in the case of The Johannesburg Stock Exchange ("JSE")[3-5] – the conventional statistical tests

have provided some evidence that the price changes are not completely independent. It has been suggested[3] that this might be due to the fact that the JSE is a small market with relatively poor information dissemination procedures. Furthermore, gold mining shares comprise a significant proportion of the JSE's total market capitalisation; such shares have several features that distinguish them from industrial shares, and these features may influence the process that determines the share price. Whatever the reasons, tests of the stronger forms of the hypothesis are of particular interest since they will indicate whether the reported deviations from strict statistical independence are of practical significance.

Tests of the strong form have invariably focussed on the performance of professionally managed portfolios and, specifically, on the performance of mutual funds. If such portfolios achieved consistently superior performance relative to that of the market as a whole, some element of inefficiency in the pricing process would be indicated. Early tests elsewhere[6-10] were consistent in finding that mutual funds do not achieve such superior performance. More recent researchers concede an element of doubt; one[11] supports the early findings, another[12] is unable to decide one way or the other, while the most recent[13] present contradictory conclusions!

Initial measurements on South African mutual funds have been reported[14,15] but were unsatisfactory, firstly in that the industry was still in its infancy at that time (1971) so that only limited amounts of data were available for analysis, and secondly in that more rigorous criteria of performance are available than were then used.

We have analysed the performance of South African mutual funds using the greater volume of data that is now available. The results of this analysis are reported below.

2 DATA BASE AND COMPUTATION OF RETURNS

Some basic information on the 11 mutual funds currently operating in South Africa is given in Table 1. The historical background has been traced by Carter[16].

Table 1: The South African mutual funds

Fund No.	Name of mutual fund	Abbreviated name	Date started	Present management company	Assets at 31 December 1981 (Rm)
1	Sage Fund	SAGE	14 June 1965	Investors Mutual Funds Limited	104,6
2	National Growth Fund	NGF	15 October 1965	Sanlam Trust Managers Limited	103,1
3	S.A. Trust Selections	SATS	3 August 1966	Sanlam Trust Managers Limited	36,5
4	Old Mutual Unit Trust	Mutual	1 October 1966	South African Mutual Unit Trust Management Company Limited	174,0
5	The UAL Unit Trust	UAL	3 April 1967	UAL Management Company Limited	73,3
6	Sanlam Trust	Sanlam	30 May 1967	Sanlam Trust Managers Limited	60,6
7	The Trust Bank Growth Fund	Trust	7 March 1969	Sanlam Trust Managers Limited	33,6
8	Santamgro	Santam	23 July 1969	Sanlam Trust Managers Limited	5,9
9	UAL Intergrowth Fund	Inter	21 October 1969	UAL Management Company Limited	20,9
10	Guardian Bankers Growth Fund	Guardbank	1 January 1970	Guardbank Management Corporation Limited	68,4
11	Standard Bank Mutual Fund	Standard	23 May 1973	Standard Bank Fund Managers Limited	20,3
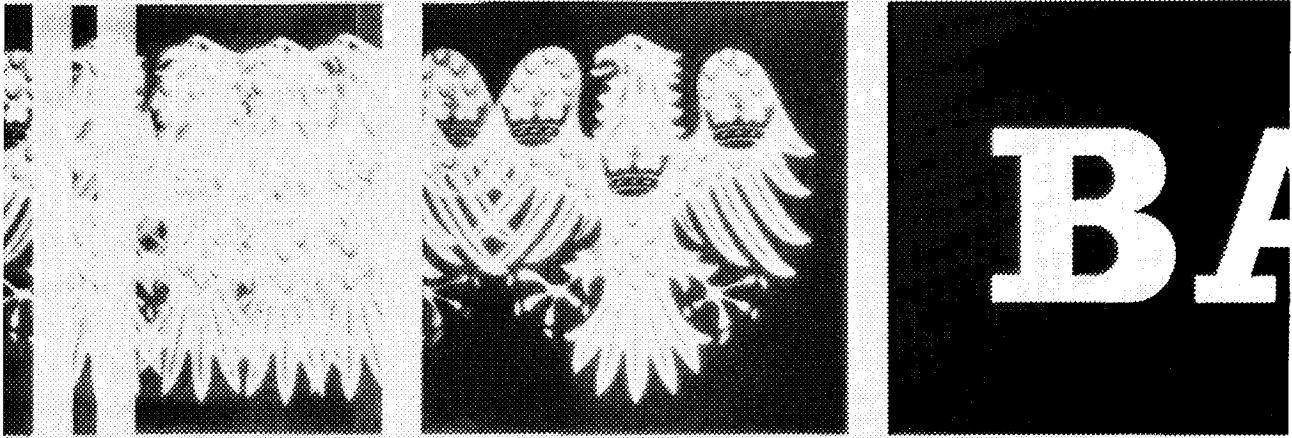
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The data base used to analyse the performance of the funds comprised:

(a) the monthly repurchase prices of the mutual funds (on the Tuesday closest to the month-end*);

(b) the dividend records of the funds;

(c) the levels of the following stock market indexes:
   - the JSE Actuaries All Shares ("All Shares") index,
   - the JSE Actuaries Industrial ("Industrial") index,
   - the RDM-100 index;

(d) the dividend yields on the All Shares index and the Industrial index. There is no published dividend yield for the RDM-100 index, and so the yield on the Industrial index was used as proxy;

(e) the discount rate on 90-day Treasury Bills.

A straightforward measure of mutual fund performance over a particular time period is the historical rate of return, ie. the change in the value of the mutual fund unit over the period plus any distributions, this sum being divided by the unit value at the start of the period. Thus

$$R_{j,t} = \frac{P_{j,t} - P_{j,t-1} + D_{j,t}}{P_{j,t-1}}$$

$$= \frac{P_{j,t} + D_{j,t}}{P_{j,t-1}} - 1. \qquad \ldots (1)$$

where $R_{j,t}$ = return achieved by the j'th fund over the period t

$P_{j,t}$ = repurchase price of a unit in the j'th mutual fund at the end of period t

$D_{j,t}$ = unit dividend declaration[†] by the j'th mutual fund during period t.

When a relatively long period of time is involved, it is convenient to measure performance as an average value of the per-period returns. Two averages are commonly used, viz.

- The ARITHMETIC MEAN return, which is determined for fund j as

$$A_j = \frac{1}{N} \sum_t R_{j,t} \qquad \ldots (2)$$

where N is the number of periods over which the per-period return is averaged.

- The GEOMETRIC MEAN return, which is determined for fund j as

$$G_j = \left[\prod_t (1 + R_{j,t}) \right]^{\frac{1}{N}} - 1 \qquad \ldots (3)$$

Of the two, the arithmetic mean is most frequently encountered, not only because it gives expression to the popular notion of "an average" but also because of its computational correspondence with the "expected return" concept of modern portfolio theory. However, the geometric mean is perhaps of more direct significance to "long-term" investors and portfolio managers, as it measures the compounded rate of growth of the initial investment with reinvestment of all cash distributions*. In any situation where the per-period returns are not identical, the arithmetic mean return will exceed the geometric mean. (See reference 17 for an illustration of this point.)

In the text which follows, geometric returns are presented when comparing performance without risk adjustment (Section 3), whilst the arithmetic returns are presented in evaluating risk-adjusted performance (Section 4); however, a fuller analysis than that presented here has shown that the overall conclusions reached do not depend on the type of mean used.

The performance measures used in Section 4 required that a "risk-free" rate of return be specified. We used for this purpose the yield-to-maturity on Treasury Bills, which yield was derived as

$$R_F = \frac{100}{12} \left[\frac{100}{100-D} - 1 \right] \qquad \ldots (4)$$

where R_F = risk-free rate in percentage per month
and   D = discount rate on the Treasury Bills.

3 ANALYSIS OF RETURNS WITH NO CONSIDERATION OF RISK

Table 2 presents the geometric means of the monthly returns achieved by the 11 mutual funds and the three indexes over the eight-year period 1974 to 1981.

Table 2: Geometric mean returns: 1974 to 1981

Fund/Index	Annualised[†] geometric means of monthly returns	Rank
NGF	17,82% p.a.	9
SATS	18,31% p.a.	8
Sanlam	19,40% p.a.	7
Trust	17,17% p.a.	10
Santam	15,90% p.a.	11
UAL	20,24% p.a.	3
Inter	19,89% p.a.	5
SAGE	19,69% p.a.	6
Mutual	21,25% p.a.	2
Guardbank	22,46% p.a.	1
Standard	20,06% p.a.	4
All Shares	19,94% p.a.	5*
Industrial	20,32% p.a.	3*
RDM-100	21,28% p.a.	2*

4 out of 11 mutual funds outperform All Shares index
2 out of 11 mutual funds outperform Industrial index
1 out of 11 mutual funds outperform RDM-100 index

*These figures indicate what the ranking of each index would have been if only it had been included with the 11 mutual funds in the ranking.

†The monthly compounded returns have been annualised by raising to the twelfth power.

It will be seen that the "best performing" fund achieved an annually compounded return in excess of 22% p.a. ie. an investment of R100 at the start of 1974 with subsequent re-investment of dividends would have grown to over R500 by the end of 1981. A corresponding investment in the "worst performing" fund would have increased to only R325.

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*This choice of dates resulted in periods of unequal length; in the analysis, the returns computed from equation 1 were "normalised" to 30 days.

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†In computing the returns for the indexes, $D_{j,t}$ was set equal to one-twelfth of the dividend yield on the index.

---

‡The LOGARITHMIC RETURN, determined as

$$L_j = \frac{1}{N} \sum_t \ln(1 + R_{j,t})$$

is a special case of the geometric return. It computes the mean with continuous (rather than per-period) compounding.

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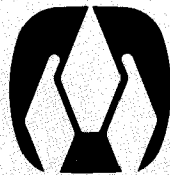
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Two observations may be made regarding the returns in Table 2. Firstly, the three indexes (All Shares, Industrial and RDM-100) have been outperformed by only a relatively small number of mutual funds (respectively 1, 2 and 4 out of 11). Thus, the mutual fund movement as a whole seems to have underperformed the indexes*, which is a finding that would be expected if the JSE were an efficient market. Secondly, the five mutual funds that appear at the bottom of the rankings are all subject to a common management. This finding raises the question of whether any particular fund consistently outperformed the other funds and/or the indexes. Table 3 presents statistics relating to this issue, namely a ranking of the relative performance of each fund in each of the eight years considered.

Table 3: Ranking of performance (geometric mean of monthly returns) of each fund in each of eight years

Fund	1974	1975	1976	1977	1978	1979	1980	1981	Times ≤5
NGF	9	4	5	3	10	2	9	9	4
SATS	10	6	7	4	5	4	3	5	5
Sanlam	6	8	9	9	4	8	11	2	2
Trust	5	9	6	2	11	1	5	4	5
Santam	3	11	10	10	8	7	10	1	2
UAL	7	5	3	6	3	9	2	8	4
Inter	1	3	11	8	1	10	1	11	4
SAGE	2	10	2	5	9	11	7	6	3
Mutual	11	7	4	7	2	6	6	7	2
Guard-bank	8	2	1	1	7	5	4	3	6
Standard	4	1	8	11	6	3	8	10	3

Index	1974	1975	1976	1977	1978	1979	1980	1981	Times ≤6
All Shares*	1	12	11	5	3	1	1	12	5
Industrial*	6	1	9	7	3	1	8	10	4
RDM-100*	9	5	12	8	2	1	8	1	4

*Figures indicate what the ranking of each index would have been if only it had been included with the 11 mutual funds in the ranking.

With one exception, the year-by-year rankings set out in Table 3 fluctuate widely; a fund that does well during one year seems as likely to do badly during the following year as it is to repeat the good performance. Thus, this year's performance is not a good predictor of next year's performance. The one exception to this generalisation is the performance of Guardbank, which rated in the "top-half" in six out of the eight years considered. It would seem reasonable to conclude that Guardbank generally (consistently?) outperformed its competitors. The case for "generally good performance" also seems to be supported when the comparison is made against the index; in fact, in the year-by-year rankings, all three indexes do surprisingly badly, with only the All Shares index being above the performance median in more than half of the eight years. These findings would not be expected in an efficient market and it therefore seems prudent to defer any conclusions pending the analysis which follows.

4 THE EFFECT OF RISK ON THE EVALUATION

The analysis so far has not addressed the possibility that one mutual fund might be more risky than another. It seems reasonable to assume that investors are generally risk averse and so on average expect to be compensated for any risks borne. Such a risk differential might explain, for example, the apparently poor performance of the five worst performing funds in Table 2. If the management company had deliberately chosen a "low risk profile" (for example by maintaining a relatively large part of the assets in fixed-interest bearing securities) then it would not seem unreasonable if lower returns were achieved.

In order to introduce risk directly into the analysis of mutual fund performance, one must find an appropriate definition of risk and a method of evaluating the performance of each portfolio in relation to its chosen level of risk[2]. Various approaches to this problem have been developed in the literature and three are used in the analysis that follows. The Sharpe index uses the standard deviation (σ) of the returns (ie. the "total risk") as measure of portfolio risk. The Treynor index is similar to that of Sharpe but uses the coefficient beta (ß) (ie. the "market related risk") as measure of portfolio risk. The Jensen measure uses the parameter alpha (α) as a direct measure of risk adjusted performance. Appendix 1 discusses these parameters in greater detail.

The use of the Treynor and Jensen measures of portfolio performance required inter alia that the ß-coefficient should exhibit the properties of stationarity and stability. The analysis of the mutual fund beta's in Appendix 2 shows that at least one of these, viz stability, cannot reasonably be assumed. Consequently these two measures of performance should be treated with caution in the analysis that follows. Emphasis on the Sharpe measure also avoids the controversy[18] arising from the now-famous article by Roll[19] but is itself (potentially) controversial in its assumption that total variability is the appropriate measure of risk.

Table 4 on the following page compares the risk-adjusted performance of the mutual funds using all three measures of performance over the eight-year period 1974-1981:

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*The arithmetic mean of the 11 geometric returns is only 19,29% p.a.

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Table 4: Risk adjusted mutual fund performance: 1974-1981

Fund/Index	Sharpe measure	Rank	Treynor measure†	Rank	Jensen measure† (× 100)	Rank	t‡
NGF	0,213	10	1,60	10	0,170	10	0,49
SATS	0,236	5	1,86	5	0,330	6	0,92
Sanlam	0,225	8	1,65	8	0,211	8	0,71
Trust	0,233	6	2,05	3	0,407	3	0,95
Santam	0,185	11	1,51	11	0,089	11	0,26
UAL	0,257	3	1,85	6	0,354	5	1,28
Inter	0,259	2	1,95	4	0,379	4	1,33
SAGE	0,249	4	2,09	2	0,437	2	1,16
Mutual	0,219	9	1,63	9	0,192	9	0,57
Guardbank	0,303	1	2,35	1	0,633	1	2,03
Standard	0,229	7	1,70	7	0,233	7	0,80
All Shares	0,207	10*	1,72	7*	0,221	8*	0,41
Industrial	0,218	10*	1,35	12*	Nil	12*	Nil
RDM-100	0,232	7*	1,60	11*	0,196	9*	0,75

*Figures indicate what the ranking of each index would have been if only it had been included with the 11 mutual funds in the ranking.

†The Industrial index was used in determining the Treynor and Jensen measures shown in this table. The findings do not differ substantially from a similar analysis using the other two indexes.

‡There are 96 returns so that n-2 = 94 degrees of freedom. The t-value for 5% level of significance (one-tail) with 94 degrees of freedom is about 1,65.

The most startling conclusion* to be drawn from Table 4 is that, on a risk adjusted basis, the majority of the mutual funds outperform all three indexes over the eight-year period. This conclusion holds irrespective of the particular measure of performance used. In fact, it will be observed that the three rankings are in good agreement†. In addition, according to the Jensen measure (which must, admittedly, be used with caution) at least one of the funds (Guardbank) has outperformed the index "significantly" (in the statistical sense). These results are not consistent with the strong form of the efficient market hypothesis and suggest that a degree of inefficiency exists in the market pricing mechanism for shares listed on the JSE.

The underlying reason why the performance rankings of the indexes are so much poorer in Table 4 than they were in Table 2, is that the two measures of risk (σ and ß) are lower for the mutual funds than they are for the indexes (see Appendix 2). This phenomenon is consistent with a situation where the funds maintain a substantial investment in fixed-interest securities‡. Table A3 of Appendix 2 confirms that, over the period considered, such securi-

ties accounted for between 6% and 48% of the mutual fund portfolios; unfortunately, the proportions, even for a particular fund, appear to be quite variable so that it is not possible to make a single adjustment on the basis of a constant proportion.

Table 5 investigates the consistency or otherwise of (risk-adjusted) mutual fund performance by contrasting the risk-adjusted returns in two consecutive four-year periods on the basis of the Sharpe measure. The performance rankings arising from Table 5 are shown graphically in Figure 1.

*We note in passing that the use of risk-adjusted measures of performance improves substantially the rankings of two of the five worst performing funds ex Table 2.

†The Spearman correlation coefficients are 0,88 and 0,90 for the Sharpe-Treynor and Sharpe-Jensen rankings respectively; both these coefficients exceed the critical value of about 0,53.

‡Until 30 September 1975, mutual funds were required by law to maintain 15% of their portfolios in "approved securities" (essentially cash and gilts). Thereafter, this minimum holding was reduced by 2% per quarter until it reached 5%.

Table 5: Sharpe index of performance and ranking

Fund/Index	1974-1977 Sharpe index	Rank	1978-1981 Sharpe index	Rank
NGF	0,077	4	0,364	11
SATS	0,052	7	0,419	7
Sanlam	0,038	9	0,399	9
Trust	0,086	3	0,384	10
Santam	−0,075	11	0,438	4
UAL	0,064	6	0,447	3
Inter	0,070	5	0,452	2
SAGE	0,101	2	0,414	6
Mutual	0,023	10	0,421	5
Guardbank	0,155	1	0,458	1
Standard	0,042	8	0,403	8
All Shares index	0,067	6*	0,376	11*
Industrial index	0,071	5*	0,401	9*
RDM-100	0,002	11*	0,501	1*

*Figures indicate what the ranking of each index would have been if only it had been included with the 11 mutual funds in the ranking.

Figure 1: Graphical representation of performance rankings in two consecutive periods

Sharpe ranking 1974-1977
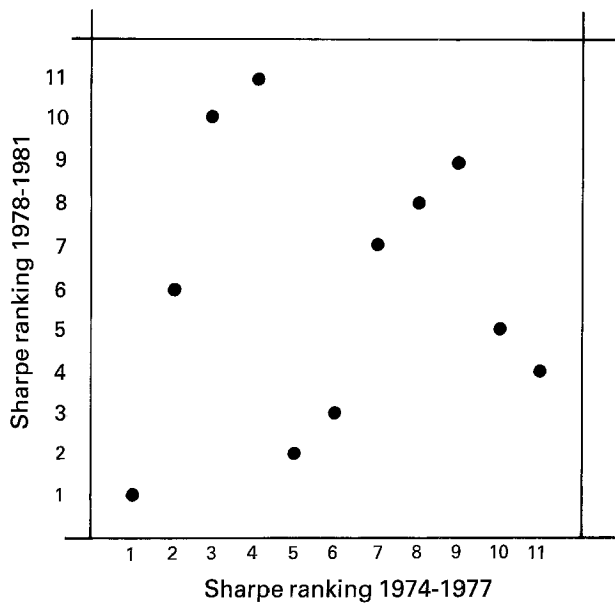
There seems to be little if any relationship between the rankings; only two out of the top five funds in the first period maintain their position in the second period and, similarly, only half of the worst six in the first period stay in the bottom six during the later period. The Spearman correlation coefficient for these rankings is only 0,06*, so confirming that, on average, relative performance in a particular period cannot be used with any confidence to predict relative performance in a later period. However, it is noteworthy that the same fund (Guardbank) achieved the best performance in both periods. This finding, together with those arising from Table 3, leave a lingering suspicion that this fund might indeed have achieved "consistently superior performance".

5 CONCLUSIONS

This report analysed the performance of eleven South African mutual funds over the eight-year period 1974 to 1981. It was found that returns achieved by the funds ranged from 15,9% per annum to 22,5% per annum (compounded monthly); these returns are generally lower than those achieved by three stock market indexes. However, when the three risk adjusted measures of performance were used, it was found that the mutual funds generally outperformed the three indexes. There is also some evidence that at least one mutual fund (Guardbank) consistently and significantly outperformed the indexes as well as the other funds. These findings are not consistent with the strong form of the efficient market hypothesis and suggest instead that a degree of inefficiency exists in the pricing mechanism for shares listed on the JSE.

*The critical value is about 0,53 for significance at the 95% level.

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Appendix 1: Three measures of risk adjusted performance

The Sharpe measure[6]

The Sharpe index of portfolio performance uses the variability of returns as the measure of portfolio risk, where variability is measured as the standard deviation of the returns. Traditionally, the "excess return" (ie. the excess of the actual return over a riskless rate of interest) is used, rather than the actual rate of return. The Sharpe index then becomes

$$S_j = \frac{\overline{(R_{j,t} - R_{F,t})}}{\sigma_j} \qquad \ldots (A1)$$

where the bar denotes the arithmetic average of the bracketted expression below it.

σ_j = standard deviation of the returns of the j'th mutual fund, and

$R_{F,t}$ = riskless rate of interest.

The Jensen measure[8,9]

Jensen starts by assuming the validity of the Sharpe[20]-Lintner[21] single-period capital asset pricing model ("CAPM"), which states that the expected return on any security (or portfolio) should exceed the riskless rate of return by an amount which is proportional to the systematic risk, or beta, of the security. More formally

$$E(R_j) = R_F + \beta_j.(E(R_m) - R_F) \qquad \ldots (A2)$$

where E denotes the expected value

R_j = return on the security (or portfolio) j
R_m = return on the "market portfolio"
R_F = risk-free rate, and
β_j = systematic risk, which is a measure of the risk of the security relative to the risk of the market portfolio.

Jensen then shows[9] that, provided the returns are measured as continuously compounded rates of return, equation (A2) can be generalised from the single-period to heterogeneous horison periods in which trading occurs continuously over time. However, since the CAPM is expressed in terms of ex-ante expected values, it still cannot be used directly to measure the ex-post performance of a mutual fund. The translation from ex-ante to ex-post may be accomplished by utilising the so-called "market model"[22] or "diagonal model"[23, 24]. Simply stated, this model postulates a linear relationship between the realised returns of any security and a general "market fac-

tor". With appropriate substitution and development, it can be shown[8] that

$$\ln(1 + R_{j,t}) = \ln(1 + R_{F,t}) + \beta_j.[\ln(1 + R_{m,t}) - \ln(1 + R_{F,t})] + e \qquad \ldots (A3)$$

or in the alternative "risk" premium form

$$\ln(1 + R_{j,t}) - \ln(1 + R_{F,t}) = \beta_j.[\ln(1 + R_{m,t}) - \ln(1 + R_{F,t})] + e \qquad \ldots (A4)$$

where the subscript t denotes a time interval arbitrary with respect to length and starting dates,

and   e = a random error term with expected value of zero.

The model is now expressed in terms of realised returns on the portfolio and market, and thus can be used to evaluate ex-post portfolio performance. Note that in these equations, the rate of return is continuously compounded.

In an unmanaged portfolio the constrained regression estimate of β_j will be a (statistically) efficient estimate of systematic risk. However, if the portfolio is subject to superior management, the portfolio will tend to earn more than the "normal" risk premium for its level of risk and the expected value of e will be greater than zero. This ability of the portfolio manager may then be measured simply by not constraining the regression equation to pass through the origin, thus

$$\ln(1 + R_{j,t}) - \ln(1 + R_{F,t}) = \alpha_j + \beta_j[\ln(1 + R_{m,t}) - \ln(1 + R_{F,t})] + u \qquad \ldots (4)$$

where u = new error term with expected value of zero.

The parameter α_j now becomes the measure of the portfolio manager's performance. A positive α_j denotes a portfolio whose returns are consistently greater than those implied by its level of systematic risk, and thus superior performance. In similar manner, negative or zero values denote inferior or neutral performance, respectively.

Finally, the parameter α is of particular value in that its sampling distribution is known from least-squares regression theory. Specifically, the distribution is student t with n-2 degrees of freedom. This knowledge allows inferences to be made regarding the statistical significance of any particular estimate of α.

The Treynor measure[6]

The Treynor index of portfolio performance is similar to the Sharpe measure except that it uses the systematic

risk (ie. the beta coefficient) of the portfolio as measure of risk. The Treynor index thus becomes

$$T_j = \frac{(\overline{R_{j,t} - R_{F,t}})}{\beta_j} \qquad \ldots (10)$$

where β_j = the beta coefficient of portfolio j.

Appendix 2: Statistics derived from mutual fund returns

Prior to calculating the various performance measures, the monthly mutual fund returns were examined for serial correlation. The results are shown in Table A1. It will be seen that the serial correlation coefficients were generally small and statistically not significantly different from zero.

Table A1: Serial correlation coefficients of mutual fund and index monthly returns

Fund/Index	Serial correlation coefficient†
NGF	0,055
SATS	0,136
Sanlam	0,098
Trust	0,027
Santam	0,086
UAL	0,096
Inter	0,157
SAGE	0,046
Mutual	0,066
Guardbank	0,144
Standard	0,105
All Shares index	0,031
Industrial index	0,167
RDM-100	0,197

* Significantly different from zero only for values exceeding about 0,2.

The distributions of the returns were then analysed. The results are shown in Table A2. It will be seen that the distributions do not exhibit any marked degree of skewness and only a mild degree of leptokurtosis. The hypothesis of normality could not be rejected at the 95% confidence level for any fund or index.

Table A2: Parameters of the distributions of mutual fund and index monthly returns

Fund/Index	Mean	Standard deviation*	Skewness	Kurtosis
NGF	1,86	5,84	−0,15	3,79
SATS	1,91	5,48	−0,49	3,63
Sanlam	1,77	5,11	−0,40	3,51
Trust	1,95	5,71	−0,47	4,00
Santam	1.53	4,94	−0,41	3,48
UAL	1,92	5,07	−0,32	3,47
Inter	1,84	4,72	−0,04	3,64
SAGE	1,92	5,23	−0,60	3,69
Mutual	1,81	5,44	−0,77	3,61
Guardbank	2,13	4,98	−0,16	3,92
Standard	1,73	4,84	−0,39	3,72
All Shares	2,18	7,55	−0,25	3,77
Industrial	1,97	6,17	0,07	3,39

*See also Table A4.

The σ and β measures of portfolio risk will depend on the relative proportions of the mutual funds assets that are invested in equities and in fixed interest bearing securities. Table A3 shows that these proportions have varied substantially, not only between funds but also, for any given fund, with time.

Table A3: Liquid assets and other securities held by mutual funds, as percentage of total assets

Fund/Index	December 1981	December 1977
NGF	28,0	12,1
SATS	18,9	10,6
Sanlam	32,0	11,0
Trust	25,2	11,1
Santam	42,8	24,3
UAL	16,7	11,6
Inter	35,4	11,4
SAGE	31,7	12,1
Mutual	17,0	10,4
Guardbank	13,7	18,7
Standard	36,7	11,6
Mean	27,1	13,2

Table A4 shows the standard deviations (σ) of the mutual fund returns. It will be seen that

- the standard deviations of the index returns were generally higher than those of the mutual fund returns (with the All Shares σ clearly reflecting the volatility of the mining sector), and
- the mutual fund σ's were higher on average in the second four-year period than in the first four-year period.

Table A4: Standard deviation (σ) of mutual fund returns

Index/Fund	4 year 74-77	78-81	8 year 74-81
NGF	6,06	5,56	5,84
SATS	5,30	5,52	5,48
Sanlam	4,75	5,32	5,11
Trust	5,70	5,65	5,71
Santam	4,62	4,97	4,94
UAL	4,84	5,14	5,07
Inter	4,61	4,69	4,72
SAGE	5,42	4,96	5,23
Mutual	5,33	5,38	5,44
Guardbank	4,99	4,92	4,98
Standard	4,50	5,04	4,84
Mean	5,10	5,19	5,21
All Shares	8,12	6,88	7,55
Industrial	6,69	5,54	6,17
RDM-100	5,76	5,17	5,60

Considerable research effort elsewhere has been devoted to investigating the stationarity or otherwise of β[9, 25-27]. There seems to be some consensus that the beta's of mutual funds are not as stationary as those of unmanaged portfolios, but nevertheless, that two-thirds to three-quarters of the variation can be explained by historical beta's[24]. Table A5 shows the β- and correlation-coefficients obtained by regressing the returns (with monthly compounding) of the 11 South African mutual funds and the three indexes on the corresponding returns of the Industrial index.

Table A5: Beta coefficients and correlation coefficients for the mutual funds, measured against the Industrial index

	74-77		78-81		74-81	
	ß	r	ß	r	ß	r
NGF	0,74	0,82	0,81	0,81	0,77	0,82
SATS	0,58	0,73	0,81	0,82	0,68	0,77
Sanlam	0,60	0,84	0,79	0,83	0,69	0,83
Trust	0,55	0,64	0,75	0,74	0,64	0,69
Santam	0,48	0,69	0,74	0,82	0,60	0,75
UAL	0,63	0,87	0,78	0,84	0,70	0,85
Inter	0,58	0,84	0,67	0,79	0,63	0,82
SAGE	0,53	0,65	0,73	0,81	0,61	0,73
Mutual	0,66	0,83	0,77	0,79	0,71	0,81
Guardbank	0,55	0,74	0,75	0,85	0,64	0,79
Standard	0,55	0,82	0,75	0,83	0,64	0,82
Mean	0,58	0,77	0,76	0,81	0,66	0,79
All Shares	0,85	0,70	0,95	0,77	0,90	0,73
RDM-100	0,73	0,85	0,87	0,93	0,80	0,89

Several features are of interest:

– Large variations occur in the beta's of the individual funds. For all but one fund (UAL) the beta's are higher in the second four-year period than in the first four-year period. On the face of it, there seems to be little evidence of stationarity.

– The average mutual fund ß-coefficient (over the full eight-year period) was only 0,66 and not a single ß exceeded unity; this implies that, on average, the funds follow conservative investment policies. (Jensen[8] found an average ß of 0,84 for American funds.) Since ß differs from unity, any attempt to compare the performance of the mutual funds to that of a market index without explicit adjustment for risk would be biased.

– The correlation coefficients are quite high, with a mean of 0,79 and a lowest value of 0,72. (Jensen's[8] mean r was slightly higher at 0,87.) This would imply that the least squares regression line fits the data for most of the funds quite closely.
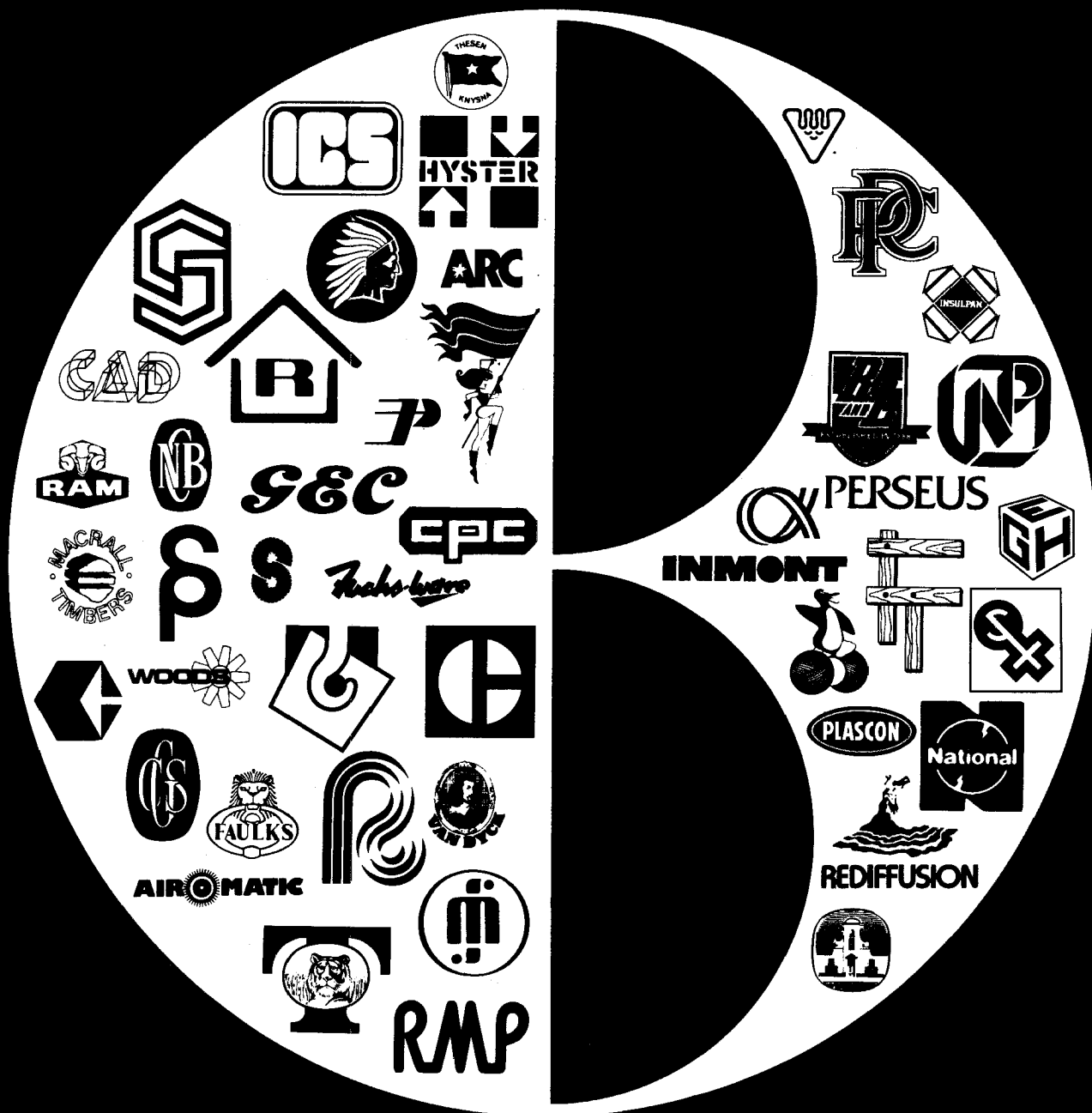
By I. S. Davies

Investment basics – XI

An introduction to gold mining taxation

Part 1

To discuss all aspects of gold mining taxation in one article would require considerably more space than space allows, so this discussion of gold mining tax is to be split into three parts. In this first part we look at the formulae used to assess a gold mine's liability for lease and taxation payments and work through a simple example. In part two we will look at a more complicated example and examine the position of small mines and state assisted mines, and in the final part we will illustrate a few shortcuts and examine some of the implications of the formula method of taxation which is unique to gold mines.

Before we get involved in the mechanics of lease and taxation calculations let us look briefly at the background to the granting of mining leases. In return for the right to mine, companies have to apply for permission to carry out these operations and pay for their rights in one form or another. Certain old gold mines make this payment in the form of claim licences, but all gold mines established since 1932 (with the single exception of Venterspost) make payment in the form of a lease consideration. This consideration is normally on a sliding scale determined by a formula of the type

$$y = a - \frac{ab}{x}$$

where "y" is the percentage of profits (after deducting certain allowances) payable to the State, "x" is the ratio of profit to revenue expressed as a percentage, and "a" and "b" are constants for a particular lease.

In determining the magnitude of "a", cognisance is taken of the indicated return on capital invested in the light of estimated grade, costs, etc. In general the value of "a" ranges between about 10 and 30. The constant "b" is usually 6 or 8. A typical formula (and the one used in the examples below) would then be:

$$y = 15 - \frac{120}{x} \text{ i.e. } a = 15, b = 8.$$

The liability of a gold mine for taxation on mining profits is also on a sliding scale and is determined using one of two formulae. These formulae are again of the type

$$y = a - \frac{ab}{x} \text{ and are:}$$

$$y = 60 - \frac{360}{x} \text{ for mines granted leases before } 17.8.1966$$

or

$$y = 60 - \frac{480}{x} \text{ for mines granted leases after } 17.8.1966.$$

In both formulae "a" has a value of 60, and "b" has a value of 6 for pre-66 mines and 8 for post-66 mines.

Mines classified as "assisted mines" under the Gold Mines Assistance Act use a different formula which will be discussed in part two.

Before getting involved in a calculation it is necessary to define some terms.

Mining income: includes revenue from the sale of all precious metals and minerals, waste rock and materials, sulphuric acid and rents on mine dwellings.

Non-mining income: which is taxed at the corporate rate includes interest on monies deposited, rents from surface rights and grazing fees and royalties received, unless the royalties are substantial in which case the Receiver of Revenue may class them as mining income.

Capital expenditure: allowed for redemption against profits includes all expenditure on developing the mine (including interest on loans) prior to the start of production but specifically excludes expenditure on mineral and surface rights, legal and transfer fees and flotation and underwriting the company.

We can now look at some examples but let us commence with the simplest case which is a mine which is in production and has been paying lease and tax.

Assuming:

Revenue	= R100 m
Costs	= R50 m
Therefore profit	= R50 m
Capex	= R10 m
Lease formula	= y = 15 - $\frac{120}{x}$
Tax formula	= y = 60 - $\frac{480}{x}$

Lease payment

Remembering that "x" is the ratio of profit to revenue expressed as a percentage and that capital expenditure can be redeemed against profit in the year in which it is incurred, "x" becomes

$\frac{50 - 10}{100}$ or 40%. Inserting this value into the formula we get:

$$y = 15 - \frac{120}{40}$$
$$= 15 - 3$$
$$= 12$$

which is the percentage of the profits payable as lease consideration. However, the profit to which this 12% is applied is not the profit used in calculating "x", because the capital expenditure redemption allowance must first be deducted. This capital allowance for lease is calculated at the rate of 6% compound interest for mines granted leases after 1st October 1967 and 5% simple interest for mines granted leases before that date. The allowance applies to any unredeemed balance of capital expenditure (and capital allowance in the case of the compound interest calculation) and to current capital expenditure from the last day of the month in which it is incurred throughout the life of the mine. Therefore, on current capital expenditure the amount spent in the first month of the mine's financial year receives the allowance for 11 months of the year, that spent in the second month for 10 months and so on until the end of the financial year with expenditure incurred in the last month re-

ceiving no allowance. In general the monthly capital expenditure pattern of the mine is not available so one has to assume that the expenditure takes place in equal monthly amounts. Making this assumption it is fairly easy to prove that the effective rates corresponding to the 6% and 5% are 2,75% and 2,292% respectively.

So getting back to our example and assuming that the capital allowance rate is 6% the amount to be deducted from the profit of R40m before calculating the lease payment is 2,75% of R10m (capex) or R0,275m. The lease payment is then determined as:

$(40 - 0{,}275) \times 0{,}12 = R4{,}767m$

We are almost there. Because no stamp and transfer duties are payable on mining leases an additional amount equal to 1,25% of the lease consideration is payable to the State. Therefore our final lease consideration is:

$R4{,}767m \times 1{,}0125 = R4{,}827m$

That concludes the lease consideration and by comparison the tax calculation is simple. Firstly, the capital allowance for tax falls away at the end of the year preceding that in which the mine first has a taxable profit. We will see that better in the second example but because we assumed earlier that the mine in our example had already paid tax we can ignore capital allowance here. For the record, all gold mines with leases granted after 1st January 1974 receive a capital allowance for tax of 10% per annum calculated on a compound interest basis. The only other point to remember is that the lease payment is deductible from profit in determining the profit for tax. Our profit for tax therefore becomes:

$R50m - R10m - R4{,}827m = R35{,}173m$

To calculate the tax rate we divide R35,173m by the revenue of R100m and express it as a percentage to give 35,173%. Dividing this into 480 and deducting the result from 60 gives the tax rate of 46,353%. The tax payment is then:

$R35{,}173m \times 0{,}46353 = R16{,}304m$

At this point we must remember the surcharge which is presently 15%, so the total tax payment becomes R16,304m × 1,15 equal to R18,749m. At present there is no loan levy charged on gold mines but if there was this is calculated by applying the percentage payable to the calculated tax figure before the addition of the surcharge.

So let us look at the final result and what remains for the shareholder.

Revenue	R100,000m	
Less: Costs	50,000m	
Profit	50,000m	
Less: Lease	4,827	
Tax	18,749	23,576m
Profit after tax		26,424m
Less: Capex		10m
Available for distribution		R16,424m

By now we should understand how the lease and tax formulae work and in the next issue we will work through an example of a new mine and look at the taxation of small mines and state assisted mines.