

Business investment decisions under inflation: some South African evidence

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1 ABSTRACT

South Africa has experienced double-digit inflation since 1973 which should have an influence on business investment decisions.

The monograph 'Business Investment Decisions Under Inflation' by Bryan Carsberg and Tony Hope which contains the results of a field study carried out in the UK in 1973 is outlined.

The results of a similar field study among major South African industrial companies in 1978 is then described. These results show a remarkable similarity to those obtained in the UK.

It is considered that these results give strong support to the hypothesis that the investment appraisal methods (and particularly the way in which inflation is allowed for in these methods) used by major South African industrial companies tend to lead to under-investment.

2 INTRODUCTION

2.1 Inflation trends in South Africa⁽¹⁾

In the decade from 1961 to 1970 the annual rate of inflation in South Africa never reached 5%. At this level the actual inflation rate and expectations of future inflation rates were probably not important factors in business investment decisions. The decade from 1971 to 1980 presents a completely different picture. By 1973 the inflation rate had reached 10% p.a. and it has remained a double-digit number since then. Since 1976 it has been on a rising trend with the figure for 1979 being 14% and that for 1980 being 15.8%.

Current inflation rates and anticipated future inflation rates are now an important factor in business investment decisions. This paper was motivated by the desire to establish how the inflation factor was incorporated into the investment decision by major South African industrial companies. It was decided to follow the approach used in a previous British study details of which follow.

2.2 The Carsberg and Hope Study in the UK

In 1976 the Institute of Chartered Accountants in England and Wales published a book by Bryan Carsberg and Tony Hope, both of the University of Manchester, entitled 'Business Investment Decisions Under Inflation'. The contents of this book can be divided into three parts. Firstly there is the motivation of the study (Chapter 1). Then follows a short review, analysis and summary of the theory underlying investment appraisal methods (Chapters 2 - 6).

Finally, there are the results of an investigation of the

methods of investment appraisal used in practice and conclusions arising therefrom (Chapters 7 - 9).

In so far as the motivation of the study is concerned the authors state "Our specific purpose is to evaluate the hypothesis that the investment appraisal practices commonly used in British firms contribute to a tendency to under-investment" (p. 2).

To this end the book "summarises and illustrates modern views on an optimal method of appraisal under inflation, ignoring risk" (p. 2), "extends the analysis to take account of risk" (p. 3), "deals with the selection of the acceptance criterion - the cost of capital" (p. 3) and "considers some alternative methods of appraisal and evaluates their relative effects on the level of investment" (p. 3). Thereafter these conclusions regarding the theory are brought together in a form suitable for comparison with the empirical findings.

These conclusions regarding the theory can be summarised as follows:

- 1 "...the best method of appraisal involves the calculation of net present values and there are two equivalent methods of detailed calculation: the discounting of real cash flows at a real required rate of return or the discounting of money cash flows at a money required rate of return" (p. 38).
- 2 "A similar situation would prevail if the internal rate of return method were used. The rate for the project and the target rate should both be in money terms or both in real terms" (p. 38).
- 3 "...the fundamental properties of the internal rate of return method may lead to bias against the acceptance of projects requiring large investments, in the case of competition between alternative projects, regardless of the treatment of inflation" (p. 38).

The empirical evidence was obtained by means of a postal questionnaire survey. "The questionnaire was sent, in the Autumn of 1973, to a sample of 325 companies chosen randomly from The Times list of 1 000 leading UK companies for 1971-72" (p. 40). Analysis of this evidence in the light of the previously established conclusions regarding the theory lead the authors to conclude as follows, subject to the normal reservations necessary when evidence has been obtained in this way:

"Nevertheless, we believe that the evidence accumulated in our study provides strong support for the hypothesis that investment appraisal practices used by large British firms tend to lead to investment below the optimal level.

"A large number of firms use a money target rate of return in association with cash flows estimated in current prices (with the added disadvantage of

⁽¹⁾ Based on end December values for the seasonally adjusted Consumer Price Index taken from the Quarterly Bulletin of the South African Reserve Bank.

failure to predict the effects of differential inflation as it affects their resources). Several firms use the internal rate of return as a method of appraisal and others use a first year accounting rate of return. Both methods in comparison with the net present value method, are likely to lead to under-investment. Several firms also use the payback method which appears to reflect an unduly cautious approach to investment decisions. To offset these factors we have identified only the use of the average rate of accounting return method which may involve a relatively slight bias to over-investment." (p. 64).

3 GENERALISABILITY OF THE CARSBERG AND HOPE CONCLUSIONS TO SOUTH AFRICA

In 1978 the writer read the Carsberg and Hope monograph with interest and decided to find out whether the conclusions reached were applicable in South Africa. Professor Carsberg kindly supplied a copy of the questionnaire used in their study. With very minor changes in wording this questionnaire was used to obtain from South African business firms evidence with which to test the hypothesis *that the investment appraisal practices used by large South African industrial firms tend to lead to investment below the optimal level.*

4 METHOD

4.1 Subjects utilised and instruments used

The subjects utilised were the top 100 South African industrial companies given in the April 1977 edition of the Financial Mail's Top Companies report. The industrial companies utilised were ranked by asset size.

The instrument used to obtain evidence from the subjects was the questionnaire designed by Carsberg and Hope. The questionnaire included 16 questions and covered 5 typewritten A4 pages. The majority of the questions were of the multiple choice type, a few required brief comments or description and one required a ranking on a scale from 1 – 7.

4.2 Research procedure

In February 1978 the questionnaire together with a covering letter was sent to the chairman of the board of the subject companies. The covering letter briefly explained the purpose of the research making reference to the Carsberg and Hope study. It requested participation by the company and suggested that the chairman direct the questionnaire to the executive responsible for investment appraisal for completion. A guarantee of confidentiality of individual practices was given.

50 usable replies were received, a response rate of 50% compared with the Carsberg and Hope response rate of 32%. From now on the Carsberg and Hope results are given in brackets after the South African results. 19 companies returned the questionnaire uncompleted. Of these 9 said they did not have the necessary executive time, 7 thought the questionnaire inappropriate to their type of business (e.g. they were too diversified), and 3 were now subsidiaries of other companies.

The questionnaire included two questions designed to test the respondent teams' interests in this research. One asked whether the firm would agree to having a short meeting with the writer to discuss their investment appraisal methods in greater detail.

The responses were as follows:

	SA %	UK %
(a) I would positively welcome a meeting	14	11
(b) I would agree to a meeting	46	49
(c) I would not agree to a meeting	40	40
	100%	100%

Furthermore in response to another question 80% of respondents (82%) requested a summary of the research findings. An interim summary was provided to these firms in July 1978.

These responses showed a remarkable similarity to the UK experience and suggest that the respondent firms had a genuine interest in the topic of the research. The implication of this is that they would complete the questionnaire with due care.

5 RESULTS AND DISCUSSION

5.1 Choice of investment appraisal method

In this area the reader will notice a remarkable similarity between the 1978 South African responses and the 1973 UK responses. It was established that 78% of South African and 71% of UK firms used more than one method of appraisal. The popularity of the various methods was derived from the responses to question 1. These questions are summarised in *Table 5.1* overleaf.

Before proceeding to draw any conclusions from the information in *Table 5.1* a brief description of its construction is in order. Respondents were requested to rank the importance of the various investment appraisal methods to their company on a scale from 1 – 7. In this case, one means, "used as the main criterion on virtually all projects", whereas seven means, "used occasionally as a subsidiary criterion". From this information an initial ranking of the methods, entitled "Points score ranking" was obtained as follows:

A "points score" was calculated for each method by multiplying the number of responses ranking a method one by one, the number of responses ranking a method two by two and then summing these products. A low points score would indicate a widely used method and vice versa.

From this number the first ranking of the popularity of the various investment appraisal methods is obtained.

The next column also reflects a popularity ranking in this case based not on a weighted average but only on the number of times this method was nominated as the primary (No. 1) method. The final column is also a popularity ranking, this time based on the number of respondents who did not use the method at all.

It is interesting to note that the ranking systems produce more or less the same rankings and that these give very similar indications on the level of popularity of the various investment appraisal methods in the two countries. Internal rate of return ranked as the most widely used method in SA, whilst it ranked second in the UK. Qualitative judgement ranked second in SA, but first in the UK. The

Table 5.1 – Popularity of investment appraisal methods

Method	Country	Points score ranking	Primary method ranking	Not used ranking
Payback period – without discounting	SA	3rd	Joint 3rd	3rd
	UK	3rd	3rd	3rd
Payback period – with discounting	SA	Joint 4th	Joint 4th	Joint 4th
	UK	Joint 4th	Joint 4th	Joint 5th
ARR. First year profit/ Initial Inv.	SA	Joint 4th	Joint 4th	Joint 5th
	UK	Joint 4th	Joint 4th	Joint 5th
ARR. Average profit/ Average Inv.	SA	Joint 4th	Joint 3rd	Joint 4th
	UK	Joint 4th	Joint 4th	Joint 5th
Net present value (NPV)	SA	Joint 4th	Joint 4th	Joint 5th
	UK	Joint 4th	Joint 4th	Joint 4th
Internal rate of return (DCF Yield)	SA	1st	1st	2nd
	UK	2nd	2nd	2nd
Net terminal value	SA	5th	5th	Joint 5th
	UK	5th	5th	Joint 5th
Qualitative judgement	SA	2nd	2nd	1st
	UK	1st	1st	1st

traditional payback method ranked 3rd in both countries. Also, in SA, the traditional ARR measure (average profit/average investment was quite widely used).

Despite the high ranking given to the qualitative judgement criteria by managers in both countries, it is clear that numerical calculations are still of fundamental importance in the investment decision. 72% of SA managers and 75% of UK managers responded this way. This conclusion is further strengthened by the finding that the average percentage of projects accepted was only 61% (75%), and only 12% (23%) of respondents indicated acceptance rates of 90% or more.⁽²⁾

Further observations in this area are that despite the wide (84% SA, and 85% UK) use of DCF methods these are supplementing rather than displacing traditional methods such as payback and ARR

⁽²⁾ These percentages would be based on the number of projects formally appraised by top management. It might be interesting to consider how many projects are eliminated by informal processes lower down the management structure.

which are still widely used. Also of the two main DCF methods the internal rate of return method enjoys considerably wider usage than its theoretically more acceptable counterpart, the net present value method.

5.2 Treatment of inflation in investment appraisal methods

Estimation of the cost of capital

The arguments developed in the earlier part of the Carsberg and Hope book "indicate that optimal decisions involve calculating a net present value by discounting real cash flows at a real rate of interest or discounting money cash flows at a money rate of interest. Inflation should be treated consistently in the estimation of returns and in the setting of targets. Similar considerations apply to the use of the internal rate of return or the accounting rate of return." (p. 49).

In order to establish whether inflation was correctly treated in the methods used in practice firms were requested to supply, inter alia, details regarding the basic discount rate or the minimum (cut-off) rate of return used.

Table 5.2 – Information needed for aggregate WACC calculation

Year	Change in consumer price index (%)	Interest yield on company debentures (%)	Money cost net on 42% company tax (%)	Real cost net of 42% company tax (%)	SA industrials composite index dividend yield (money basis) (%)
1971	7,0	10,0	5,8	-1,1	6,4
1972	7,3	10,0	5,8	-1,4	6,0
1973	10,0	9,5	5,5	-4,1	4,8
1974	14,1	9,8	5,7	-7,3	7,2
1975	11,7	13,3	7,7	-3,6	9,9
1976	10,8	13,5	7,8	-2,7	10,1
1977	11,1	13,9	8,1	-2,7	11,5

Before proceeding to summarise the responses it is useful to estimate, on an aggregate basis, the cost of capital of the South African industrial sector in 1978. This will be done using the traditional weighted average cost of capital (WACC) approach incorporating a constant dividend growth model for equity valuation. For this purpose the information in Table 5.2 has been collected.

The information contained in Table 5.2 was all obtained from publicly available sources and is more or less self-explanatory. From this information the component costs of the cost of capital can be obtained. 8% p.a. can be taken to be a fair estimate of the cost of debt. The cost of equity is estimated using the constant dividend growth model

$$(i.e. k_e = \frac{d_1}{P_0} + g)$$

where d_1 is the next dividend (in money terms) expected, P_0 is the current share price (in money terms) and g is the expected growth in dividends (in money terms) expressed as a percentage. Drawing from the table we estimate

$$\frac{d_1}{P_0}$$

at 12% and g at 10% ($6,4 \times (1,10)^6 \approx 11,5$) giving a value for k_e at 22%. Making the assumption that the typical South African industrial company is financed one-half by debt and one-half equity, we arrive at a weighted average cost of capital suitable for use as an investment decision discount rate of about 15% ($WACC = (\frac{1}{2} \times 8\%) + (\frac{1}{2} \times 22\%) = 15\%$ in money terms or about 3,5% in real terms after allowing for the effects of inflation. This value can now be used as a benchmark when considering the values actually used by the companies as a discount or cut-off rate.

The responses regarding the level of target rate of return or discount rate and the period of time which has elapsed since it was last altered is summarised in Table 5.3. Inspection of Table 5.3 indicates a range of values for required rate of return from 9% to 30% with a model value of 15%. Clearly then, respondents have submitted their figures in money terms rather than real terms and hence cash flows or accounting profits should also be specified in these terms for investment decision purposes.

Table 5.3 – Level of target rate of return or discount rate and time since last altered

Rate used (%)	Number of companies using rate	Rate chosen as a matter of policy	Time since rate last altered (in years)							Not disclosed
			< 1	1	2	3	4	5	6+	
9	3	–			2					1
10	1	1		1						
12	5	5			2	1	1			1
13	1			1						
14	1	1						1		
15	9	3	1	3		2			1	2
16	1	1								1
17	4	3		1	1	2				
18	1	1	1							
20	3	2		1	1					1
22	1	–	1							
23	1	1		1						
25	2	2		2						
30	1	1						1		
Not disclosed	16	8	2	4	1					9
	50	29	5	14	7	5	1	2	1	15
		SA companies as %	10	28	14	10	2	4	2	30
		UK companies as %	7	10	13	13	2	10	9	36

There seems to be a slight tendency for firms which have more recently changed their rates to have adopted higher rates. Also over half of the SA companies responding to this question indicate that they had altered their rates within the last year. This is much higher than the UK situation of 5 years prior. Taking the aggregate cost of capital figure previously

calculated at 15% as a benchmark one could accept that rates up to 20% could possibly be justified as basic rates. However, rates above this are probably too high to be basic rates and would produce a bias towards under-investment. Five companies reported using rates above 20% and would therefore fall into this category.

Also included in Table 5.3 is an indication that a majority of companies (about 60%) choose their discount rate as a matter of management policy rather than in some objective and readily explained way. Discount rates chosen in this subjective way varied through the whole range of rate values.

Another popular basis (about 20% of respondents) for establishing a rate was the interest rates on bank overdrafts. The remaining 20% of respondents used an objective method which could possibly be optimal in the circumstances.

The firms were also asked whether the normal rate was varied for individual projects. 70% of respondents said that this was the case. They

explained that the adjustment was usually based on top management judgement taking into account the nature of the project (8 firms), the risk of the project (12 firms), and strategic factors (14 firms). Finally the firms advised that in about 80% of cases the rate was established by the managers alone, whilst in the remainder of cases the advice of consultants or writers in the field was sought. This is very similar to the UK results.

The treatment of inflation

The information obtained in this regard is summarised in Table 5.4 which forms the heart of this section of the analysis.

Table 5.4 – The treatment of inflation in investment appraisal

(1)	(2)	(3)	(4)	(5)
Total respondents SA/UK	Basic target Rate of return SA/UK	Adjustment to basic rate SA/UK	Adjustment to cash flow or profit estimates SA/UK	Outcome number
100%/100%	9% TO 10% p.a. 8%/15%	NO.ADJ.(NA)	NA 8%/ 4%	1
			IGI 0%/ 2%	2*
			ISI 0%/ 4%	3**
	11% TO 14% p.a. 14%/18%	INCR.GEN.INFL(IGI)	NA 0%/ 2%	4
			IGI 0%/ 1%	5
		INCR.SPEC.INFL(ISI)	ISI 0%/ 1%	6
			NA 0%/ 0%	7
			IGI 0%/ 0%	8
			ISI 0%/ 1%	9
	15% TO 30% p.a. 46%/17%	NO.ADJ.(NA)	NA 10%/13%	10
			IGI 0%/ 1%	11*
			ISI 2%/ 1%	12**
		INCR.GEN.INFL(IGI)	NA 0%/ 1%	13
			IGI 0%/ 1%	14
		INCR.SPEC.INFL(ISI)	ISI 0%/ 0%	15
	NA 2%/ 0%		16	
		IGI 0%/ 0%	17	
		ISI 0%/ 0%	18	
	NOT DISCLOSED 32%/50%	NO.ADJ.(NA)	NA 24%/13%	19
			IGI 4%/ 0%	20*
			ISI 6%/ 1%	21**
		INCR.GEN.INFL(IGI)	NA 0%/ 1%	22
			IGI 2%/ 1%	23
		INCR.SPEC.INFL(ISI)	ISI 0%/ 1%	24
	NA 2%/ 0%		25	
		IGI 0%/ 0%	26	
		ISI 8%/ 0%	27	
	NOT DISCLOSED 32%/50%	NO.ADJ.(NA)	NA 16%/32%	28
			IGI 2%/ 2%	29*
			ISI 0%/ 8%	30**
	NOT DISCLOSED 32%/50%	INCR.GEN.INFL(IGI)	NA 0%/ 0%	31
			IGI 6%/ 0%	32
			ISI 2%/ 0%	33
	NOT DISCLOSED 32%/50%	INCR.SPEC.INFL(ISI)	NA 2%/ 4%	34
			IGI 0%/ 2%	35
		ISI 4%/ 2%	36	

In the first column is shown the total respondents from each study in percentage terms. In the second column, the totals are divided into four groups according to the rate of return disclosed. These four groups are then further sub-

divided into three groups each (in column three) according to whether or not they adjust the rate-of-return (per column two). It is suggested that there should be no adjustment to the basic rate of return to allow for inflation.

This is because the majority of the discount rates disclosed are within an acceptable range of the benchmark money cost of capital figure of 15%. This figure has been derived from numbers obtained from the capital markets and thus has impounded in it the capital market's inflation expectations. Note that 72% (8% + 12% + 34% + 18%) of the SA companies make this decision correctly compared with 81% (10% + 15% + 14% + 42%) of the UK companies. The balance are rates which are probably too high and thus create a bias toward under-investment.

In column four, the existing twelve groups from column three are further subdivided according to whether or not the respondent company adjusts its cash flow or profit estimates for inflation, and if it does, whether this adjustment is in respect of the general or specific level of expected inflation. The theory supports the view that an adjustment should be made in respect of specific expected inflation. Ideally then, the cash flow or profit estimates used in the investment appraisal method will be the actual money amounts that will arise when the investment is carried out (other things being equal!). These arguments would suggest that outcomes 3, 12, 21 and 30 (marked xx on Table 5.4) represent optimal adjustments to the investment appraisal method in respect of expected inflation. Inspection of the table shows that only 8% (0% + 2% + 6% + 0%) of SA companies did this and in the UK only 14% (4% + 1% + 1% + 8%). This would suggest a strong bias toward under-investment in both countries.

It could be argued that an adjustment of cash flows or profits in respect of the general level of expected inflation (outcomes 2, 11, 20 and 29 marked x on Table 5.4) is a good enough approximation in practice. In that case only a further 6% (0% + 0% + 4% + 2%) of SA companies can be said to adjust for inflation in a manner which approaches the optimal (UK 5% (2% + 1% + 0% + 2%)). In other words 86% of large SA industrial companies incorporate inflation into their investment appraisal methods in a way which would give a bias towards under-investment. This comparative figure for the UK in 1975 is 81%.

6 IMPLICATIONS AND CONCLUSIONS

The main conclusion from this study is that it gives strong

support to the hypothesis (stated on page 9 that the investment appraisal practices used by large South African industrial firms will tend to lead to investment below the optimal level.

The main factors giving rise to this are:

- The majority of firms use a money discount rate of return in conjunction with cash flows or profits estimated in current terms. This would probably lead to under-investment in inflationary times regardless of the investment appraisal method used.

Furthermore

- Many firms use the internal rate of return method as their primary method of investment appraisal. This method is likely to lead to under-investment by comparison with the theoretically preferable net present value method.

- Many firms use the payback method which would suggest an overly conservative approach to investment decisions.

In a study of this nature it is never possible to be sure whether one has asked the right questions or interpreted the answers correctly. If, on balance, this has been achieved in this study, then the results are of some importance to the business community. One form of action that would seem to be desirable would be to check the results of these studies, preferably by means of further in-depth studies. The writer also supports one of Carsberg and Hope's concluding recommendations which suggested that "A requirement that companies should publish a statement of the methods of investment appraisal that they use, and the level of their target returns would provide useful information to shareholders, and perhaps lead over time to a greater uniformity in use of best practice". (p. 65).

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