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"THE MEASUREMENT OF EFFICIENCY WITH SPECIAL REFERENCE TO RETAILING"

Ph.D. Thesis April 1973.

SYNOPSIS

The thesis deals with two areas: Marketing and Finance and it shows the interconnection between them.

The starting point is an examination of the behaviour of the channel of distribution. A behaviour model of typical channels is developed which, empirically tested, supports the theoretical model.

In the present thesis, an attempt was first made to investigate another hypothesis concerning the efficiency of firms in the given channel of distribution. More specifically, the question arises, is an efficient distributor linked with efficient suppliers and vice versa? Unfortunately, both suppliers and distributors were unwilling to disclose data required for such a study. The thesis therefore investigates the question of the measurement of efficiency from a different angle, departing from Marketing. It discusses at some length other methodologies concerned and presents the difficulties of using them. It shows that in order to effect a comprehensive measurement one should consider a map of utility indifference curves. The model developed is a combination of a number of other theories, mainly those presented by 1) Dunning and Rowan (157) which suggest the use of utility curves rather than production curves, and 2) Amey (I) who offers another concept - the comparison of ex-post with ex-ante profit. In the light of these considerations the model developed in this thesis utilizes stock market data in order to estimate ex-ante profits. For this reason the portfolio theory is employed. The model is empirically tested on a sample of public companies for a ten-year period, while techniques are developed in order to deal with such data.

The thesis also examines the effect of other factors on performance, viz. the level of management divorced from ownership.

The main conclusions derived from this study are:

1. The market does not attribute a constant reward to one unit of deviation from the mean of performance; the required marginal premium for additional unit of deviation is monotonic increasing.
2. The Food Industry performed better than others, while the Store Industry had the worst performance.
3. Management do not necessarily seek the maximization of shareholders' wealth.
4. Shareholders do not always act towards the maximization of their wealth in terms of direct income.
5. Firms' performance is negatively associated with
   (a) the proportion of its directors' holdings in its equity, and
   (b) the proportion of remuneration of its directors in earnings before interest and tax.
6. The proportion of holdings in firms' equities and remuneration of their directors are inversely related to the capital intensity of the industry.

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CHAPTER 1

INTRODUCTION

It is apparent that the channel of distribution is among the most important segments in marketing studies.[1] Much attention should be devoted to the channel structure by all its members, since the structure influences activities of the "channel members" in both the short-run and the long-run. The literature is familiar with the following basic channel structures:

Members	Channel Number 1	2	3	4
Manufacturer	+	+	+	+
Wholesaler	+	+		
Jobber	+			
Retailer	+	+	+	
Customer (Ultimate)	+	+	+	+

Analysis of profitability and growth results may suggest that, in the consumption goods sector, as shown below, there is no uniform pattern of distribution of profitability and growth, in terms of Return on (1) Net Assets and (2) on Physical Assets.

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1. Kotler (XIX) pp.287-288

Industry	No. of companies in the Sample	Rate of Return Average %	Rate of Return S.D.* %	Growth Average %	Growth S.D.* %
Cotton and Man-made fibres	51	16.3	5.7	5.6	6.4
Woollen and Worsted	52	17.4	4.7	7.2	5.1
Hosiery etc.	93	15.8	7.6	7.6	5.1
Clothing and Footwear	70	14.7	9.4	5.7	7.0
Food	73	17.6	8.0	10.4	7.1
Drink	104	12.8	5.5	6.0	4.5
Tobacco	7	12.0	5.8	8.1	7.9
Paper,Printing, etc.	105	17.2	8.0	9.7	7.4
Leather etc.	123	15.5	7.9	6.4	5.0
Wholesale Distribution	172	14.8	7.0	7.7	8.1
Retail Distribution	117	18.0	8.3	8.7	6.7

*S.D. - Standard Deviation

Source: Whittington (XXXV) pp.24-27

TABLE 1-1

Table 1-1 based on results of all quoted companies, in a particular industry, in the U.K. (for the period 1948-1960) indicates a pattern which may suggest that the most profitable channel-member is the retailer with rate-of-return on Net Assets (Total capital and reserves + Interest of Minority Shareholders in Subsidiaries + long term liabilities - Provisions) of 18.0%. The growth rate of this industry is also, relatively, very high with a rate of 8.7 per cent, only the Food and the Paper industries showing a higher rate. A closer look at the retail industry reveals that there is a strong tendency for growth of Multiples retailers over the last twenty year period. In fact, the proportion of retail establishments of Multiples grew from the 9.0

per cent level in 1951 to the level of 17.9 per cent in 1971, while the Independent retailers' share decreased during the same period from 86.5 per cent to 77.0.[1] A more illustrative picture may be found in the changes in the proportion of the trade done by those type of retailers. The share of Multiple retailers in turnover which was 28.0 per cent in 1961 increased to the 36.8 per cent level in 1971, while Independent retailers' share shrank from 54.0 to 46.4 per cent respectively. Forecasts of this issue demonstrate that the trend of this phenomenon is continuous.[2] Figure 1-1 displays the relative stage of growth for a certain type of retailing.

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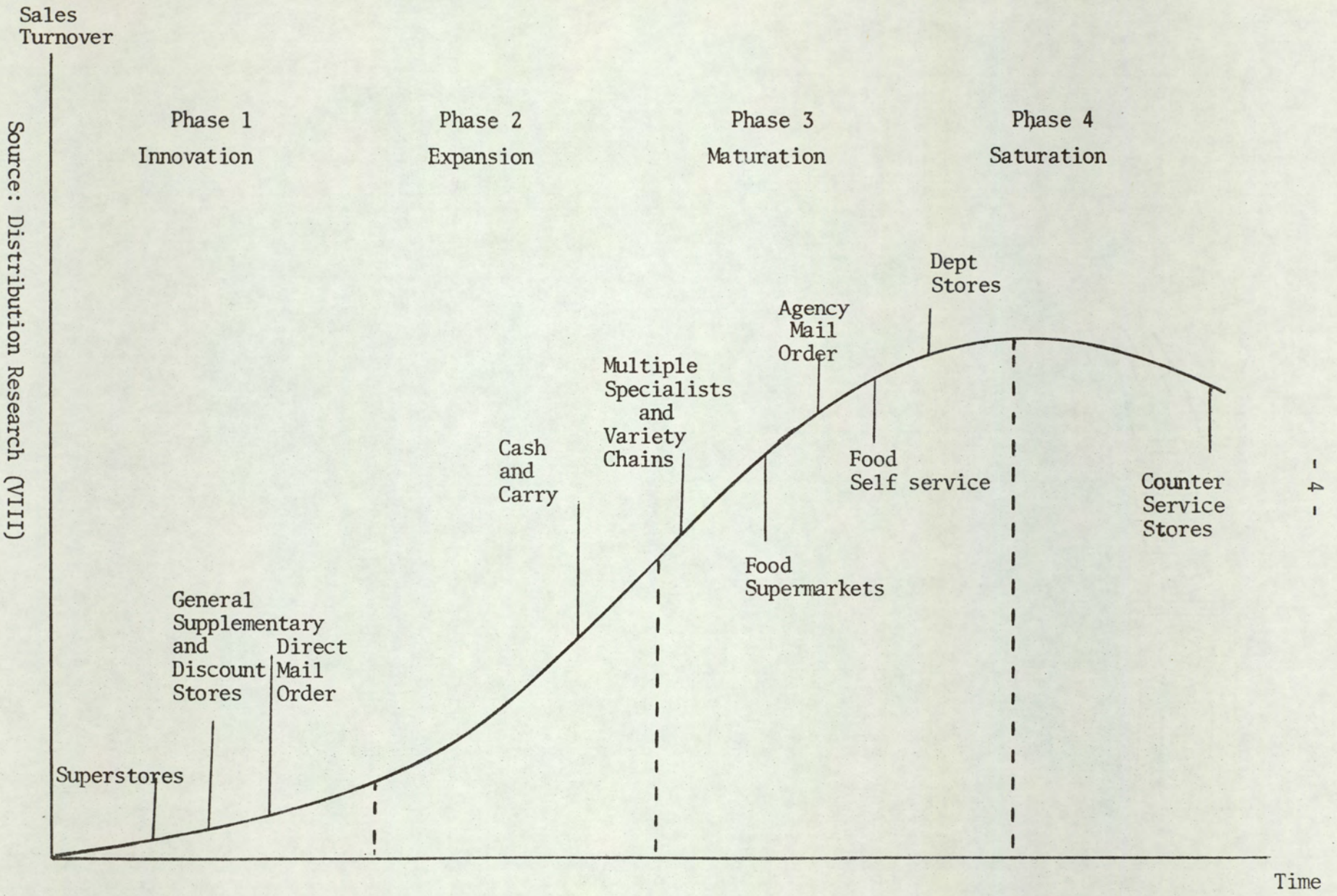
1. Distribution Research Ltd. (VIII)
2. Op.cit. p.38



Source: Distribution Research (VIII)

Figure 1-1

where "Phase 1 - innovation, where a few, but increasing number of people are attracted to new products for various reasons.

Phase 2 - rapidly increasing rate of acceptance by market

Phase 3 - new users are becoming increasingly difficult to find and competitive alternatives begin to appear

Phase 4 - growth stops as maximum number of users is reached. The market may continue at this level, if there are repeat purchases, otherwise decrease."[1]

Analysis of the "Financial League Tables for the Clothing Industry 1968/1969" (XXI) - which gives financial information for 244 firms in this industry, collected from their balance sheets, for that year - shows a similar pattern of inter-industry to intra-industry, as summarised in Table 1-2.

Sector	No. of firms	Rate-of-return Mean %	Rate-of-return Variance %
1. Men's Outfitters	17	10.2	14.4
2. Rainwear	14	6.2	67.2
3. Men's Outerwear	39	8.7	36.0
4. Shirts and nightwear	20	10.0	37.9
5. Corsetry	16	10.1	48.1
6. Lingerie	7	8.2	22.3
7. Women's Outerwear	64	9.9	220.0
8. Children's Wear	13	9.1	33.5
9. Workwear & Protective Clothing	15	10.9	60.3
10. Diversified companies and those not elsewhere classified	39	9.2	34.0

TABLE 1-2

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1. Distribution Research (VIII) p.110

Table 1-2 shows that even within industry there is neither a uniform rate of profitability nor a similarity in the degree of variance. The most striking figures are those of the Men's Outfitters and Women's Outerwear sectors with the rate-of-return on assets of $(10.2 \pm 3.8)\%$ and $(9.9 \pm 15.0)\%$ respectively. A closer look at the nature of the business lends credence to the hypothesis, suggested by a statistical analysis, that the sectors shown in Table 1-2 are not of the same population. By and large, companies shown in Sector 1 (Men's Outfitters) are manufacturers as well as distributors (they operate, partially, in channel No.4, see page 1, while being members of other channel systems.) But the companies belong to Sector 7 (Women's Outerwear) engaged mainly with manufacturing.

This introduction gives rise to a number of questions on the actual behaviour of the channel of distribution, as far as the channel-member's profitability is concerned. This thesis, therefore, makes an attempt, in Chapter 2, to build a model for intra-channel behaviour. Chapter 3 provides empirical evidence to support the model that is developed. At the end of the chapter, a hypothesis is put forward concerning the measurement of inter-firm efficiency. Departing now from Marketing, this issue is discussed in length in chapters 4, 5 and 6. Chapter 7 examines the concrete application of the model suggested at the end of chapter 6. A summary and conclusions are presented at the end of the thesis in chapter 8.

CHAPTER 2

THE BEHAVIOUR OF THE CHANNEL OF DISTRIBUTION

Introduction

The previous chapter indicated the necessity to investigate the behaviour of the channel of distribution.

The channel of distribution, in some circumstances, is a long run commitment by its members.[1] Failure in choosing a channel member may impose difficulties on its members (such as loss of vintage of products, financial losses through unsold production and loss of production opportunities).

This chapter will deal with intra-channel behaviour.

It is possible for an entity to be a member of several channels, however, the behaviour of the same entity in different channels, would not be necessarily the same towards other channel members as will be shown later by the model. For the sake of simplicity the channel which consists of only manufacturers and retailers will be discussed although the same implications and arguments can be applied to other channel systems.

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1. "Two aspects of channel decisions place them in the important decision areas facing top management. The first is that the channels chosen for the company's products intimately affect every other marketing decision.....The second reason for the significance of channel decisions is that they involve the firm in relatively long-term commitments to other firms." Kotler (XVIII) p.549

The model

It is obvious that many advantages are inherent in the use of channel systems. The use of intermediaries, such as wholesalers, creates a more efficient allocation of resources, in some cases. If a manufacturer desires to reach "n" retailers with journey expenses of "a", his total distribution cost will be "a n". However, when a wholesaler carries a function as of mediator between several manufacturers - say "m" - and "n" retailers, the total number of journeys is reduced from "nm" to "n+m". Thus if "a.n.m" >"b`(n+m)" - where b` is the average cost of the journey to the wholesaler - the wholesaler's function will justify its existence from an economic point of view. Therefore, the wholesalers play a positive role in channel systems. Nevertheless, channel systems will not always include wholesalers.

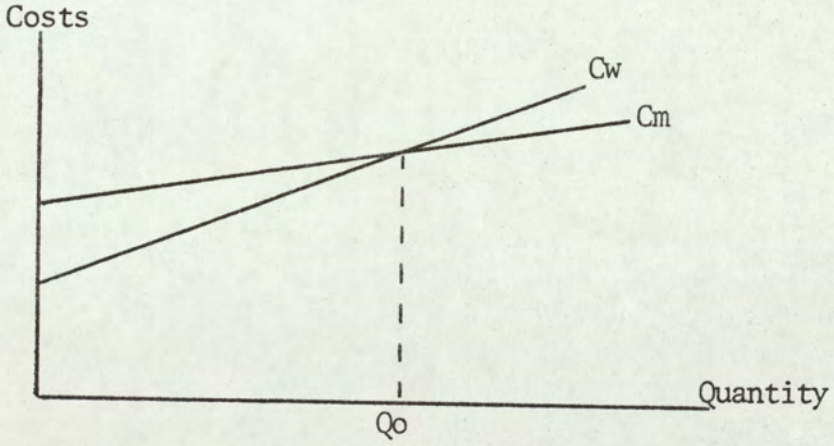

Figure 2-1

Cw.....retailer's purchasing cost, per unit purchased, from a wholesaler
Cm.....retailer's purchasing cost, per unit purchased, from a manufacturer

If a retailer purchases a quantity smaller than Qo - as shown in Figure 2-1 - it will not pay him to buy direct from the manufacturer. However, if the retailer's order is sufficiently big (his purchases are greater than Qo in Figure 2-1), it will pay the retailer to deal direct with the manufacturer

(assuming differences in purchasing prices and services between the two). Therefore, strictly speaking, a large scale retailer will tend to avoid using wholesalers and deal direct with manufacturers. By so doing he may reduce the total costs of goods he buys and may eliminate a circle of conflicts[1] which may exist in a channel that includes another entity, namely the wholesaler. This will perhaps provide the retailer with better services than he may obtain direct from the manufacturers. Symmetrically, both the manufacturer and the retailer will try, for the same reasons, to dispense with the wholesaler. It is apparent, therefore, that the first common interest of manufacturers and retailers, who are negotiating, is to eliminate the wholesalers; in this way they are allies.[2]

The negotiating process starts with an initiative by either side - the manufacturer or the retailer. At this point the two parties have in mind that at the end of the process they will reach the position that "there is the implicit agreement to maintain a continuous trading relationship. The (manufacturer) also agrees that his salesman will call at specified times, that merchandise will be delivered in securely packed cartons and at times when it is convenient for the retailer to receive it... The retailer agrees to check the merchandise and sign a receipt for delivery, to pay for the merchandise promptly....."[3]

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1. Rosenberg & Stern define the conditions for conflict as follows: "...a social relationship between two or more parties (persons, groups or empirically distinguishable entities) in which at least one of the parties perceives the other as an adversary engaging in behaviour designed to destroy,injure,thwart, or gain scarce resources at the expense of the perceiver". (156) pp.41-42.

2. It should be borne in mind that although the wholesaler may not be a channel member his function has to be carried by another member. No channel can exist without this function.

3. Wore Alderson (5) p.202

In most cases it will be found that the weaker party will try to initiate negotiations in order to establish contacts with the stronger party, as will be explained below.

Two scales may be considered from two different standpoints as illustrated in Figure 2-2.

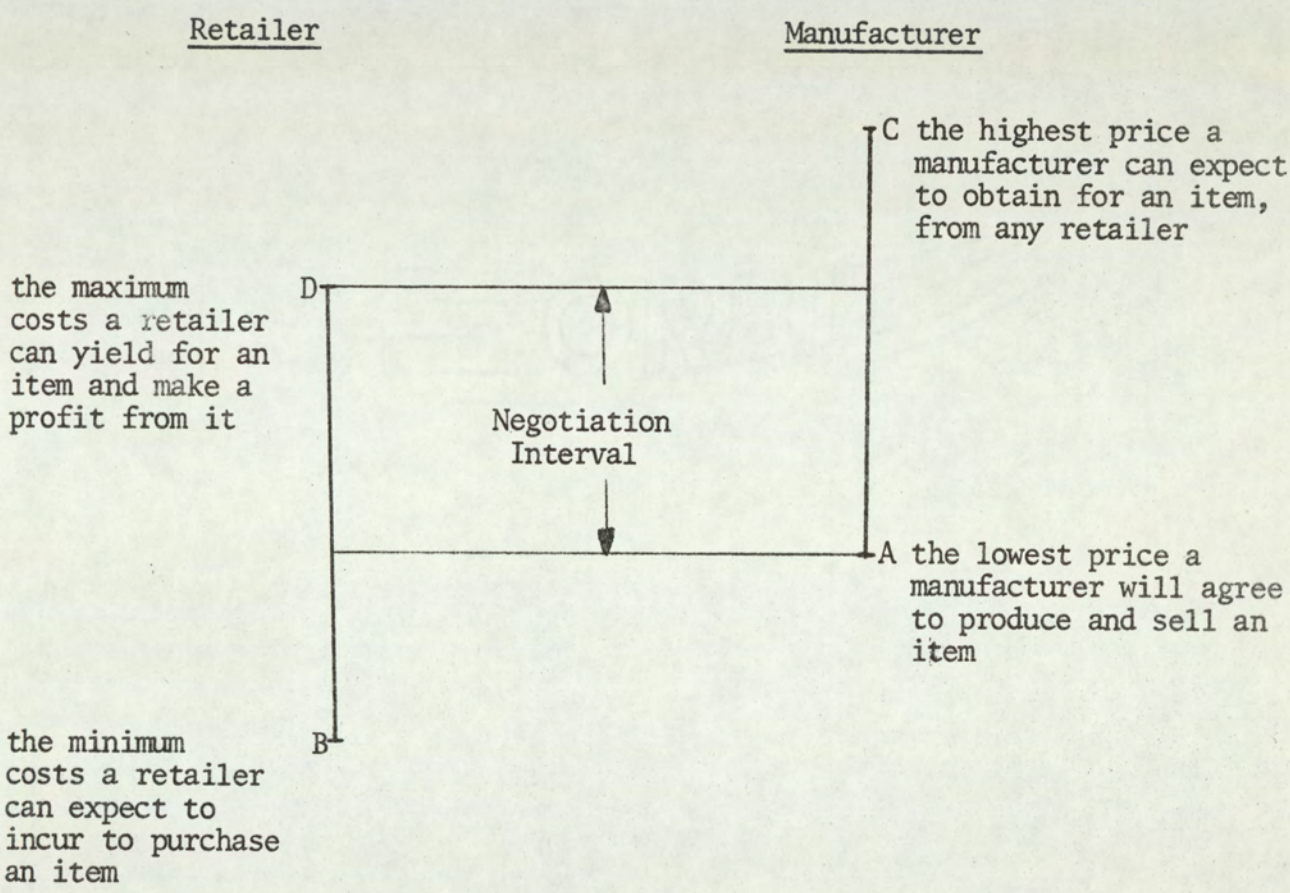

Figure 2-2

When negotiations start the buyer bears in mind a "cut-off" cost; at this purchasing cost he can never generate profit. The other purchasing cost a buyer has to consider is a subjective cost, which he estimates when he calculates the production costs. The manufacturer, on the other hand, also has a "cut-off" price at which he cannot produce and make a profit above his

normal profits. Yet he has a "subjective" price as well; he may base this price on speculation, rumour, past experience, etc.

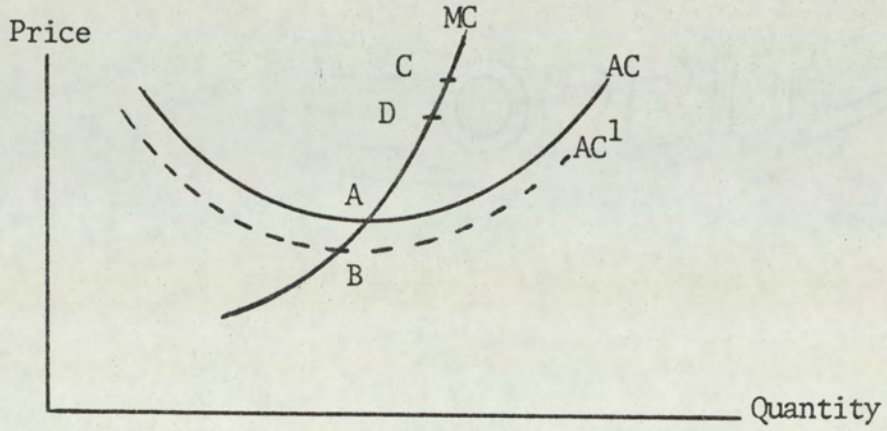

Figure 2-3

Theoretically, the point A in Figure 2-2 forms the manufacturer's minimum AC curve (Figure 2-3). Nonetheless, the AC curve shifts according to the efficiency or inefficiency and the normal profit of the manufacturer. The retailer, however, may expect to obtain minimum price (Figure 2-2) where the curve they form coincides with the minimum AC^1 curve in Figure 2-3.

The latter means that the retailer, if he is sufficiently strong,will demand that the manufacturer be efficient in allocation of resources and in production. Moreover, the retailer wishes to reduce the manufacturer's normal profit to a sufficient level to keep the manufacturer in business. Let us take point C in Figure 2-2 and Figure 2-3 which is the highest price that can be obtained by any manufacturer for this particular item. D, in the same figures, represents the highest price at which a retailer can possibly afford to buy this item without incurring loss.

In practice a manufacturer does not consider his Marginal Costs (MC) curve. He knows only his Fixed Costs (FC) and Variable Costs (VC) when producing any given quantity of items. He fixes the selling price, as illustrated

in Figure 2-4, according to his calculation of Total Costs (TC) divided by the number of units produced plus his mark-up (which is arbitrary).

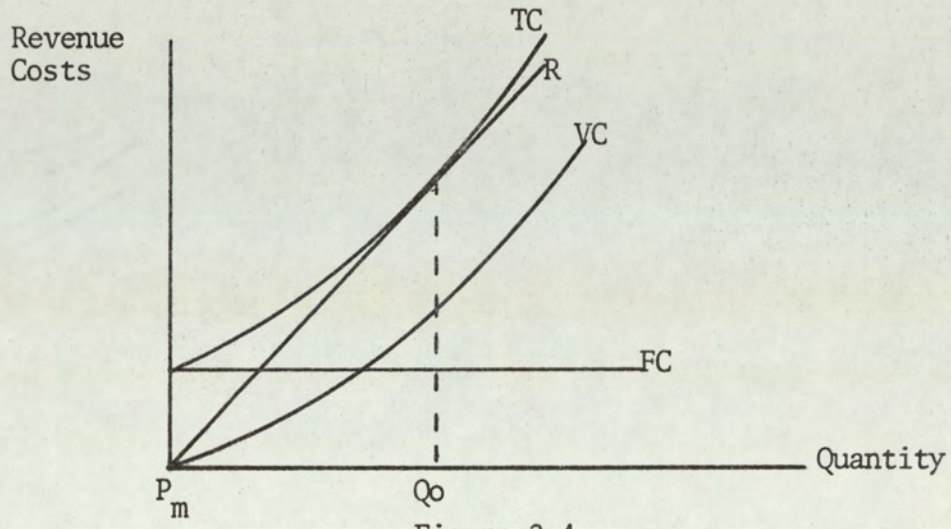

Figure 2-4

P_m in Figure 2-4[1] is the minimum price at which a manufacturer will sell his product and this is the price which places the Revenue Curve (R) tangentially to the TC curve. However, in the long-run he will never sell a different quantity, such as Qo at this price. This price is equivalent to A in Figures 2-2 and 2-3. Kelly (97) particularly adopts this approach when he refers to "Specification buying" which "contains the idea that the purchasing firm exercises a rigid control over the quantitative and qualitative characteristics of a given item. Since the control aspect is such an important attribute of the management, it will reflect the complex of ideas presented..."[2]

He argues that a big retailing organisation should develop its own products, estimate the production costs and look for the suitable manufacturer who wishes and is able to produce them at the quoted costs while maintaining the products' required quality. However, in no event will the retailer

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1. Kotler (XVIII) pp.363-4

2. Kelley (97) p.255

wish to consider "specification buying" as just described. The conditions can be summarised as follows:

1. Strong brand position of manufacturers
2. Own private brand is weak
3. Patent as monopoly of source
4. Fair traded merchandise
5. Starting a new line
6. Fashion merchandise[1]

Prices and costs are not the only matters under negotiation. Other issues may create conflicts and threats, and endanger the possibility of an "autocratic"[2] relationship. The other matters that may feature in negotiations are as follows:

1. product promotion expenses
2. information flow
3. resale price
4. product range
5. distribution range
6. awareness and attitude to competition
7. relationships with competitors
8. form of advertising
9. timing of notification of changes in price
10. business philosophy
11. attitude to growth[3]

Stern (173) refers to the bargaining power of big retailers such as chain stores as adding another factor which influences negotiations when they use private brands. He argues that "Chain bargaining influence, however, does not emerge initially as a result of private labels; the faculty to demand lower prices relates to a chain's buying power and would be present without the existence of private labels. But with the existence of private labels manufacturers' monopoly power is reduced."[4] A similar argument was given

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1. Kelley (97). However, not all these conditions are valid as will be shown.
2. Mallen (121) p.24.
3. Mallen (121) p.24.
4. Stern (173) p.46.

by Kelley suggesting that a use of private brands by chain stores imposes profit restraint and controls manufacturers.

Returning to the discussion of the negotiation area, it appears that the buyer has to consider, in negotiations, two kinds of gains:

1. Explicit gain - the actual gain made by lowering the price from D to the settlement price.

2. Implicit gains - symbol (b) - i.e. gains which are equal to the costs involved of finding another supplier.

Similarly the supplier faces a parallel situation to that of the buyer. First, he gets the profit which is equal to the difference between the settlement price and his minimum costs A. Secondly, he considers his implicit gains by reaching an agreement (K) i.e. the costs of (1) looking for a buyer who will express readiness to sell his products and (2) the premium to cover increasing the risk that his product may lose ground.[1]

Thus it can be assumed that the two parties reach a settlement at a price, say X, though the suppliers' or the manufacturers' gains are AX +K and those of the buyer are DX + b. Settlement is achieved when these two gains become equal. Hence,

$$DX + b = AX + K$$

but

$$AD = AX + DX$$

by substitution we get

$$2DX - AD = K - b.$$[2]

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1. Stern (173) gives another cost "There is the possibility,...., that retailers will integrate backwards, e.g. buy plants and produce their own products." p.45.

2. The variables K and b may influence each of the other parties by factors such as: a. range of products
   b. population served
   c. services rendered and/or function performed
   (Rosenberg and Stern (156))

It appears that the dominating factor influencing the settlement price is the amount of loss of potential profit one party can impose on the other by not reaching an agreement. Therefore, where $K > b$, which means that the buyer can cause greater potential loss to the supplier (exerting his power by threatening to break negotiations) settlement will be reached at a point where

$$DX > \frac{AD}{2}$$

i.e. in the lower half of the negotiation area. El-Ansary and Stern (54) made an attempt to measure the power existing in the channel of distribution. They distinguish between four major sources of power:

1. Power as Control over Marketing Strategy
2. Power as a Function of Dependence
3. Power as a Function of Source of Power
4. Power as a Function of Both Dependence and Source of Power.

Similar conclusions will be drawn about the upper half of the negotiation interval where, $K < b$, the supplier's implicit costs are lower than those of the buyer.

Stern (173) looks at the polarity of the negotiation scale and tries to explain this phenomenon as follows:

> ".... the small manufacturer, no doubt, continues to provide private labels, for such production may at least assure his short-run survival. Indeed, for these manufacturers, assurance of short-run survival may be their most meaningful goal."[1]

Wills (XXXVI) mentions some of the factors influencing explicit costs and gains which encourage or discourage agreements. He distinguishes between:

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1. Op.cit., p.47.

(a) "Negative factors" - where one of the negotiators sees that choice does not exist for the following reasons:

1. trade practice
2. the company's internal weaknesses, e.g. its small size, and

(b) "Positive factors" - where negotiators see

1. adequate profitability
2. lower costs
3. control

Once negotiations decline into conflicts their causes and outcomes will be reflected in future negotiations.[1] Therefore, the two parties will try for their mutual benefit to avoid conflicts. This may be achieved by enlarging the negotiation area within which the two parties may co-operate. This may be accomplished by any combination of the following factors apart from those of conflict:

1. personnel training
2. aid in promotion
3. developing new ideas
4. allocating funds
5. store/factory layout
6. management consultancy

The "channel member" who is the channel leader and employs this approach will be regarded as a "democrat"; this results in a stable equilibrium within the channel. In choosing a buyer or a supplier a firm has a long-run objective; "healthy channel members" will create a strong and durable channel. Payne (146) pinpoints four major factors determining the

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1. See Rosenberg and Stern (156)

evaluation of the supplier or buyer by the channel leader - retailer (or manufacturer), viz:

1. technical or engineering capabilities
2. manufacturing and production capabilities
3. financial strength
4. management and personal capabilities

It appears that Payne adds a new dimension to the process of channel member selection. He treats channel members as assets; for which reason the buyers should minimize the risk of the manufacturers' bankruptcy. Henry Assael (10) gives the following conditions for Constructive Conflict.

1. A critical review of past action by management concerns - reviewing policies independently.
2. More frequent and effective communications between disputants and the establishment of an outlet for the expression of grievances.
3. A more equitable distribution of the resources of the system.
4. Standardization of modes of conflict and resolution.
5. Creation of balance of power within the system.

As explained above the negotiation interval is bounded from above and below. The profit function can be written as follows:

$$P_{tm} = \alpha R - d_c$$

where P_{tm} ..... the supplier's profit

R ..... the supplier's expected revenue

d_c ..... the supplier's cost of producing these items

α ..... a subjective risk premium

If there is co-operation in the channel, this can reduce A, the lower limit of the negotiation area - utilizing one or more of the above methods of co-operation. This will affect P_{tm} through both the elements governing it. On the one hand it will decrease the costs (this does not necessarily involve increasing the other party's costs). On the other hand it would

decrease the supplier's risk element. Thus the channel as a unit can gain by co-operation, at least in the long run.

CHAPTER 3

TESTING THE MODEL

Introduction

While chapter 2 suggested a model of intra-channel behaviour, the present chapter will provide some evidence which may support the described model. Together with the findings themselves, the chapter will discuss other variables related to the findings such as the chosen samples. At the end of the chapter another hypothesis will be raised in the light of the findings and this will be concerned with the efficiency of the channel. The latter topic will occupy the remainder of this thesis.

The Samples

Two different sectors of the distribution channels were studied in order to test the suggested model.[1] The first sector of the distribution channels from which a sample was selected is that of the Textile Industry and the second was that of Foods.

About twenty large-scale retailers engaged in the two channels comprised the distributive sample. Their retail outlet spread all over the U.K., thus the sample is in this sense homogeneous although they are not diversified to the same extent and are not of the same size. Nevertheless these conditions do not suggest that the sample is unrepresentative. This random sample, as were the others, was drawn from "The Kompass - Company Information Directory 1971-1972". Unfortunately the response by firms to the request to co-operate in the study was disappointing; only

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1. Due to the fact that distributors diversify the nature of their products in order to reduce their element of business risk, the same distributors will have membership in the various types of business. This does not, of course, mean that the samples are distorted.

five firms wished to be interviewed while ten vigorously rejected the idea and the rest did not respond. Thus the results are not necessarily representative, since they relate to too small a number of firms. However, the retailers' size exerts an influence in the industry and tendency and actual behaviour could shed some light on the model. Nonetheless the test should rely more on the suppliers than the retailer.

Twenty six textile manufacturers comprised the second sample. This sample was drawn from the industry using two criteria:

(i) size
(ii) location

The second criterion was required in order to identify environmental effects and the first in order to examine the effects of size on relationships. The criterion of size was noted in three groups, based on the number of employees in the firm:

	Category	No.of employees in the firm	No.of firms in sample
1.	Small	20 - 200	6
2.	Medium	200 - 1000	12
3.	Large	over 1000	8

This sample could be categorised within different classes but for the sake of convenience it was drawn on the bases just stated. Indeed the response to the inquiry was remarkably high; only one firm declined to co-operate.

The third sample comprised food manufacturers. Here again the structure as described in the selection of the second sample was applied. The sample contained twenty firms, eight of whom declined to respond.

The Technique and General Results

In these samples top management executives were interviewed in order to study the validity of the hypothesis set. Face to face interviews were held although this procedure absorbs more resources. This was in order to

investigate the channels in depth. In addition it was proved through the study that the interviewees prefer an oral interview to completing a posted questionnaire even though the time spent on the former approach is much longer. In fact, the length of interviews varied between two hours and a period of three weeks with the mean of one day. During the interviews a uniform questionnaire was followed for each part of the channel. This enabled a more rigid comparison, without loss of dimensions, so that the time spent on the study maximised its benefits. The questionnaire was drafted in such a way that not only the interviewee's aspect was considered but the effect of other factors such as the reliability and response of the other party negotiated with. For example the interviewee was asked "which of the following variables do you emphasize in negotiations? (rank)". This was followed by the question "which of the following variables does the other party emphasize in negotiations? (rank)". Other factors investigated were the firm's restrictions, education of management and inter-channel relationships. Amongst other questions interviewees were asked to give the names of their channel members. It was stressed that the interviews are confidential and no attempt would be made to reach their channel members without their prior permission. The pattern of answer was uniform: retailers were very reluctant to give their suppliers' names, while manufacturers willingly gave their customers' names and sometimes even indicated the proportion of their production going to particular customers. The reason for the latter phenomenon is that retailers regard their suppliers as their assets; by naming which they may expose their business secrets (or they just do not want to discuss their relationships with them!). Manufacturers on the other hand, were pleased to provide the interviewer with the list of their customers since - as they indicated - their reputation in the industry

depends also on their customers' reputation. (The latter point will be elaborated on at a later stage). The inquiry revealed clear patterns and directions in the channels with the following aspects:

1. Type of relationships between channel members in the vertical sense, i.e. retailer - supplier and vice versa.
2. Type of relationships that exist between channel members that exist in the horizontal sense, i.e. between suppliers of the same retailer.
3. Inter-channel trends.
4. Different approaches depending on the nature of the product i.e. Foods and Textiles.

A common reaction of interviewees in the first instance was "we have a very good relationship with our customers/suppliers". However, during the interview it became clear that the statement made varies from one channel to another. The kinds of relationship can be classified into three types:

a. Democratic
b. Autocratic
c. Anarchical[1]

The first two classes have been characterised as a channel system comprising large scale retailers or wholesalers where the manufacturers' scale does not play an important role. This suggests that channel dominance is determined by the distributors' scale rather than the manufacturers' scale. However, whereas this last conclusion is very significant in the Textile distribution channels it is less, though still, significant in the Food channels. The third type of relationship has been characterised as a channel system comprising small retailers or wholesalers who are the manufacturers' clients, regardless of the

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1. Mallen (121)

manufacturers' size. The latter phenomenon was found significant in the two sectors studied.

Democratic Relationships

In this survey, significantly, only one large scale retailer could be classified under this heading. This organisation declares that it has unique relationships with its suppliers. However, it is not the declaration that creates this sort of relationship. In fact, the buyers' policy is to provide the organisation's stores (1) with quality goods (2) at low prices (in that order) and this is their guideline. This point has been confirmed by all channel members. The stimulus given for the success of the organisation's buyers is beyond the scope of the discussion, but the system employed by the buyers, which requires the suppliers' cooperation, motivates the buyers to create co-operative relationships where they are supervised by the organisation's board of directors.

This organisation, hereinafter called Y, develops its own specifications for each item - no goods are purchased until there is first a specification - in its own laboratories. According to all its suppliers and other manufacturers in the same industry these specifications are very rigid. Aware of the manufacturers' difficulties in reaching their specifications, due to the possibility of increase in costs, Y has established an expert group to assist its suppliers in solving production problems in either the latter's factories or in the former's headquarters laboratories. This does not mean that the experts are engaged solely on day to day problem solving. They also develop new plants to help manufacturers to reach the specifications provided. One can argue that Y utilizes an operational leverage but Y's executives deny this. According to them, Y's yearly expenditure on this policy exceeded £1m, far more than their ad hoc benefit from price

reductions. The main objective of this expenditure is the maintenance of their most important asset - their suppliers.

Their assistance to suppliers is not limited to production and quality control but extends to other fields such as developing and creating good industrial relationships in general, such as management accounting, production management, factory layout, inventory management etc. Y not only provides suggestions and advice but also organises (several times a year) special courses lasting for a few days to educate suppliers' management in a variety of subjects concering production and management. The lecturers for these programmes are selected from different fields and different sources and they are not otherwise involved with Y.

A few of Y's suppliers have added another dimension to the relationships. They argue that even financial assistance can be provided if required although it is not necessary. This clearly raises the possibility of vertical integration. On this Y's executives state that their financial resources will not enter production and hence this sort of financial assistance will not be provided. An exception was when a supplier faced a take-over danger and Y could lose some obvious advantages. It was then decided to purchase part of the supplier's equities to prevent the take-over being implemented. It may be that this exception contributed to the other suppliers' confidence in Y. Nevertheless it is clear that the suppliers' business risk is reduced when the above operation occurs.

Y provides its suppliers with forecasts of its own demands to enable the manufacturers to have manoeuverability and make decisions.

The suppliers expect to obtain from Y contracts which will yield them certain explicit gains i.e. profits and certainty. They discover that there are implicit gains inherent in contracts with Y added to these explicit ones. All Y's suppliers also supply to other organisations

i.e. they are members of several channel systems. They may sell identical goods to different buyers but the selling terms may vary with all the other buyers; all buyers except the organisation discussed above buying on less favourable terms than Y. The suppliers emphasised this point and stated that they differentiate between Y and their other customers when negotiations take place. In most cases the suppliers' turnover at constant prices has increased considerably over the past ten years. However, the incremental proportion produced for other organisations was much higher than for Y itself. This does not mean that these suppliers are unconcerned with inter-channel competition, which extends to a remarkable degree in all possible directions. But those suppliers explained that being accepted by Y means being recognised as a good and reputable supplier who provides quality goods and that other buyers are prepared to pay for that.[1] Nonetheless most of the manufacturers interviewed stated that a high level of competition exists in their industry. Gaining contracts from Y has other advantages, too, such as getting better credit terms for raw material supplies, easier terms for bank loans (although this advantage can be obtained from a number of other channel systems as well), etc.

It is worthwhile indicating that this group of suppliers shows a high level of loyalty to Y. They stated that in no event would they replace Y by another nor would they supply Y's direct competitors.

The nature of relationships existing in the channel described are necessarily based on mutual trust and understanding, which are informal and depend upon an emotional rapport between the parties. Thus regulation procedure and costs are reduced and so is the maintenance required for fashionable

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1. It should be stressed that this phenomenon is found where business risk is not involved, thus the risk element could not explain the price differences.

goods in the beginning of the season. This would seem a typical case of democratic relationships.

Autocratic Relationships

A contrast to the Democratic Relationships has been identified. This could be described as an "autocratic" channel where the dominant channel member tries to take every opportunity of increasing its gains while reducing the other parties' profits. In this case the dominant member is a large scale retailer. The policy of the organisation, hereinafter called X, is to buy where it can at the most favourable terms. The way negotiations are conducted indicates the degree to which it seeks to squeeze its suppliers. The quality of the goods does not figure in negotiations since the retailer is not at all concerned with the quality.[1] X's instructions to its buyers is to buy goods at lower prices in order to generate maximum ad hoc profits.

The loyalty of channel members is naturally not as strong as in the former case where a democratic channel was investigated. Here channel members are ready to substitute. On the one hand the retailer ceases buying from the present supplier once cheaper resources have been found (unless the present supplier agrees to lower his price and to absorb losses). On the other hand, suppliers argue that they stop selling to X when an alternative customer is discovered. This is based on hypothetical grounds since the number of suppliers who actually break relationships with X is very small. Manufacturers complained that they were not secure and suffered shrinkage of profits. The growth of a typical supplier - under this classification - is very low whereas the growth of retailers is relatively very high.

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1. However X's suppliers suggest that their products are of a high standard of quality.

Buyers rarely visit the suppliers in the latters' factories and relationships are formal.

Buyers feel and utilise their power over relatively small manufacturers and dictate terms to the frustrated suppliers. The buyers' negotiations with larger size manufacturers are rather different, especially where manufacturers enjoy market imperfections, due, for example, to their size. Under these conditions terms will not be dictated by either side but agreed between them.

Suppliers keep close commercial ties with X's competitors when some goods are sold to X and its competitors.

Payment for shipment of goods is usually delayed and is only made promptly when discount terms have been conceded.

Anarchical Relationships

This type of relationship characterizes small buyers who buy from any source for resale at some small profit. Usually these buyers are not permanent customers of particular suppliers, or vice versa. The buyers buy the goods on the spot; thus the sale is made from existing stocks and the business risk taken by suppliers in this sort of transaction is high. Obviously the buyer has to pay a higher price to compensate the producer for taking the risk.

In these circumstances, where anarchical relationships exist, Reed Moyer's (141) model will fit very well. Where this sort of negotiation takes place each participant knows that it may be the first and the last with the present negotiator. Thus no long-run considerations will be involved. In fact, cases of this sort of relationship were not found to be significant and to be based mainly on the evidence of manufacturers without going into more details, in contrast to the cases of the former relationships described.

Two significant extreme types of relationships have been described. However, there is strong evidence for a trend in the industry studied towards democratic relationships. Buyers realise that exploitation of their suppliers will not serve their long-run ends. This trend started when competitors noticed the success of the democratic channel. This trend has been explicitly noted by both big retail organisations and manufacturers. The latter welcome the shift in the attitude towards them but - according to the majority - these buyers are far shart of reaching the democratic channel, i.e. they still lag behind Y. The retail organisations, from their own side, adopted the democratic approach by joining present buyers in the democratic channel.

Another trend which was discovered concerns firms which act as suppliers to the same customer. They became more aware of the fact that when they co-ordinate some of their activities they can benefit. Thus it is not unusual to find two manufacturers supplying the same customer sharing some of their "secrets", although competition between them within the channel continues. This trend was encouraged by the channel leaders, since they do benefit from the development so long as competition continues.

Inter Products Nature Differences

The findings indicate some prominent differences in the buying-selling process and the comparisons between Textile manufacturers and Food producers although, by and large, the model suggested in chapter 2 is suitable in these cases. The most prominent difference found between these two industries relies to a large extent on the manufacturers' size and their concentration, which characterise the industries. The Food industry appeared to be more concentrated than the Textile industry. The former industry is characterised by larger factories in terms of their number of employees per firm and products specialisation, whereas the latter industry is characterised

by smaller manufacturers and the absence of products specialisation.[1] Hence these phenomena have effects on the following elements:

1. The inter-industry level of competition
2. The sources of new ideas
3. The size of investments in R & D
4. Magnitude of involvement in advertising and products promotion
5. Formal education of directors - the investments in human capital.

Since there is no high degree of competition in the Food industry such as exists in the Textile industry, the manufacturers' terms of the former are harder than those of the latter. Nonetheless, the latter does not suggest that there is a contradiction in the model suggested and the findings. The model has a strong foundation as the earlier sub-section showed, though the price settlement will rest at a high level in the negotiation area. A by-product of the concentration and specialisation and the nature of products in the Food industry is the higher level of investments in looking for new ideas, developments of products and the sources of new ideas. The new ideas for products are mainly of internal origin and very rarely stem from outside sources. Hence it is not surprising that the number of actual new products is rather small, while the improvement of existing products is a common venture in the industry. In fact as much as 75% of Food manufacturers interviewed indicated that this element is the most effective restriction faced by their firm. The period taken to develop new products is, on the average, well over a year. The costs involved in developing new products are very high and usually involve a team of researchers. On the other hand, Textile manufacturers get new ideas from a variety of sources, such as customers, fashion shows, professional literature, competitors, as well as from their internal sources.

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1. Products specialisation refers to the relative number of firms producing similar products.

Therefore all but one of the Textile manufacturers interviewed indicated no restriction imposed by lack of new ideas. Thus the costs of developing new ideas are relatively small, with few people involved in developing the products, and it is not necessary to invest much capital in research plants. Since the Textile industry is characterised by a short life-cycle the period taken to develop new products is relatively very short - from two weeks to three months. Identical reasons will explain also the phenomenon that all Food manufacturers interviewed produce products also under their own brand and carry out promotion programmes and advertising either on an independent plane or through some kind of assistance to distributors. On the other hand, only 50% of Textile manufacturers have their own brand while only seven manufacturers actually use it. Only five of these carry out sales promotion programmes.

There are a few other dimensions of differences between the two industries which are worth discussing briefly.

a) 70% of the executives in the Food industry interviewed have formal education and training. On the other hand only 30% of the interviewed executives in the Textile industry have similar qualifications. The reasons for the difference are based on the fact that the Textile industry had a family character and the managers inherited the factories after working in the firm for many years. The Food industry, in contrast, has no such character and absorbs managers from outside the organisation: the firms look for qualified and experienced management.

b) As was suggested above, Food manufacturers sell products under their own brands as well as the distributors' brands.[1]

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1. Food manufacturers pointed out in the interviews that the net profit rates on products carrying their own brand is far higher than that on private labels.

The latter embark on a strong battle between the two parties - the manufacturer and the distributor - over allocation of shelf space, where distributors use this constraint as a threat against the manufacturers. A manufacturer who invented a new product indicated that distributors refused to allocate space for this particular product for market test unless some concessions were made. The same applied to co-operation in measuring the effect of advertising on sales. As a result of these conflicts the manufacturers used their own retail outlet which depends on the nature of products produced by the firm - as well as continuing marketing in the existing channels, thus reducing the threat imposed by the distributors. Such phenomena do appear in the Textile's distribution channels, but with less significance. The evidence does not suggest, as one might have inferred, that Textile manufacturers have a higher degree of loyalty to their customers. The inquiry's results show that the same degree of manufacturers' loyalty exists among the Food manufacturers.

c) The result of the difference in the nature of the products in the two industries is also reflected in the length of time given to a manufacturer to fulfil an order placed by his customers. The average of this period in Textiles is three months, whereas in the Food industry it is one week. The reason is, as was suggested above, that the Food firms are specialised, and their production is continual and an order may be supplied from stocks. Textile manufacturers are not specialised and do not produce mainly under their own brand, thus they have no stocks. On the other hand the products ordered by customers are not necessarily the same. In order to complete an order the time required is of the length indicated.

Conclusions

It has been shown that although differences do exist in the two types of distribution channel, the model suggested in chapter 2 is valid. A bargaining interval does exist within the distribution channel, no matter what type of channel it is. However, the type of relationships which exist in the channel can and does influence the bargaining interval. A more accurate study of this hypothesis was not possible, as both suppliers and buyers are very sensitive about disclosing figures which might give evidence of differentiation of the buying prices arrived at in negotiations. Nevertheless, the description of the findings provides enough support to the theory that the channel relationships affect the bargaining interval and buying price. The hypothesis that the higher the power imposed by one party on another the greater the benefit the former will derive is not well founded. The question raised is, therefore, will an efficient manufacturer be associated with efficient distributors or vice versa, so that both may benefit as shown in Figure 2-3. An attempt to resolve some of the unsolved problems which has to be made explicit in this hypothesis, will occupy the rest of the thesis. However, some of the difficulties in using the existing techniques, should first be illustrated.

The most frequent use of retailers' performance criteria are the sales engendered by an employee and the sales made to selling space. Using the two criteria one can compare or rank retail units performance. However, the use of such criteria may be misleading and mistaken, for the following reasons inherent in the criteria.

1. They do not take into consideration the assortment of products in the retail unit - its product mix.
2. Account has not been taken of the level of diversification of the retail unit.

3. No provision is made for the retail unit's stocks.
4. The effect of the location of the retail unit is neglected.
5. Account was not taken of the costs of use of labour and capital, or of
6. The differences in the use of the quality of the labour input.[1]

It appears that the above criteria may give vague and unreliable results when comparison is made. In addition, the credibility of these criteria is even more diminished when one wishes to make an inter-channel (or inter-industry) comparison, such as is necessary for the present hypothesis. Another mode of measuring performance in the retail industry was given by M.Schiff (164) and J.S. and M.Schiff (165). They suggest considering financial ratios, such as the return on investment and return on assets managed. Thus they consider the firm's profits as their output. McAnnally (131) provides a reason for rejecting the profit as a sole output of a firm, since firms have obligations also to a variety of entities rather than its owners. The difficulties in measuring a firm's performance will be discussed and elaborated on in the succeeding chapters, providing at the end a suitable measurement model. However, it should be made clear that this measure, like others, is not a comprehensive one,and cannot lead to a comprehensive model. Nevertheless it can lead to a more elaborate model than others used so far.

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1. All these factors will remain valid even when retail units are considered to belong to the same kind of products channel.

CHAPTER 4

INTRODUCTION TO THE MEASUREMENT OF EFFICIENCY

The previous chapter dealt with the problem of measuring the efficiency of a firm. The present chapter will evaluate some of the methods of measurement based on the stated or implied criteria , and the difficulties arising in their use. Chapters 5 and 6 will be concerned with the elaboration of existing models for measuring business efficiency. Chapter 7 will apply and test the conclusion empirically, on the basis of the results reached in Chapter 6.

The welfare of every entity - either on a national scale or as an individual - depends very much on its total efficiency. An increase in efficiency means that at least one can consume more without decreasing another's store; that one is better off in terms of satisfaction, without reducing other satisfactions.

What is efficiency?

The definition of the term efficiency can vary although it is commonly used in all aspects of life. While there are references to this term in a broad spectrum of areas, its definition is inherent. The term efficiency in science is defined as the output input ratio. It appears that this definition is the correct one and can be applied in all respects. It could be defined in words such as: The ability of an entity to maximise outputs - in any term of satisfaction - for a given set of inputs. The latter definition is just an interpretation of the former.[1]

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1. Portfolio analysis, for example, refers to the term "efficient Portfolio". This means: that which maximises returns (outputs) for a given portfolio (inputs) where the risk is of the same class.

It can be said, therefore, that the total efficiency is an aggregation of productivity of inputs such as productivities of materials, labour, machinery and capital. Increase in productivity of any of these factors - without changing other forms of inputs - will necessarily increase total efficiency. It appears, therefore, that the terms efficiency and productivity have the same connotation but the former generalises the latter. Hence, there is no practical limit to the scope of efficiency so that the term or the expression "absolute efficiency" should be avoided.

The definition of efficiency gives some implicit ideas about the need for its measurement. It is worthwhile to be more explicit in this matter. Four major reasons can be given for illustrating the importance of such measurements.

1. For strategic purposes - it provides the firm with a tool to make a performance comparison with other firms.
2. For tactical purposes - it provides management with a control tool for divisional or functional performance.
3. For planning purposes - it provides a yardstick for decisions on the kind and quantity of factor input needed for production.
4. For other managerial policies in decision-making - it enables management to draw its policy on different issues such as an employees' incentive scheme.[1]

The need for measurement is not confined to internal management purposes. This can be used also by external investigators such as investment analysts and by economists for drawing up policy in investments and for decision making in the resources allocation. However, it should be borne in mind that "productivity increases are not ends in themselves but merely one means of promoting more fundamental ends."[2,3]

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1. Eilon and Teague (52) and Gold (XII) pp.32-33
2. Gold ibid.
3. The ends of a firm are to reach the objectives it sets, see ch.7.

Let us focus the discussion on the behaviour of the firm.

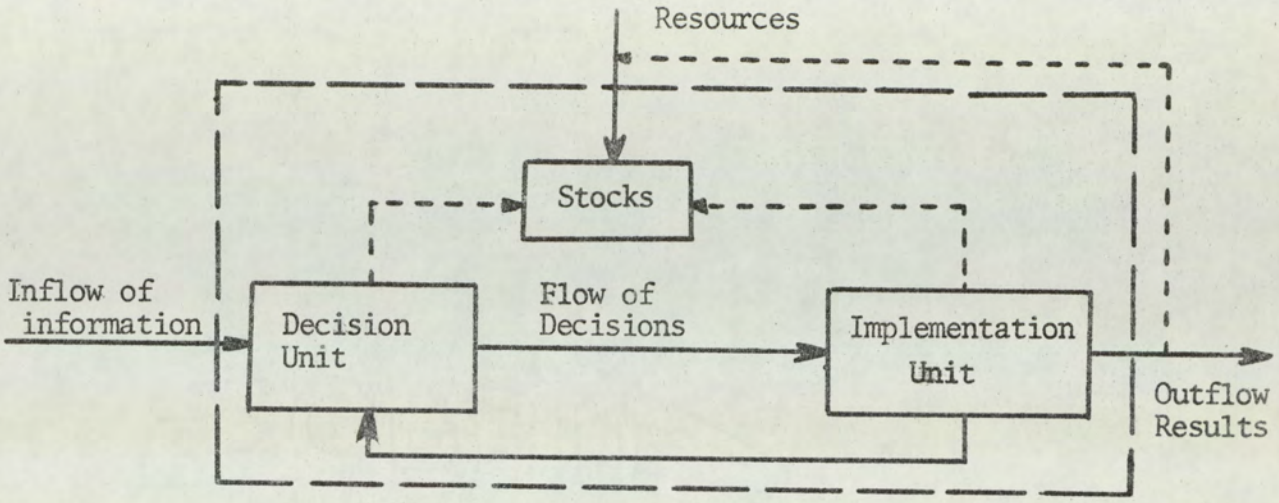

Figure 4-1

Broadly speaking, a firm is fed with a flow of information and by using available resources it produces results, as described in Figure 4-1. The ability of a firm to respond to the information flow and produce 'good' results will determine its efficiency. It appears, therefore, that a firm's efficiency refers mainly to the ability of its entrepreneurs and management to perform. The last point has to be clarified and discussed in more detail.

The functions of management guided by its objectives, can be divided into two groups:

1. decision making
2. implementation of decisions taken.

These two groups of functions,which are interrelated, are carried out either by the same or by different persons. First, let us examine these functions separately.

1. Decision making

As stated above, a firm as an organism receives a flow of information to which it responds. A firm's management responds to information in two ways:

(a) by ignoring it - i.e. to consider the information as irrelevant to the firm in all respects

(b) by reacting to it - i.e. the firm will make use of it in an operative decision.

It should be borne in mind that the step of ignoring information is also a decision. Thus, management has to be sensitive in seeking information and so gaining the detected information.

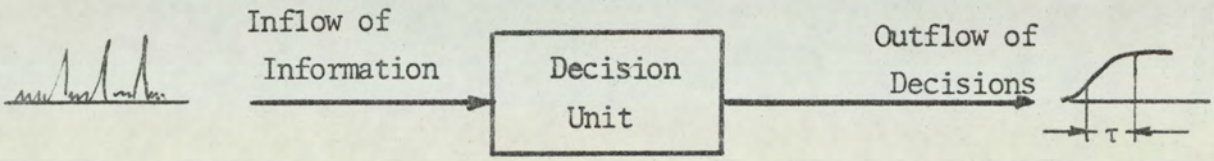

Figure 4-2

It is dangerous to be too sensitive since 'noise' will be considered as a signal. Lack of sensitivity, on the other hand, may result in losing opportunities, through a 'signal' being considered as a mere 'noise' and not receiving the appropriate attention. Another important factor influencing decision making is the decision's 'rise time' (τ), or the time delay from receiving a signal and making a decision. The 'rise time' may be crucial for management since it could arrive - in some cases - too late for the decisions to be carried out. A classic example of the importance of the above factors can be found in short life-cycle products - e.g. fashionable goods. When management does not 'detect' information about a product it may lose opportunities; a 'delay' in decision making may bring losses since the market may be saturated or the product will be out of fashion. The whole process is described in Figure 4-2.

2. Implementation of decision

Decision making is only the first stage in producing results. The second stage, as Figure 4-1 suggests, is the implementation of decisions made. Implementation in manufacturing organisations consists implicitly of three sub-functions

(a) to convert money into products (manufacturing)

(b) to convert products into money (marketing)

(c) co-ordination of (a) and (b)[1]

An organisation's output depends to a large extent on each of the sub-functions. Failure to succeed in one of them will affect its total output. It follows from the above that the two main functions,viz, decision making and their implementation, are interconnected and influence one another. There are also aspects of planning and control in the above description where decision making would be considered as planning and implementation as control. Ability of management to command on these two elements will determine the firm's output and hence its efficiency. Thus, by and large managerial efficiency follows firm's efficiency and vice versa.

The Rate of Return on Capital Employed

Eilon argues that efficiency of firms can be measured by any input - output set of the same nature, such as money or materials (in physical units) inputs against money or materials (in physical units) outputs, respectively (as shown in Figure 4-3).

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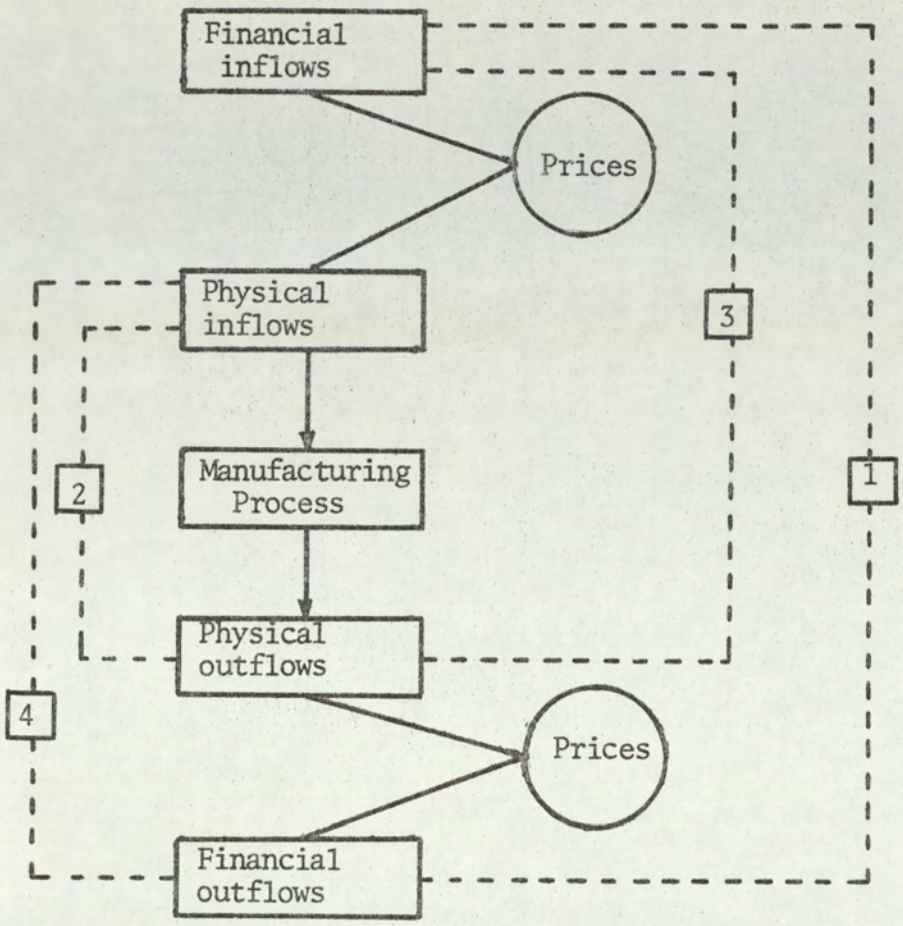
1. N. Garber, A. Kitchenner, A. Nigan (68)



1. is the financial efficiency
2. will determine technical efficiency or conversion efficiency
3. is the input efficiency
4. is the output efficiency

Figure 4 - 3

The first set, viz. money input and money output has been widely considered since it is easier to measure than other sets. This argument leads to a development of several financial ratios which determine the business efficiency.[1] These ratios are known as profitability ratios or the return

1. Van Horn (XXX) p.646. It will be shown that financial ratios may be misleading when they are taken as interfirm performance criteria.

on investment. Basically profitability ratios are comprised of profit (either net of taxation or before taxation, depending on the purpose of its use) in the numerator and capital employed or capital invested in its denominator. Under the same conditions the higher the ratio the higher the business efficiency. This ratio can be separated into two additional ratios:

1. Profit on sales or Profit margins
2. Sales on capital or Assets turnover

The product of the multiplication of these two ratios will be the original profitability ratio. These ratios may be used by investment analysts or the business owners to examine the performance of the firm. Du Pont has developed a chain of ratios in order to assist management in detecting weak departments or sections under its operations.[1] Thus, the ratios as described in Figure 4-4 are used in order to have a better control within the firm.

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1. Weston and Brigham (XXXIV) p.74

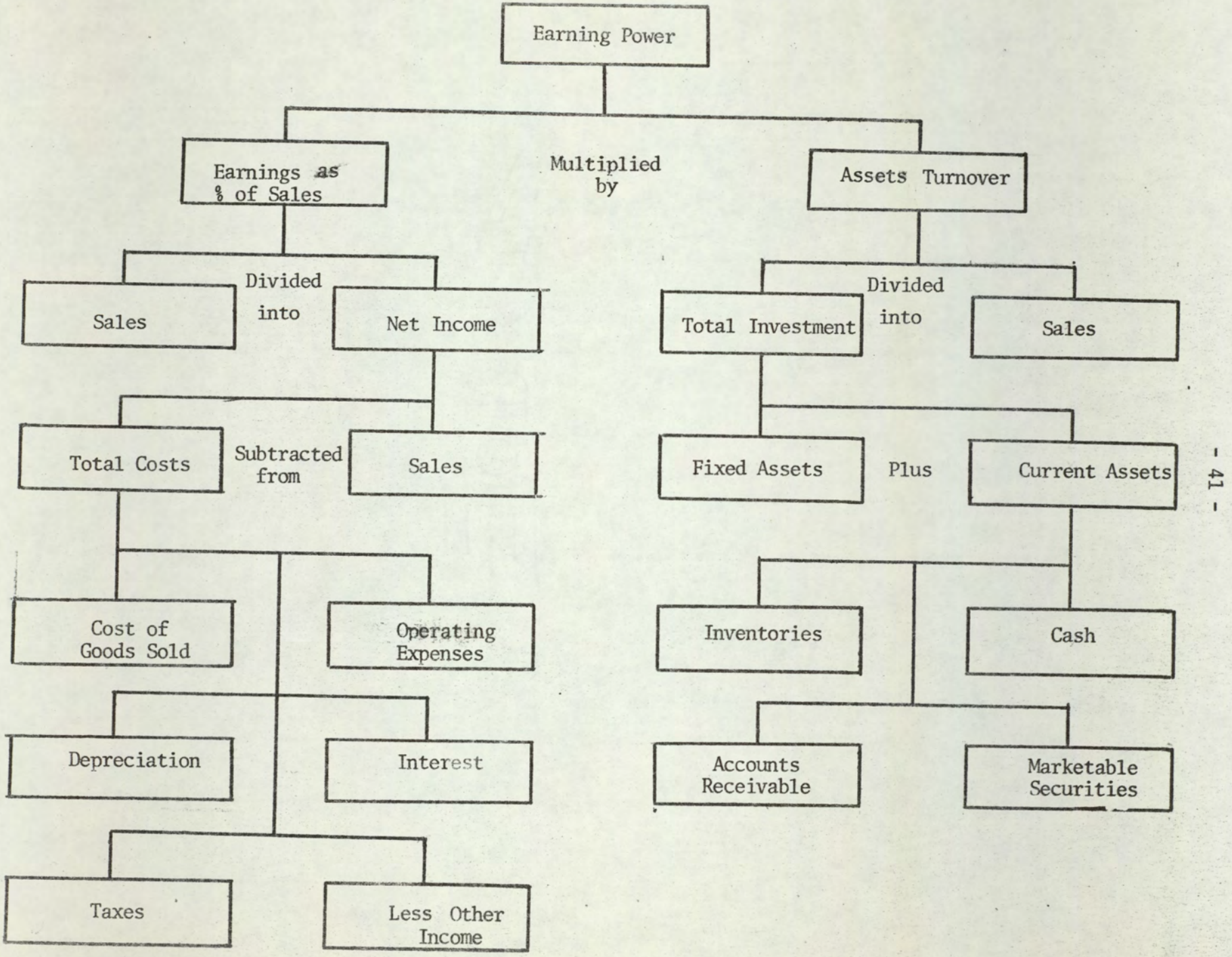
Earning Power
Earnings as % of Sales
Multiplied by
Assets Turnover
Sales
Divided into
Net Income
Total Investment
Divided into
Sales
Total Costs
Subtracted from
Sales
Fixed Assets
Plus
Current Assets
Cost of Goods Sold
Operating Expenses
Inventories
Cash
Depreciation
Interest
Accounts Receivable
Marketable Securities
Taxes
Less Other Income

Figure 4-4

The last use has been elaborated by Gold (XII) who suggests that a firm should consider three ratios in addition to the financial. By so doing firms can have better guides for control and for evaluating divisional performance. The ratios that should be considered are:

1. $\frac{\text{Profit}}{\text{Sales}} = \frac{\text{Profit}}{\text{Output}} \times \frac{\text{Output}}{\text{Total Investment}}$

2. $\frac{\text{Sales}}{\text{Total Investment}} = \frac{\text{Sales}}{\text{Output}} \times \frac{\text{Output}}{\text{Total Investment}}$

3. $\frac{\text{Profit}}{\text{Total Investment}} = \frac{\text{Profit}}{\text{Output}} \times \frac{\text{Output}}{\text{Total Investment}}$

"These additional bases for managerial control obviously cannot be used in place of the financial ratios. But it seems reasonable to suppose that, in most industrial situations, management would secure additional, practically useful guides to control with the system of managerial control ratios supplementing pure income, outflow and investment relationships with a variety of measures designed to represent the physical side of production and to bridge the gap between the physical and financial aspects of operations".[1] Therefore the elaborated comparison of managerial ratios should appear as shown in Figure 4-5.

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1. Gold (XII) pp.26-27

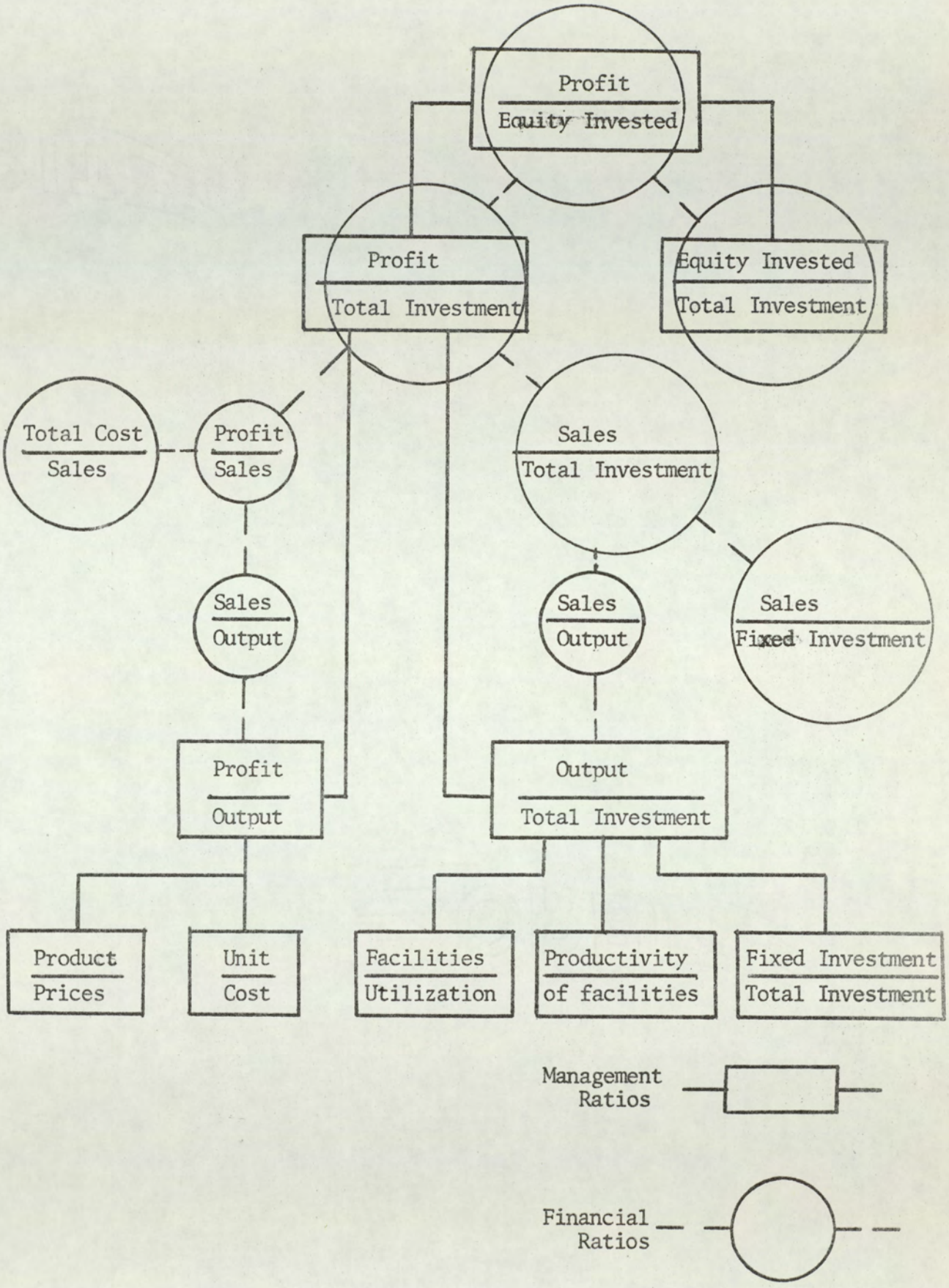

Figure 4-5

Source: Gold (XII)p.26

For interfirm comparison, however, account has to be taken of the risk factor carried by the firm and therefore, a series of other financial ratios has been developed. These ratios determine the risk.

At first sight one can argue that the information provided on risk and profitability will determine the business efficiency when interfirm comparisons are made on the same basis. Yet, there are probably other elements - internal and external (see Chapter 5) - influencing risk and profitability factors. For example, economies of scale can take place where interfirm comparison is made. Thus profitability and risk may be affected by the size of firms. A study carried out by Whittington (XXXV) showed "that amongst the largest firms, as amongst the smaller firms, there is no strong systematic relationship between size and average profitability although such tendency as exists is for profitability to be lower in the very largest firms. The tendency for interfirm variance of profitability to decline with size seems to be less amongst the largest firms."[1] Samuels and Smyth (161) reached similar conclusions "Profit rates and firm size are inversely related.... The time variability of profit rates and intra-group (size) variability of profit are both inversely related to firm size."[2] Thus, it will be erroneous to rely solely on the ratios described as a measurement of efficiency since the effects of exogeneous variables may distort conclusions reached by using these ratios.

The ratios described above are based upon accounting data which are available for each firm at the end of each year of its activity. There are two data sources each year:

1. The balance sheet - this statement indicates the distribution of Assets on the one hand and Funds (liabilities and owners) on the other <u>for a point of time</u>. A comparison of two

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1. p.59
2. p.139

successive Balance Sheets (of the same firm) will produce the source and uses statement which shows how each item of the firm's balance sheet has changed over the period.

2. The Profit and Loss Account - this is an Income statement of a firm's report on its activities over the period of time (a year) in generating profits or losses. These activities include, inter alia, the firm's sales, costs incurred in production and distribution of the costs and the distribution of the residual between the sales and the costs (payments for tax and interest on loans and dividends when appropriate decisions are made).

These sources, and hence the data used, are of limited application when interfirm comparison is made, for the following reasons:

1. Not all firms produce their statement for the same length of time or for the same period covered.
2. Changes in the Balance Sheet may reflect supreme position of the parent company.
3. Transactions in terms of 'book' value will affect the statements.[1]
4. Other accounting conventions such as treatment of depreciation may affect profits and distort comparative ratios, see chapter 7.
5. Balance sheets represent assets at their historic value or valuation value. When prices do not remain constant real value of assets will be different from their book value. Therefore, profitability ratios will be affected by the valuation policies

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1. Whittington (XXXV) p.11 and Sizer (XXVI) p.87

of firms and/or by their age.[1]

6. By and large financial statements do not indicate all intangible assets.
7. Other financial resources available to the firm such as the employees pension scheme, do not indicate their existence in the financial statements.

For these reasons, therefore, the significance of interfirm comparison is put in doubt when the profitability ratios are used (a comparison of firms in different industries may suffer from even higher degrees of distortion since other factors may be involved such as the level of competition in the industries which may influence the firms' output). It is possible to eliminate or reduce the effect of some of the historic capital value factors "by the substitution of current values as declared for fire insurance purposes".[2] This system is employed by Dunning and Rowan (157). Although the above suggestion may reduce the degree of error in interfirm comparisons the argument of the effect of other factors, such as market imperfection, will remain valid but an external investigator will find it rather difficult to obtain the real value of firms' assets. For all the above reasons and disadvantages ratio analysis - as described in this section - is not reliable for the purpose of interfirm efficiency measurement.

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1. Whittington op. cit. states that "The high proportion of very large firms revaluing (their assets) may explain why the large firms appeared to have slightly below average profitability, when all industries were taken together, the effect of revaluation is to lower profitability, as measured in the accounts. It should be remembered that past revaluations also affect the accounting rate of return....a relatively unprofitable company would be reluctant to revalue because this would make its relative unprofitability look even worse. Relatively profitable companies, on the other hand, might be keen to revalue as this would increase the the nominal assets backing for their shares and create capital reserves which would enable them to make scrip issue easily." (pp.59-64).
2. Sizer (XXVI) p.84

Other efficiency measurments suggested

The previous section rejected the use of financial ratios as criteria for determining firms' efficiency. This section will give a brief survey of other suggested methods.

In isolated cases such as firms which produce only one output and use consistently identical forms of inputs - for the sake of simplicity assume one factor input - and when factor prices are not subject to changes, it would not be difficult to assess their relative performance in any form of measurement as shown in Figure 4-3.

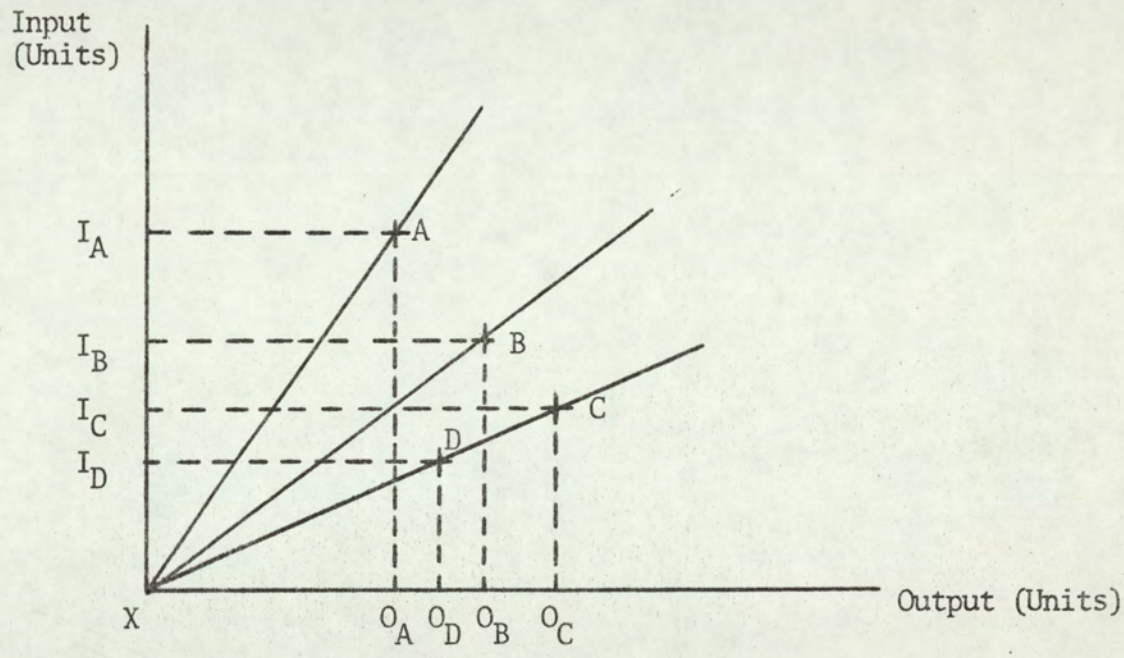

Figure 4-6

Assume coal mines which use one factor input, namely labour, and one form of output - i.e. coal. Mine A in Figure 4-6, employs I_A manhours in order to produce its output say O_A tons of coal. Mine B employs I_B manhours and produces O_B units output where $O_B > O_A$ and $I_B < I_A$. It is clear, therefore, that mine A is less efficient than mine B since B uses less inputs and produces more units output. The same analysis could be implied with mines B and C. However the mines C and D are equally efficient since they use

relatively the same amount of input in order to produce relatively the same quantity of output (assuming constant return to scale). Therefore, the slope of rays originating from X will determine the efficiency of the mines lying on them - the greater the slope the less efficient the mine which lies on that ray. This implicitly assumes that all these mines are of the same nature, but it could be that for geological reasons it is much more difficult to dig and handle the coal in mine A than it is in mine B. In such cases there is no clear justification for the conclusion that B is more efficient than A. Thus, the environment element must count in the measurement of efficiency.[1]

Where it is necessary to make a comparison under different conditions, like those in the more realistic world - where heterogeneity of outputs and inputs have to be considered - it will then be much more difficult to provide the correct measurement. Some of these problems are those of aggregation since the firms' output, are a mix of products and not merely a uniform product. The same argument will be applied to the different input factors used for different objectives. An illustration of aggregation difficulties can be given as follows:

Assume a firm which produces only two products A and B in two periods

Period	Product	A	B	P_A	P_B	P_{AF}	P_{BF}
0		10	15	1	2	1.5	2.5
1		20	10	2	3		

Obviously, if the firm produces in the second period more of the two products, it can be said that the firm increased its efficiency (although the rate of change cannot be stated). In other cases, as illustrated in the above table, assessment of the direction of the firm's efficiency cannot

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1. This idea was developed by Hall and Winsten (83)

be made unless aggregation criteria are provided. One of the suggestions is to take the products' market price as a weighting factor of quantities output. Since market prices are likely to change over a period of time, this change may alter the direction of shift in efficiency. If one takes the products' price in period 0, in the above example the index will show:

$$\eta_o = \frac{Q_{A1}\ P_{AO} + Q_{B1}\ P_{BO}}{Q_{AO}\ P_{AO} + Q_{BO}\ P_{BO}} = \frac{20 \times 1 + 10 \times 2}{10 \times 1 + 15 \times 2} = \frac{40}{40}$$

However, when period 1 will be used as a base year, and consequently the quantities produced will be weighted by period 1's prices, the index will indicate a different direction of change in output.

$$\eta_1 = \frac{Q_{A1}\ P_{A1} + Q_{B1}\ P_{B1}}{Q_{AO}\ P_{A1} + Q_{BO}\ P_{B1}} = \frac{20 \times 2 + 10 \times 3}{10 \times 2 + 15 \times 3} = \frac{70}{65}$$

The problem is therefore, which index provides the right change in output.[1] One of the suggestions given is the use of a price index for both periods. Such an index was suggested by Fabricant.[2] He suggested that the effiency index should consider the quantities of output weighted by the averages of the two periods price. Thus the index gets the form as equation 4 - 1.

$$\eta = \frac{\sum_{i=1}^{n} Q_{i1}\ P_i}{\sum_{i=1}^{n} Q_{io}\ P_i}, \quad P_i = \frac{P_{io} + P_{i1}}{2} \qquad i = 1; \ldots, n \qquad 4 - 1.$$

The above index is a purely quantitative index since products prices can get a relative price. The index, then, takes the form

$$\eta = \frac{\sum_{i=1}^{n} Q_{i1}\ P_i}{\sum_{i=1}^{n} Q_{io}\ P_i}, \quad P_i = \frac{P_i}{P_m} \qquad i = 1; \ldots, m, \ldots, n. \qquad 4 - 1b$$

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1. Eilon and Teague (52)

2. Fabricant S., The Output of Manufacturing Industries 1899-1937. National Bureau of Economic Research, New York 1940.

The disadvantages of using such an index are prominent:

(a) The index does not consider changes in forms of output

(b) It ignores changes in inputs which may occur during the periods investigated.

Many economists show much concern to develop a measurement of productivity, since it influences community welfare. The majority of economists who deal with the subject are mainly interested in measuring the productivity of the community as a whole or one sector of the economy. They consider one output viz. the value added of the community or the sector under study. In addition they assume only two production factors namely labour and capital. Capital means an aggregation of all factors except labour input. These factors are converted to their market value - in money terms - which make the aggregation plausible. One of the indices suggested[1] is the one shown in equation 4 - 2

$$\frac{\dot{P}}{P} = \frac{\dot{Y}}{Y} - \frac{F_K K}{Y} \frac{\dot{K}}{K} - \frac{F_L L}{Y} \frac{\dot{L}}{L} \qquad 4\text{-}2$$

where

$\frac{\dot{P}}{P}$ - is the rate of change in productivity

$\frac{\dot{Y}}{Y}, \frac{\dot{K}}{K}, \frac{\dot{L}}{L}$ - the rate of change of output, capital stock and labour, respectively

F_K, F_L - the marginal outputs of capital and labour respectively

$\frac{F_K K}{Y}, \frac{F_L L}{Y}$ - the ratios of capital and labour to output.

The explanation of the equation 4-2 is straightforward. Productivity is a residual element. This residual, therefore, is obtained by deducting the relative change in the aggregate input from the relative change in output. The relative change in aggregation input is obtained by weighting capital stock and labour by their proportional contribution to the product.

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1. Y. Manzly (123)

It can be shown what the difficulties in employing this equation are:

1. It ignores intangible inputs such as investments in research and development changes in skill and education.
2. Relative contributions of capital and labour are not necessarily constant and likely to be changed over periods.
3. The equation deals with stocks rather then using flows.
4. Capital, labour and output are calculated in real terms. The question is, therefore, whether the adjustments are adequate.
5. Errors in measurement of capital, labour and output will be reflected in productivity.[1]

Another index, similar in nature, was given by Kendrick (123). He suggests that we consider the wage rate (w) and rate of return on capital (r) as weighting criteria instead of using marginal outputs of the production factors. Thus, his index is

$$P = \frac{\frac{Y_n}{Y_o}}{w_o \frac{L_n}{L_o} + r_o \frac{K_n}{K_o}} \qquad 4 - 3$$

A very similar index was used by Reddaway and Smith (151) when they tried to estimate the productivity of sectors of the U.K. economy over the period 1948-1954. Their suggested index is:

$$\text{Progress} = \frac{\text{Increase in Output less allowance for extra factors}}{\text{Output which would have been attained with unchanged productivity}}$$

In symbolic terms it will be

$$\text{Progress} = \frac{P_1 \Delta O - (W_1 \Delta L + r_1 \Delta K)}{P_1 O_1 + W_1 \Delta L + r_1 \Delta K} \qquad 4 - 4$$

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1. ibid.

where O, P, W and r are output, output price, wage and the rate of return on unit capital.

It appears that this index takes into consideration other input factors such as intangible assets and attributes them to capital since they are all reflected in the rate of return. In their calculation Reddaway and Smith adopted a uniform rate (r). They were not unaware of the mistake in using a uniform rate (r) and consequently use "net output price discrepancy". There is no doubt that these indices are more meaningful than 4-2. Nevertheless, these formulae are subject to biases where prices of capital stocks change. An elaboration of the equation 4-4 in regard to the cost of capital, is given by Jorgenson and Griliches (96). Their suggested measure for cost of capital is

$$P_k = q_k \left(r + \delta_k - \frac{\dot{q}_k}{q_k}\right) \qquad 4 - 5$$

where

q_k - price of the kth investment good

p_k - price of the kth capital service

r - the rate of return on all capital

δ_k - the rate of replacement of the kth investment good

$\frac{\dot{q}_k}{q_k}$ - the rate of capital gain on that good

It appears, therefore, that equation 4-5 avoids the disadvantages of equation 4-4. Chapter 7 will indicate the implication of the use made by employing this suggested measure.

Other economists dealt with developing measurement for the use of inter-firm comparison i.e. these economists tried to look at the measurement problem from a micro-economic standpoint.

Timmer (179) argues that "If all firms faced identical factor costs and the same technical production function, and were all allocatively efficient, then relative average cost data would be sufficient to measure relative technical

efficiency."[1] Assume two firms employ only two production factors, A and B, producing one unit of output and facing the same relative price $\frac{A'}{B'} = \frac{A''}{B''}$, as shown in Figure 4-7. When the process is lineary homogeneous:

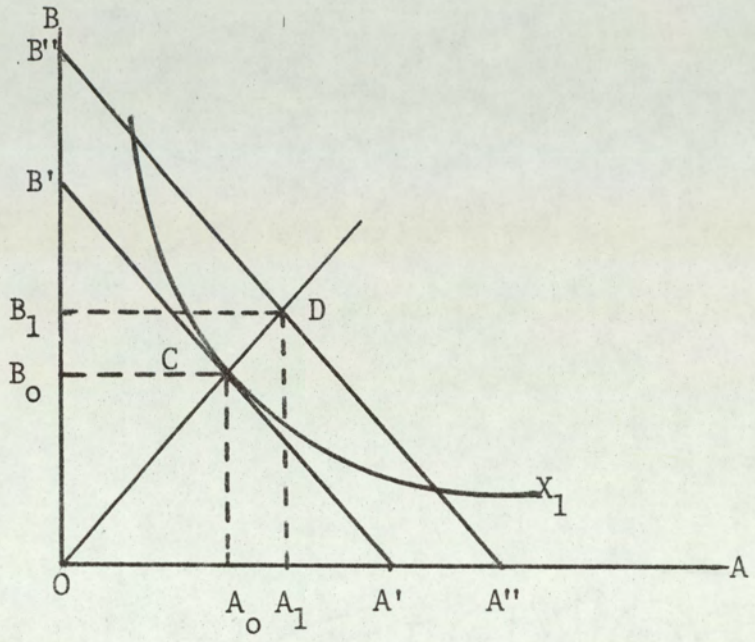

Figure 4 - 7

It can be said that firm C is more efficient than D, since D uses A_1 and B_1 inputs when C uses Ao and Bo inputs ($Ao < A_1$; $Bo < B_1$) in order to produce one unit output. The ratio of the cost of inputs will determine the relative efficiency of the two firms (in the above case D's efficiency relative to C is $\frac{OC}{OD}$). Note that both firms are efficient in their inputs allocation. Farrell (59) suggests that under the above conditions and the assumption of constant return to scale, an inter-firm comparison can be made. This will be so if an indifference production curve, of the most efficient firm, say A, which produces one unit of output (x_i in Figure 4-7) was given.

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1. p.777

All other firms will produce to the right and above the given production curve.

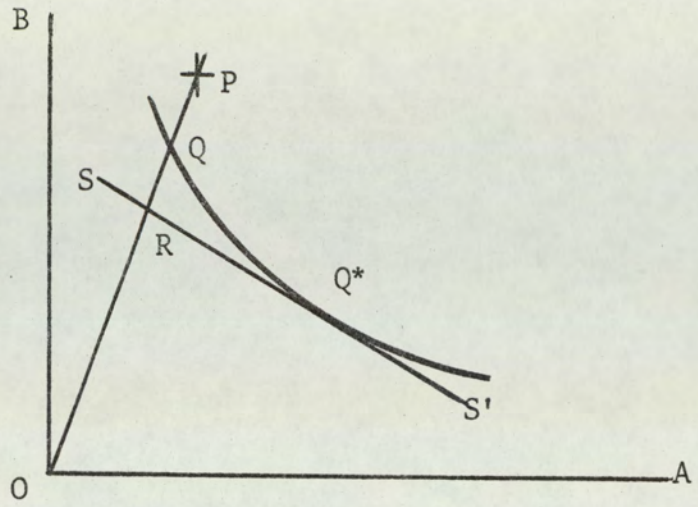

Figure 4 - 8

It is obvious, though, that Firm P - in Figure 4-8 - is less technically efficient than Q by $\frac{OQ}{OP}$. One should consider, however, the relative factors price represented by the line S S`. Thus, combination Q* is the most efficient combination of factors since it minimizes the production costs. Therefore, combination Q is price inefficient, the price inefficiency is $\frac{QR}{OQ}$. Firm P, consequently, is as price inefficient as Q but less technically efficient. Farrell is aware of the difficulties in assessing the production function, he says that "... it is very difficult to specify a theoretical efficient function for a very complex process .... the more complex the process, the less accurate is the theoretical function likely to be."[1] Therefore he suggests "we consider observed standards; this could be achieved by observing the actual results of several firms, thus each firm can be represented by a point on an insoquant diagram, so that a number of firms will yield a scatter of points like that on"[2] Figure 4-9:

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1. (59) p.255

2. ibid

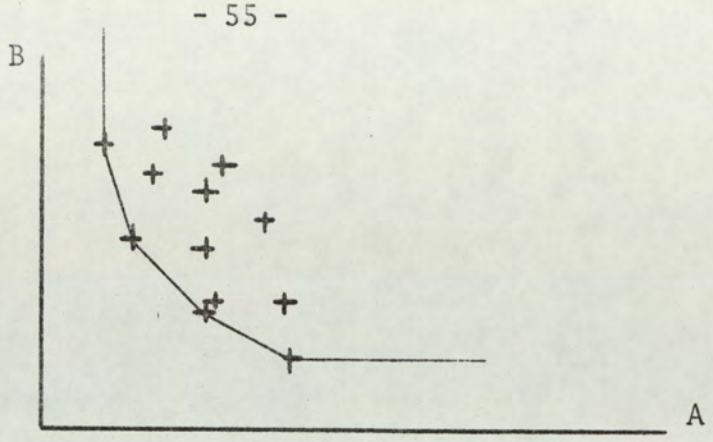

Figure 4 - 9

If a frontier line is drawn to those scattered points and the two additional points $(0;\infty)$ and $(\infty;0)$, this function can be considered as the most efficient production function and thus the same technique - as given by him - may be applied. Farrell argues that his model is not restricted to the conditions of two factors input and constant return to scale as assumed. He demonstrates a mathematical treatment in order to remove the assumption of two factors input. In addition he suggests a comparison of firms of the same size in order to relax the assumption of constant return to scale. However there are four major disadvantages in using this concept:

1. It allows comparison only of firms with the same class of returns.
2. The concept ignores intangible inputs.
3. Knowledge of all factor inputs has to be provided.
4. Factors input prices is the same for all firms.

Timmer (179) uses Farrell's concept with some modification. Instead of empirical frontier he suggests that a probablistic frontier be used, thus, eliminating the extremes. Nevertheless, the last two disadvantages in Farrell's model still obtain. Ball (13) suggests the use of Farrell's model where the firms output should be their value added. He states that "net output or value added in constant prices which measures the work done by the firm."[1]

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1. (13) p.7

However, Ball's method is also imperfect for the following two reasons:

1. Factor input prices are constant for all firms in all industries.
2. While output measured is of a flow nature the input factors are of the nature of stocks. [1]

Beattie (19) suggests that one should take the profitability (profit to capital employed ratio) rather than the value added concept as suggested by Ball. But, Beattie's arguments are based on wrong assumptions and interpretation as pointed out in my 'Comment' (14) (see the end of the thesis).

Dunning and Rowan (157), adapting Farrel's model, elaborate Ball's approach by using the value added as the firm's output. They suggest that if two firms' output to input ratios both do not point in the same direction, viz, $(\frac{VA}{WL})_A > (\frac{VA}{WL})_B$ and $(\frac{VA}{qK})_A > (\frac{VA}{qK})_B$, a comparison cannot be made. They suggest therefore to take the market prices ratio of labour and capital in order to determine relative efficiency as shown in Figure 4-10.

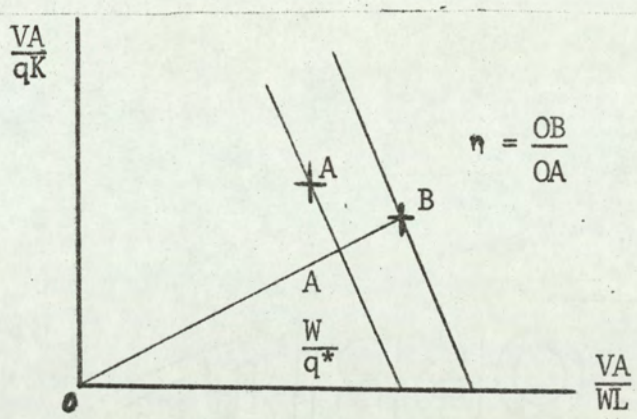

Figure 4 - 10

Their efficiency index became $\frac{VA}{WL + q^*K}$ where q^* is the social cost of capital, w is labour wage rate, k capital employed (book value) and VA is the value added of the firm. Thus, they apply Reddaway and Smith's (151) index but a less efficient one since the capital considered is the book

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1. See Y. Manzly (123) pp.54-55

value of capital employed. The use of constant cost of capital implies the production curve of a straight line. Dunning and Rowan reject the measurement of profitability as an index since it is a bias for similar reasons to those suggested at the beginning of this chapter.

Dunning and Rowan show a high correlation between their index and the rate of return (profitability) of firms. But, these measures are both biased for the same reason (the use of book value) and the high degree of correlation between the two indices are of a mathematical nature (see my 'Comment'). The same index is used also by Dunning and Utton (49).

Amey (I) argues that an efficiency index should be the one which incorporates two different profitability rates namely the actual rate of profitability against budgeted profitability. By and large the approach for measuring efficiency of a firm by comparing ex-ante profitability to ex-post profitability takes into account, implicitly, all the firm's assets either tangible or intangible. These assets are known to be contributing to the firm's profits from the two points of view of the calculations, viz. ex-ante and ex-post. Another advantage of using this approach is that it takes into consideration the objectives of the firm.[1] Nevertheless, Amey's approach may be employed by a firm for internal purposes. Yet, it will be rather difficult to make implications to interfirm studies since firms do not, usually, publish their pro forma balance sheet or pro forma profit and loss account.

The measure to be suggested in Chapters 6 and 7 will indicate the use of the approaches adopted by Amey and Dunning and Rowan with some account of other studies discussed in this chapter.

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1. Ball (13) argues that "It is necessary to measure efficiency in relation to objectives, otherwise it has no meaning." p.6.

CHAPTER 5

THE USE OF THE PRODUCTION FUNCTION AND THE VALUE ADDED APPROACH

While chapter 4 gave a brief survey of methods used for estimating relative business performance; the present chapter will discuss the method of estimating business efficiency which is most popular among econometricians - the utilisation of the production function. This will illustrate the need to consider the function of managements when discussing firms' efficiency. It will be shown that, even when many assumptions are made, the production function is of limited use for interfirm comparison. Conclusions can be derived only in some cases.

The Production Function

The output of a firm is a function of its inputs. It could be considered that firms generate their output (O) by using N production factors, e.g. Labour (L), Capital Goods (K), etc. Assume that a Cobb-Douglas production function is used by a firm, i.e.

$$O = A \prod_{i=1}^{N} X_i^{\alpha_i} \quad i=1....N \qquad 5.1$$

where O.... the firm's net output, O is a positive quantity.

x.... the firm's net input of the ith production factor, x_i is a positive quantity.

A.... a coefficient, A is positive.

α.... partial elasticity of output (O) relative to the production factors, α is positive. (Timmer (179)).

The properties that characterise the above equation are:

1. The function is homogeneous
2. The degree of homogeneity is $\sum_{i=1}^{N} \alpha i$.
   When $\sum_{i=1}^{N} \alpha i$ exceeds unity there are increasing returns to scale and $\sum_{i=1}^{N} \alpha i = 1$ indicates constant returns
3. The marginal physical productivity of factor input declines if $\alpha_i < 1$ as this factor input is increased. Specifically, $\frac{\partial^2 O}{\partial x^2} = \frac{\alpha_i(\alpha-1)O}{x_i 2}$ and is negative if $\alpha i < 1$.
4. The marginal rate of substitution of production factors is $\frac{\alpha_1 x_1}{\alpha_2 x_2} = \frac{\alpha_3 x_3}{\alpha_4 x_4} = \ldots\ldots$, and so the elasticity of substitution is unity (Walters (189)).

Obviously the above equation (5-1) requires knowledge of <u>all</u> the firm's production factors and their proportionate use in order to produce the required output. An external investigator will find it rather difficult to obtain these specific types of data. Hence, where several firms are investigated this task will be impossible, unless some assumptions (explictly or implictly) are made. Therefore, the following assumptions will be introduced:

1. Return to scale, of all firms in the study, is constant. Thus this assumption would probably hold where the firms investigated are of the same size.
2. Free and perfect competition in the product market as well as the factors input markets.
3. All firms optimize the utility of capital goods in use.

The provided assumptions will enable the use of a more popular form of the Cobb-Douglas production function, i.e.

$$O = AL^{\alpha_1} K^{\alpha_2} \qquad 5\text{-}2$$

where L.... factor input labour

K.... the firm's aggregate capital factors of production

These assumptions will be relaxed explicitly or implicitly hereafter.

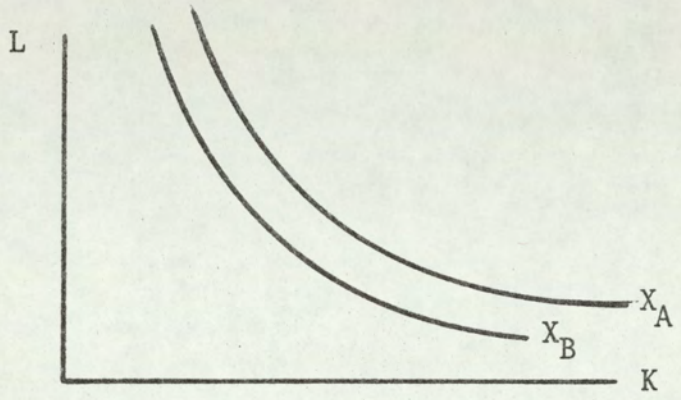

Figure 5-1

Figure 5-1 describes graphically the Cobb-Douglas production function, x, where two factor-inputs are used; x_A and x_B denote the different quantities of units of output. Economists consider the firm's output as a flow of physical goods produced by the firm where it uses various amounts of respective production factors (inputs). However, when introduction of the price element in the estimation of the output and input factors takes place, the production curve which will face us will be the one with the value added as its parameter rather than physical units of production and costs of labour and capital will substitute their physical amounts as input factors. It should be noted that the introduction of prices into the system will not change any of the production curve's properties - they all remain as they were. Nonetheless, the introduction of price will give us an advantage, as now

it is possible to make an interfirm comparison (although it may be that firms investigated do not produce products of the same nature and of the same product-mix) where previously we were restricted. As Dunning and Utton state: "because, in comparative studies, we are forced to deal with a wide variety of both inputs and outputs it is necessary to evaluate both in money terms". [1]

It should, however, be pointed out that the assumption made of perfect competition has to be firmly held either in the labour and capital markets or in the product market, in order to allow for inter-firm comparison. . Relaxing the last assumption will necessarily upset any comparison of that kind.

The preceeding paragraph saw the value added, V.A., as a production function of flow of labour and stock of capital.

$$VA = f(wL;K) \qquad 5\text{-}3$$

Since there is not a great deal of significance in the absolute volume of production-factors and output, both sides of the last equation (5-3) should be divided by VA, in order to normalise 5-3, thus

$$1 = f(\frac{wL}{VA};\frac{K}{VA}) \qquad 5\text{-}4$$

---

1. Dunning and Utton (49) p.21

It should be considered, though, that the characteristics and properties of the production function will remain independent of the mathematical processes that take place. However, the use of the inverse of the function 5-4, i.e. $1 = f(\frac{VA}{wL};\frac{VA}{K})$, will indicate the average rate of use of labour and capital in a firm for generating one unit of value added. [1]

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1. Equation (5- 2) shows the Cobb-Douglas function

$$O=A\ L^{\alpha_1}\ K^{\alpha_2} \qquad 5\text{-}2$$

Constant return is indicated by $\alpha_1+\alpha_2=1$ thus

$$O=AL^{\alpha}\ K^{1-\alpha}$$

Divide both sides by L and re-arrange to get

$$\frac{O}{L} = AL^{\alpha-1}\ K^{1-\alpha}$$

$$\frac{O}{L} = A(\frac{K}{L})^{1-\alpha} \ldots\ldots 1^*$$

in the same way we get

$$\frac{O}{K} = A(\frac{L}{K})^{\alpha}$$

$$\frac{KA}{O} = (\frac{K}{L})^{\alpha}$$

$$\frac{K}{L} = (\frac{KA}{O})^{1}/\alpha \ldots\ldots 2^*$$

substitute 2^* into 1^* to get

$$\frac{O}{L} = A(\frac{KA}{O})^{\frac{1-\alpha}{\alpha}}$$

$$\frac{O}{L} = A(\frac{O}{KA})^{\frac{\alpha-1}{\alpha}}$$

$$(\frac{O}{L})^{\alpha} = A^{\alpha}(\frac{O}{KA})^{\alpha-1} \ldots\ldots 3^*$$

Thus, it is clear that equation 3^* has the same properties as (5-2).

The Management Function and the Production Function

Although the managements' functions could be amalgamated under one definition, it would be useful to review some parts of the complex of these functions in greater detail. According to Turnovsky "Any business enterprise in the course of its operations must make at least three kinds of distinct decisions. First, it must decide upon a production plan - i.e. how much to produce and the choice of productive factors by which this may be optimally achieved. Second it must be decided how much money capital it should invest in fixed assets and working capital, both of which are necessary in order to sustain production. Third, it must decide how this investment should be financed" (181,p.1061). In other words, the managements' tasks are not limited to (a) quantitative selection decisions and (b) to finding the optimum combinations of production factors', it has to consider also (c) constructive decisions as to the kind of the optimal financial structure and (d) how to finance its activities, since this is vital and crucial ((d) will be discussed in greater detail and elaboration in the section dealing with the "Cost of Capital"). Nevertheless, all these kinds of decisions are interconnected and one must not consider any one of them as isolated from the rest. They have to be taken simultaneously since one decision may affect other decisions. Vickers (XXXI) argues that economists consider capital as factor input, but this concept is erroneous since capital is also a constraint.

When capital is treated as a constraint the marginal rate of substitution between production factors is changed, thus altering the conditions of full equilibrium.[1]

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1. In Chapter 8 of his book Vickers states, "At the optimum factor input combination the ratio of the marginal physical products of the factors will be equal to the ratio of their unit prices $(\frac{fx}{fy} = \frac{\gamma_1}{\gamma_2})$.... But these results are based on the extremely unrealistic assumption that the firm, in making its optimum production and factor use decisions, does not face any shortage of money capital..... so long as we hold to the traditional assumption of capital saturation, money capital is not a scarce resource, its marginal cost is therefore zero, and no imputation of capital costs to the various factors need be, or indeed can be, made..... If, on the other hand, we do regard money capital as scarce, and as importing a marginal cost into the optimization model, the principal implication of this for the present argument can then be stated quite clearly: The extent or degree to which a factor will be required to carry a capital cost imputation will depend on that factor's money capital intensity, ... The conclusion emerges that under conditions of capital shortage, or what the finance literature has called capital rationing, the classical textbook optimization solution of equating the ratio of marginal products to the ratio of direct marginal factor costs no longer holds. In this case also .... the equilibrium conditions no longer equate the marginal revenue products and the unit factor costs. $(\frac{fx}{fy} = \frac{\gamma_1 + \mu\alpha}{\gamma_2 + \mu\beta})$."(XXXI)

It stems from the from the above reasons that it would be inappropriate to regard capital as a production factor without giving the right attention to its costs (ρ). Hence, considering the cost of capital for the investigated period will give the correct capital input as the production factor used during the investigated period in producing the corresponding output (see succeeding chapter).

The Measurement of Efficiency - Production Point of View

The production function as described in Figure 5-2 illustrates the behaviour of two firms' relative production function. Thus, it is clear that firm A, characterized as x_A, is more efficient than firm B since A produces relatively more than firm B while using any set of input factor combinations. Since firms do not have the same production function (in fact the production functions' of firms vary considerably even

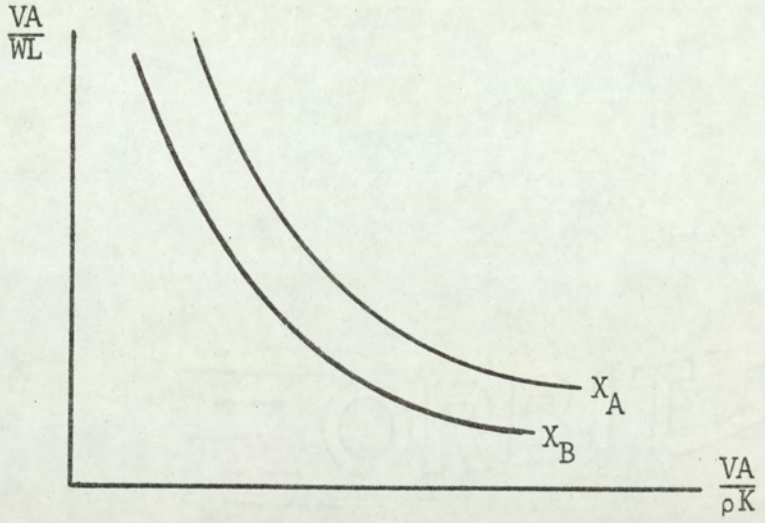

Figure 5-2

within a single industry; where inter-industry comparison is made a wide spectrum of production functions' will be revealed) so some of the production

functions will intersect one another, as illustrated in Figure 5-3. Consequently the efficiency frontier abcd (the broken line) will be introduced. Obviously no firms can produce in the North East of the frontier (this, of course, stems from the definition of the boundary). Any firm which produces in the area closed by the efficiency frontier, the abscissa and the ordinate, will be regarded as inefficient

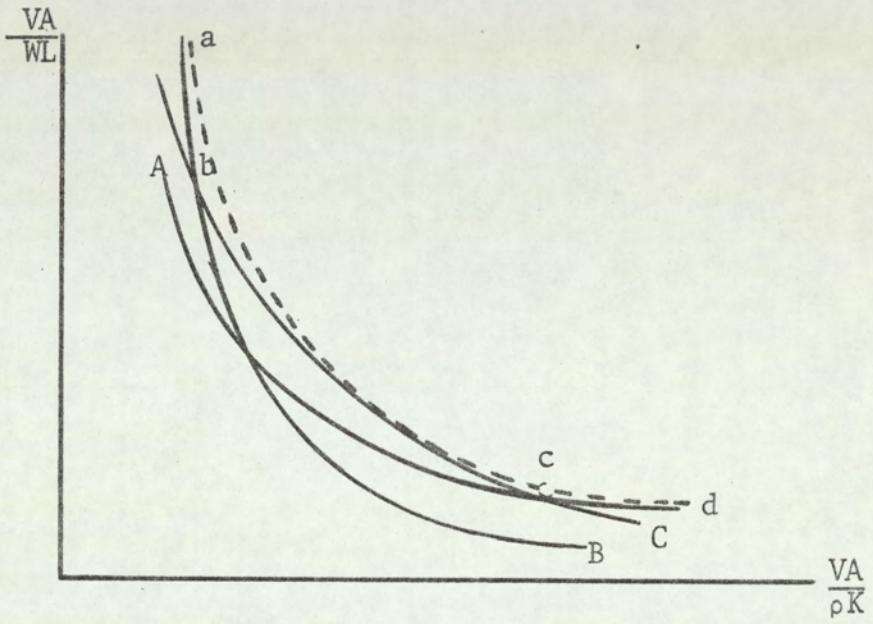

Figure 5-3

in relation to a firm which produces on the efficiency frontier. However, in order to make interfirm comparisons it is not essential to know the production function of those firms under discussion; actual production combination would provide a clue to relative performance as is shown in Figure 5-4.

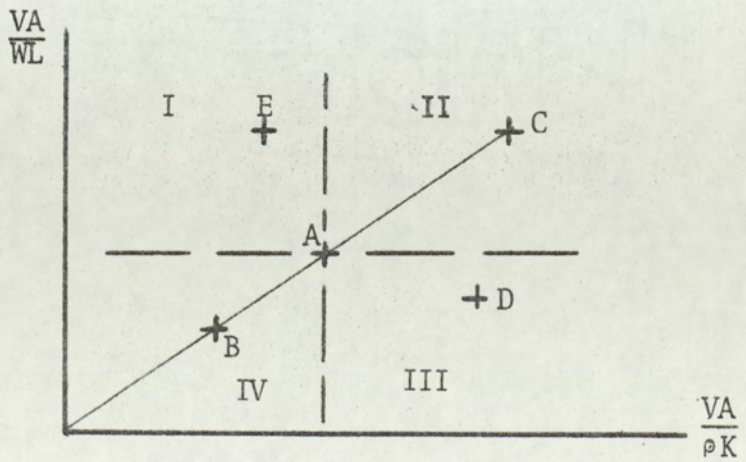

Figure 5-4

An observation of a firm's production combination, during the period t, would be plotted somewhere in the space between the axes, where the firm's capital efficiency denoted as $\frac{VA}{\rho K}$ will be plotted along the abscissa and the firm's technical efficiency along the ordinate denoted as $\frac{VA}{WL}$. In Figure 5-4 five hypothetical firms have been plotted in the space between the axes. Assume that the relative performance of firm A has to be discussed. Thus, co-ordinates parallel to the axes will be drawn through the plotted position of firm A to get four sections. It is clear that A performed better than any other firm in Section IV, since firm A produced relatively more output than any firm in this section where the same input factors were used. (The methodology of this paragraph is very similar to Sharpe's methodology of portfolio performance {xxv,pp.26-30}).

In the case of two plotted firms lying on the same ray originating from O, their relative performance could be determined in absolute terms. Suppose that firms A and B are plotted on such a line (Fig.5-4). In this specific case it could be said precisely that A performed better than B by $(\frac{\overline{AB}}{\overline{OA}}.100)$ percent. In all other cases, where plotted firms are <u>not</u> lying on such a ray, the relative performance cannot be stated unless other assumptions are being made as will be discussed in the next chapter. From the above exposition it is clear that such conclusions could be applied to Section II in Figure 5-4. However, any plotted firm in Section III is relatively more capital efficient <u>but</u> less technical efficient than A; in the absence of knowledge about the marginal rate of substitution between the two factors (capital efficiency and technical efficiency) facing the firms. Therefore, no conclusions can be made about the performance of these plotted firms. The same argument can be inverted and applied to the discussion of Section 1. The next chapter will introduce a different approach which overcomes these difficulties.

So far, a static measurement of relative performance of firms has been discussed, that is, the relative performance of firms for the period t. A dynamic measurement could be applied in the same methodology as discussed above where the plotted observations will present different periods in the life of any firm or firms. Hence the analysis concept introduced can provide some information on the tendencies of a firm's performance as well as interfirm comparisons.

CHAPTER 6

THE UTILITY CURVE

The present chapter will take a different attitude towards the subject of measuring relative business efficiency. Instead of using sets of production curves, as illustrated in the previous chapter, resort will be made to a map of utility - indifference curves for individuals. The model presented at the end of this chapter, which will be examined empirically in the next chapter, is based on an investor's curve. This as will be shown, eliminates difficulties which may arise by using a set of production curves. The behaviour of such an investor's utility curve will also be studied.

The previous chapter discussed a theory of measurement of relative efficiency from the production standpoint but it was shown that conclusions can be derived only in some cases. Thus, a complimentary device has to be introduced in order to reach more definite conclusions. This may be found by using a map of utility indifference curves of the same characteristics and properties as presented by economists in the theory of utility (see XXIX, ch.4). Though, instead of discussing indifferentiality between products, two forms ,will be considered, viz. capital and labour efficiency, of which total efficiency is comprised. It is worth while at this stage to note that the indifference map characterized only certain entitites and it is not necessary for two different entities to have the same map.

Assume a given indifference map as shown in Figure 6-1.

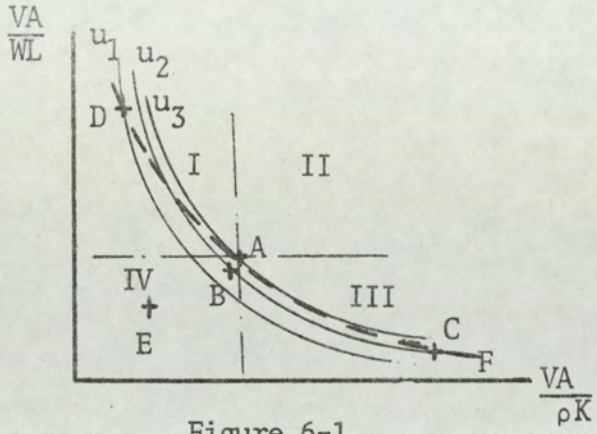

Figure 6-1

The previous section showed that any firm which was plotted below and to the left of the efficiency frontier is regarded as less efficient than those lying in it. However, no attempt was made to draw conclusions about those firms plotted on the frontier (or, more generally, it is shown that a comparison of firms plotted in sections I and III were beyond the provided measurement method). Since the indifference map was drawn on the same set of co-ordinates, a comparison of performance can be made for all firms, even for those firms who were plotted in the problematic sections I and III. It should be borne in mind that the higher the indifference curve the higher the satisfaction of the entity (person or group of persons) it represents.

It is apparent, though, that the conclusions were drawn by using the set utility curves consistent with those which were drawn previously. Thus firm B is more efficient than E and less efficient than A since the utility curves intersecting the plotted firms indicate these ranking levels - the same order as shown previously. This system reveals, consequently, that Firm B is not less efficient than firms C and D (the latter firms are lying on the efficiency frontier - the broken line, labelled F). As a matter of fact firm B is as efficient as C since they both lie on the same utility curve, u_2. However, B is more efficient than D for the reason that the former lie on a higher utility curve than the latter, u_1. Nonetheless, the latter order form can be changed where a different indifference map is being considered.

It appears, therefore, that the most efficient firm is the firm plotted at the tangency point of a utility curve and the efficiency frontier. In the specific case of Figure 6-1 it is the firm A. Thus A performed better than any other firm plotted in section IV either from the production analysis standpoint or from the utility point of view. Thus, there is only one firm which is the most efficient from both standpoints - the production and utility. Other firms on the efficiency frontier such as C and D may be efficient in allocation of resources and/or in production but they have failed to fulfil the aspirations of certain entities (maximising their satisfaction). Thus, using a utility function rather than a production function has the following advantages:

1. The utility function is independent of assumptions about the form of production function.
2. It is independent of the assumption that firms are in equilibrium (MPa=Pa).

However, when a family of utility curves is discussed no one can state the performance percentage term as when a production function was discussed.

The Investor's Utility Curve

The previous section indicated that the performance of a firm plotted in section II is preferred to that plotted in section IV from all standpoints, either from the society's point of view or from any individual point of view, since these sections do not depend on the form of the indifference curve. This section will discuss the behaviour of an indifference curve considered by certain entities, namely, the owners and financial creditors of a firm.

As shown earlier the output should be considered by a firm as its value added. Value added comprises, by definition, the following components:

1. The aggregate payments made for labour used, symbol L, which will include direct as well as indirect payment such as payments for social securities, profit sharings and so forth.
2. All other payments, outcomes and provisions made for using other production factors apart from labour, namely, capital goods. This will include interest paid for nonowners' capital, managements' compensations and allowances; and the residual income which is the non-management owners' return. Since for a variety of reasons to be explained below, gross value added (symbol VA) is considered, the depreciation will be included under the heading denoted as Y.

Thus,

$$VA_i = L_i + Y_i \qquad 6 - 1$$

$$Y_i = VA_i - L_i \qquad 6 - 1a$$

Equation 6-1a shows what was a firm's ex-post income for its owners. However, when comparisons are made this absolute value will show no indication of input factor. Therefore both sides of the equation 6-1a will be divided by factor capital input, K. Although this factor has not been discussed so far it will be assumed for the time being as given. The expression will take the form,

$$\frac{Y}{K} = \frac{VA}{K} - \frac{L}{K} \qquad 6\text{-}2$$

The main concern at the moment is to show how the left side of the equation 6-2 affected by the firm's efficiency, which is as discussed in Chapter 5, comprises two components:

1. labour or technical efficiency
2. capital efficiency

Hence, part of the right hand side of equation 6-2 will be modified without changing its mathematical meaning to show the desirable relations. Thus, both the numerator and the denominator of the fraction $\frac{L}{K}$ will be multiplied by the expression $\frac{VA}{LK}$ in order to get

$$\frac{L}{K} = \frac{L}{K} \frac{\frac{VA}{LK}}{\frac{VA}{LK}} = \frac{\frac{VA}{K}}{\frac{VA}{L}} \qquad 6 - 3$$

substitute 6-3 into 6-2 to have

$$\frac{Y}{K} = \frac{VA}{K} - \frac{\frac{VA}{K}}{\frac{VA}{L}} = \frac{VA}{K} \cdot (1 - \frac{1}{\frac{VA}{L}}) \qquad 6 - 4$$

For the sake of convenience the expressions $\frac{VA}{K}$, $\frac{VA}{L}$ and $\frac{Y}{K}$ will be substituted by ψ , γ and π respectively. Therefore equation 6-4 will change form to

$$\pi = \psi \ (1 - \frac{1}{\gamma}) \qquad 6 - 4a$$

At first sight the equation 6-4a indicates that a firm's "Operational Profitability" O.P. hereafter symbol π depends on the two elements of its efficiency, (ψ) the capital efficiency and (γ) its labour efficiency. It is apparent, however, that the latter influences O.P. to a lesser extent than the former. This equation (6-4a) is very important since it embraces the question of private efficiency. Thus, it is necessary to investigate its behaviour. Multiply both sides of equation 6-4a by γ to get

$$\gamma\pi = \gamma\psi - \psi$$

$$\psi = \gamma(\psi - \pi)$$

$$\gamma = \frac{\psi}{\psi - \pi} \qquad 6 - 4b$$

$$\frac{\partial \gamma}{\partial \psi} = \frac{(\psi - \pi) - \psi}{(\psi - \pi)^2} = \frac{\pi}{(\psi - \pi)^2} \qquad 6 - 5$$

The equation 6-5 is a partial derivation of 6-4b in respect to ψ , it indicates the slope of the O.P. isoquant. Thus, where π will be held as constant and if $\psi > \pi$ (this is the case where π is assumed to be positive) the isoquant curve will be characterised by a negative slope where the marginal elasticity of substitution of labour productivity and capital efficiency is decreasing more than ψ as described in Figure 6-2.

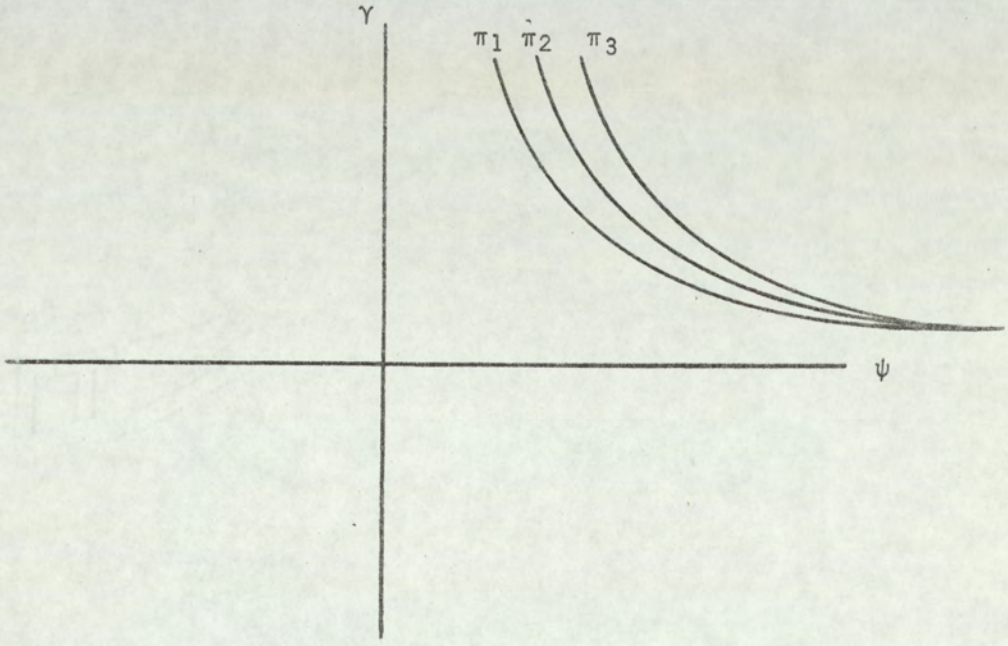

Figure 6-2

The conclusion stemming from this explanation is quite clear. Once O.P. of several firms has been calculated, a ranking comparison of relative performance of these firms can be made without the knowledge of the components comprising it. This is in contrast to the earlier chapter which showed that interfirm comparisons can be made if and only if $\gamma_A \geq \gamma_B$ and $\psi_A \geq \psi_B$. For any other conditions no conclusions could be drawn. The O.P. isoquants are the investor's indifference curves, inherent in the relative weight of its components. Therefore, this measurement contradicts another measurement used by Dunning and Barron (48) and Beattie (19). The writers suggest a comprehensive index. They use the input output ratio as follows:

$$\frac{\text{value of output actually produced}}{\text{input value of labour and capital inputs}}$$

interpreted as

$$\frac{\text{Value added}}{\text{cost of labour and capital expenses}}$$

As indicated in my comment on Beattie's paper, this index is incorrect since it shows that the marginal elasticity of substitution between capital efficiency and labour efficiency, equates unity whereas equation 6-4 proves explicitly that this is not the case. The investors are putting more emphasis on the way management use their capital rather than how they utilize the labour force. However, Dunning and Barron and Beattie assume that the investors are indifferent to capital and labour efficiency where the substitution factor is unity. Figure 6-3 provides a graphic illustration of the root of the contradiction.

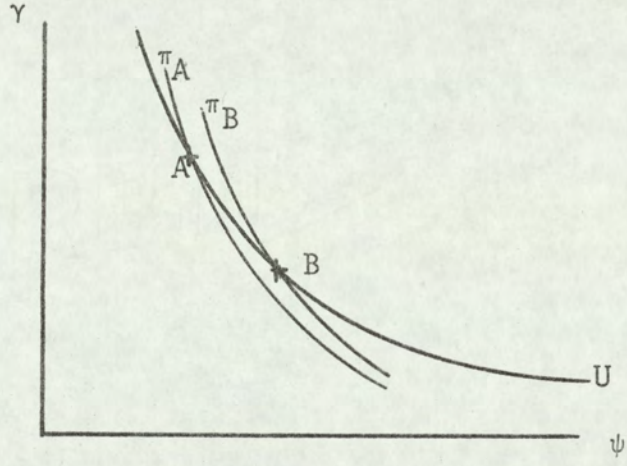

Figure 6-3

Using Dunning, Barron and Beattie's index will show that A and B are equally efficient since they are both lying on the same Unit Elasticity Curve labelled U. But when a family of indifference curves is drawn in the area between the axes a different conclusion will be drawn. Thus firm B is more efficient than firm A since a higher indifference curve π_B, is passing through B than the curve which passes through A, π_A.

The Problem of Intangible Assets and Measurement of Assessment

As assumed in chapter 5 the firm's output is a function of its inputs as described by the Cobb-Douglas production function

$$O = AX_1^{\alpha_1} X_2^{\alpha_2} \qquad 6 - 6$$

where O, X_1, X_2 are output, labour and capital respectively. When perfect competition will be assumed this production function will face all firms within industry. Marschak and Andrews (128) argued that production functions change even within an industry or for the same firm from one year to another since firms accumulate knowledge, and in addition the firm's output depends on luck. They summarised these factors as "technical efficiency" which can be represented as a random variable U_o in the Cobb-Douglas function. Another random variable which has been considered by them was the "economic efficiency" U_1 indicating that entrepreneurs have different abilities. The last point has been made clear but more difficult by Hall and Winsten (83). ".... Thus the most we can hope to do as a rule is to rank the managers.... However, if the managers are to be ranked, this may be done by assigning to them a number, just as a mark can be given to an examination candidate. The number would be an indication of the rank only and no meaning could be attached to the ratio difference of such numbers".[1] Walters (XXXII) argues that "care is required in interpreting the role played by the disturbances". However, equation 6-6 will have the following form

$$O = AX_1^{\alpha_1} X_2^{\alpha_2} U_o U_1 \qquad 6 - 7$$

where U_o and U_1 have a mean equal to unity. It follows from the latter discussion that the assumption of perfect competition has been removed where other variables (disturbances) are introduced to the production function. Therefore, the treatment of different firms with different market conditions will be allowed by introducing the appropriate variables. An alternative, and probably more accurate, approach to the treatment of their disturbances is that

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1. pp. 73-74

instead of using them as parameters it is preferred to consider them as affecting the exponents of the production function (α_i).

The above analysis indicates that output will be different for different market conditions which may affect performance ranking. An example can be given where a firm enjoys a monopolistic power which affects its output. If a performance comprised of this firm against a competitive one will be made, where they both may use the same tangible inputs without considering market conditions, it will be decided that the monopolistic firm is more efficient.

An attempt to make use of the model described in the last two paragraphs, will be made in order to consider the disturbances referred to above in the quotation from Walters. In fact it will be rather difficult to assess the exponents (α_i) in the equation 6-7 especially when they are subject to disturbance factors. However, a use of this function can be made where perfect competition is assumed in the capital markets. The last sentence means that where a firm has intangible assets of any kind which include, inter alia, good will; advertising and R & D concealed investments; experience and skill of management and employees; ties established with suppliers and customers; capacity of management and its ability to adapt itself to market conditions; and overall the firm's competitive element - all these factors may be reflected in the capital market. Assume, for the sake of illustration, that the firm's value in a free market is known. The firm's value may not be merely its plant value but some reflections of other factors such as those described above; the higher the value of these factors the higher the firm's value. Hence, if the period's capital expenses (K) have to be considered the firm should calculate the firm's market value (V) times a specific interest rate (r) - an implicit assumption is made about certainty. However, the capital expenses (K) have to include factor depreciation (d) for the period

considered, thus,

$$K = Vr + d \qquad 6 - 8$$

In a world of certainty, full free information and the absence of taxation, equation 6-8 will be equal to the firm's O.P.

The firm's value as mentioned earlier, is its market value, but how can this be determined? Or what criterion should one use to determine it? The answer to these two questions is, as can be expected, the price raised by an entity which is interested in buying this firm. However, it can be argued that the firm's valuation reached by using this method can lead to a biased value since quoted value can be subjective and may belong to the extremes - as in cases where a take-over bid is made by an outside firm which can gain advantages of different kinds by the acquisition. Nevertheless, where sufficient numbers of buying offers will be made the extreme effects will be diminished.[1] Thus, this system of normalising a firm's value is precisely

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1. Miller and Modigiliani (134) spell out the precise meaning of "perfect capital markets". The latter term will hold, according to this source, when all the following conditions are fulfilled:

    1. "no buyers or sellers of securities is large enough for his transactions to have an appreciable impact on the ruling price"
    2. "all traders have equal and costless access to information about the ruling price and about other relevant characteristics of shares"
    3. no brokerage fees
    4. no transfer taxes
    5. no "other transaction costs incurred when securities are bought, sold or issued"
    6. "no tax differentials either between distributed and undistributed profits or between dividends and capital gains."

the theoretical case of the Stock Exchange.[1] The firm's share price can be given as an indication of its value.

In the simple case where a firm's capital structure consists of equities the value of such a firm (V) is

$$V = NP \qquad 6 - 9$$

where N is the firm's number of issued shares and P is the respective share price. In the event that a firm is recruiting loans as well as using owners' capital its value becomes

$$V = NP + D \qquad 6 - 10$$

where D is the market value of debts (Modigiliani and Miller (1958).

A full treatment of this question will be given in chapter 7.

It was indicated that a firm's income from using capital goods (Y) will be, under the market condition set above, equal to the period's capital expenses(6-8). Thus the O.P. (π) in equation 6-4a will equal unity and all firms will be equally efficient. However, when taxation is taken into consideration factor π will be greater than unity, since owners considering their returns on investments to be after taxation. Corporation tax imposed on firms will shrink the owners' profits which will affect share prices and consequently the firm's value. Nonetheless, the introduction of taxation although changing the value

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1. W. Baumol states "many ..... volumes have described this institutions (the Stock Exchange) as a relatively close approximation to a perfect market, indeed, one of the best which is to be found anywhere in our economy. After all, a hasty glance suggests that it processes all if not most of the characteristics required of a pure competitive market. Its products are homogeneous..... there seem to be many sellers, most of whom are relatively small ..... free entry and exit." (III), p.4

of π will not change the equilibrium conditions for a total efficiency.

With certainty and perfect market conditions being removed it is therefore likely that a firm's π's will vary from year to year. Uncertainty and imperfect conditions will affect K in equation 6-8 which is mainly calculated as ex ante where, Y, the firm's income, is ex post relative to K. However, the dispersion of π over several years will shed light on the firm's performance. Thus, $\bar{\pi}$, the average O.P. could be suggested as one factor to consider. The second is the variation factor (σ_π) as illustrated in Figure 6-4.

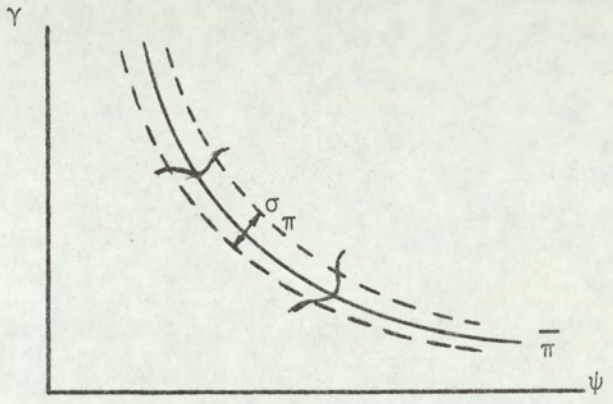

Figure 6-4

The latter conclusion tries to bring together: 1. The use of the value added concept suggested by Rowan and Dunning although they calculated π as the ratio of the value added on book value of total assets, which is some sort of return on capital, (for the properties and criticism see Chapter 4) and 2. Amey (1) suggested measurement of efficiency - "economic efficiency is best measured by a comparison of actual and budgeted profitability, the budgeted being set in a particular way, viz. in economic terms. That is, instead of judging efficiency by comparing two or more ex post measures, we are proposing that the comparison should be between ex post and ex ante profits in the same firm" (p.40).

The succeeding chapters will deal with the utilisation of concepts suggested in previous chapters, while testing the model just presented.

CHAPTER 7

THE MEASUREMENT OF PERFORMANCE

Introduction

The previous chapters introduced a model of measuring business efficiency. This model will be tested empirically in the present chapter. Several additional factors need to be clarified before testing the suggested model. This chapter will, therefore, discuss, inter-alia, the objectives of a firm, some aspects of the cost of equity capital, the data and the implications of the suggested model.

The Objectives of the Firm

A firm should set its objectives in order to enable the decisions made by its management to be on a rational basis. This may provide a criterion for measuring the effect of its management's decisions. A few of the firm's objectives may be found in the memorandum of association which is the constitution of the firm - amongst other things the memorandum of association states the area and the nature of its business and the powers of its management. The purpose of the memorandum is to restrict the firm's management in order to protect the firm's owners. However, the memorandum is drafted, at first, in terms which provide flexibility to mangement in its operation; thus the firm's objectives become vague. Therefore, the question of the firm's clear objectives and true responsibility arises.

At first glance it would seem that the firm's objective is to maximise its profits. Solomon (XXVII) argues that this definition of objective"suffers from three flaws:

1. It is vague..... it is inconveniently loose and hence a source of ambiguity (What kind of profit is intended? Is it the long run or the short run? Is it the rate of profit or the amount? Is it profits on total capital or on equity capital? etc.)

2. ..... it cannot help us to decide between two courses of action which offer benefits that differ with respect to their timing.

3. ..... the profit maximization criterion ignores the quality of the expected benefits. In an uncertain world neither the amount nor the rate of profitability provide a basis for selection. In addition we must take into account the quality of benefits, where quality refers to the degree of certainty with which the benefits can be expected."[1]

Porterfield adds that "it is often possible for a firm to increase profit after tax by selling additional common shares and investing the proceeds in low yielding assets such as government bonds. Profit after tax would go up but earnings per share would go down..... What about earnings per share as the goal of the enterprise?..... (it) implies that the firm should make no dividend as long as funds can be invested internally at any positive rate of return, however small. Such a dividend policy may not always be to the shareholders' advantage..... Return on investment measures suffer, in addition, from a more fundamental defect. As fractions, the results may be increased by reducing their denominators as well as by increasing their numerators....."[2]

The single definition of the objective of the firm, which may be independent of the above defects, is "maximizing owner's wealth"[3] or "to maximize the value of a corporation to its stockholders."[4] The latter definition eliminates all the defects inherent in other definitions. It considers the timing and quality of the future stream and the taxation aspects whether of the firm or of the shareholder.

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1. Solomon (XXVII) p.19
2. Porterfield (XXII) pp.14-16
3. ibid
4. Robicheck and Myers (XXIII) p.4

It is argued, on the other hand, that management, while serving as a trustee on behalf of the shareholders, need not necessarily adhere to the last-named objective of the firm. "The wide separation between the owners and managers of large American[1] firms has led to consistent speculation that managers are serving their own ends rather than the shareholders: For instance, it has been argued that firms try to maximize sales, subject to a constraint in that a 'satisfactory' rate of profit must be achieved on invested captial. The managers of such a firm presumably bask in the prestige and market power which sheer company size provides, while the extra costs of such maximum effort sales drive are subtracted from funds that otherwise would be available as dividends."[2] Solomon even goes further, arguing that management serves also "all parties connected with the enterprise, including employees, customers, suppliers, creditors,the government, the general public...."[3] If this is the case, what is the validity of the assumption that the firm's objective is to maximize the wealth of its shareholders? The answer to this question lies in the fact that the management operates in a restricted world as far as its input is concerned, viz. money input. If a management will not fulfil the owners' objective the market will deny them future funds (the "market discipline"[4]). Other reasons are that "it is really not so strange for a corporation which obtains little or none of its capital from the Stock Exchange should

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1. Whittam-Smith (191) points out that the proportion of current investment by insurance and provident institutions in shares in percentage term is higher in U.K.(40) than in the U.S. (22). In the current study it is shown that the proportion of a firm's shares held by its management, with some exceptions, is very low with an average of 17.9 per cent. The Store Industry provides the highest proportion of shares held by management - 26.2 per cent (see Table 7-8).

2. Robichek and Myers, op cit., Donaldson (46) arrives at similar conclusions.

3. Solomon (XXVII) p.16.

4. Studies show that only 4% of American companies come to the Stock Exchange with new issues of shares, see Baumol (III) p.69.

nevertheless be concerned with the performance of its securities."[1]
The reasons are:

1. Poor performance of shares is a bad advertisement for management - hence, management which seeks to have good publicity will make an effort to improve share performance.
2. Although the shareholders do not control the day-to-day operations of the firm, they have considerable power over management. Thus a management will act in such a way to keep shareholders content and so obviate any threats they may pose.
3. Firms obtain their funds not only from the Stock Exchange but from other sources, i.e. lenders. A good performance of shares on the Stock Exchange may influence loan terms (such as reducing the rate of interest they bear through decrease in the risk premium).
4. Management benefits directly from maximizing the value of shares in the market when they are entitled for share options.

Samuels and Wilkes (XXIV) add another reason to the above list. They argue that a poor performance on the Stock Exchange may threaten management with a take-over bid by other firms which may leap at the opportunity provided by the low price of the shares.

The present study will consider management's objective to be the maximization of the wealth of its shareholders. This will affect its input component described at the end of the previous chapter, while the firm's output is more than merely the shareholder's income as shown in Chapter 6. This will not raise any conflict between the objective of the firm stated above and the suggested criterion for measuring the firm's performance.

The Data

In order to test the model described in earlier chapters against the background of reality a sample of firms should be selected. Since the study initially discussed and was occupied with three industries - Retailing, Textile and Food - it was thought fit to continue in the same sampling structure although it would make no differences if the model were applied

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1. Baumol (III) p.80

to any kind of firms. Consequently the sample was mainly selected from these industries. However, firms in other industries were studied, mainly in order to test whether in reality differences do exist between industries. The sample is restricted to public firms for reasons of market estimation of their variables (to be discussed in the following sub-sections). Estimates of unfloated firms can be found "although no method of approximation is completely satisfactory, perhaps the most feasible approach is to find companies of similar risk and size, with similar growth in earnings, whose stocks have a viable public market."[1] Since it is rather a difficult task to match firms in the sense described in the last quotation it was decided to refer only to quoted firms. 104 firms were selected in the sample which is of the following structure.[2]

Industry	No. of firms in the sample
Stores	28
Textile	28
Food	21
Electrical Engineering	10
Non-Electrical Engineering	8
Chemicals	5
Industrials	3

The sample was selected from those firms that were listed both in the Financial Times and on Moodis cards at 31st December 1971 and which also existed in 1962. The classification is based on that used by The Financial Times. The ten-year period was essential in order to consider the risk element and changes which occurred due to industrial cycles.[3] One may argue that the sample does not include fairly small business enterprises and firms which died during the ten-year period under study, 1962-1971 inclusive, and is therefore biased. This argument - legitimate enough in the case of a

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1. Van Horne (XXX) p.6
2. For complete information on the sample see Appendix A.
3. Samuels (160).

normative study - is invalid in a comparative study such as this.[1]

Share Price

Theoretically one should take the share price at the beginning of each period (one year in the case considered in the present study) as this price should present the value of the firms at that date. In the case of an absolutely perfect market this argument would hold. But under normal market conditions, where information is not available to all free of costs and at the same time[2] and when share prices have a random character[3], it will be erroneous to take these prices as the real valuation of shares.

Hence one should consider the average of share prices reached in transactions through the whole period under consideration (one year). In fact Marris and Singh (126) have discovered that a very good estimate of this price (P*) is the geometric average of the high (P_H) and low (P_L) prices achieved by the firm's share over the period under consideration (one year). In the light of this conclusion it was decided to consider the share price as

$$P^* = \sqrt{P_H \cdot P_L} \qquad 7 - 1$$

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1. Although any comparison one wishes can be made - between firms of different size, nature, industry etc. - without considering industrial effects, nevertheless attention should be paid to the trends in the industries since exogenous factors may change equilibrium conditions. In the present sudy it has been assumed that equilibrium conditions have not been violated.

2. Samuels and Wilkes (XXIV)

3. Baumol (III) pp. 35-46 and Granger (75, 76).

Stock Dividends, Stock Splits and the Value of Rights

At first glance one would think that there is no connection between share price and the first two actions of the firm viz. stock dividends and stock splits. The logic behind this matter is that the owners' proportion of shares in the firm will not change as long as the splits and stock dividends are uniform to all shareholders and these actions are "merely detail". For example, if one had N shares of firm X at the price P on the day before X going ex-split or ex-scrip, the value of his holdings, V, is

$$V = NP$$

when X goes ex-split, say 1 to 1, the number of its shares will be doubled and consequently their price will fall exactly to the value $\frac{P}{2}$ and thus

$$V = 2N\frac{P}{2} = NP$$

the value of his holdings will not change. In practice, however, this is not the case since shareholders expect at least that the dividend be maintained and hope for a constant increase in dividend per share[1] and the value of their holdings will increase by such actions. The share price will fall when the firm goes ex-split; not the whole amount to $\frac{P}{2}$ as was thought but higher than that. Thus ex-split has an information content that the firm observes an increase in dividends in the future. A contrast to stock dividends and stock splits is the rights issue. While the two former actions are purely accountancy manipulation, the latter has the aspect of resources recruiting. When a firm wants to issue more common shares to the market, the pro rata interest of shareholders may be changed unless a provision to maintain this interest is made. Therefore the firm, before issuing new shares, gives the opportunity to shareholders to buy additional shares under special terms. The shareholders may decide to sell these rights - if they do not

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1. Lintner (115)

want to increase the number of shares in this particular firm. The market value of a right of one share (Ro) is

$$Ro = \frac{Po - S}{N + 1} \qquad 7 - 2$$

where Po ..... is the market value of shares before the rights issue

S ..... is the subscription price per share, and

N ..... is the number of rights required for purchasing one share of stocks.

For the purpose of the present study it was assumed that the shareholders did not sell their stock dividends, stock splits and rights. Thus they continue to hold the same proportion of holdings and maintain the same interest as before.[1]

Preference Shares

One kind of fund recruitment of a firm is to issue preference shares. As the name suggests, there is a difference between common shares and the preference kind of funds. Preference shares may have a different nature in different firms but one right is clear and has common grounds in all firms. As the name implies, in case of liquidation of the firm the preferred shareholders are entitled to payment of their funds - in par value - before the common shareholders receive their share. But these payments are made after all debts are paid. Thus, the preferred stockholders' funds are more secured than those of common shareholders. The nature of the annual payment to preferred shares - the rate of their receipt - is classed as a dividend. As such,in any year, it is not necessary for the firm to make payments which are due from the firm's profits (or retained profits). Once the firm declares ordinary dividends (to common shareholders) it cannot deny dividend payment to its preferred shares. In fact dividend payments of preferred shares have to be made before dividends on common shares. Usually preferred stocks have fixed payments per share. In this sense they are very

1. Ben Shahar and Sarnat (24)

similar to debts. However, the payments are not tax deductable as debts. Therefore, the nature of the financial leverage of the firm is of a different nature as noted by Hunt (XIV) - although they may have different features such as:

1. Cumulative - when the dividends were not paid one year the payment is carried forward and added to the dividends of the year in which they are paid.
2. Participating - when ordinary dividends exceed a certain amount, preferred shares may be entitled to extra dividends, in addition to those the firm has to pay in order to meet its obligations.
3. Voting Power - preferred stocks may have voting power in the annual meetings and exert their influence, in some cases, on management's business policy.
4. Redeemability - unlike common stocks, preferred shares may be redeemed at a date given in their issuance conditions.
5. Convertibility - preferred shares may be converted, in some proportion, into common shares according to their terms.
6. Calls - preferred stocks may be redeemed on call at a certain price given in the conditions.

Nevertheless, for the purpose of calculating the costs of this source of capital, this study will consider them as debt since there is a similarity between these two sources, in respect to a constant annual receipts, although they are not mutually exclusive.

Depreciation

A firm's balance sheet is a declaration of the firm's assets at the moment of reporting. This may include intangible assets under the heading of "goodwill". That item is introduced mainly when the firm, or part of it, changes owners (or in the case of purchasing production rights/patents etc). In fact the tendency is to reduce the amount of that item in every period of

reporting mainly for the reason that it is depreciable[1]. However, only "tangible intangibles" are subject to tax deduction. But, as stated in chapter 4, not all intangible assets (e.g. research and development; advertising expenses; knowledge and education and the competitive status of the firm) will be reflected in the balance sheet. Although in theory these factors have to be treated as part of the firm's capital[2], in practice they are not. In addition accountancy convention is conservative in its attitude. Thus many items on the balance sheet are subject to changes in their real value - when prices are not kept constant and are rising - which will not be reflected in the annual reports. However not only the assets on the balance sheet are used by a firm. It may have other "hidden sources" of funds such as pension schemes - firms may contribute a large sum of money to their employees' pension scheme funds. These contributions are subject to tax deductions, when the employees welcome new costless funds towards their scheme. In most cases these fund schemes are administered by the firm's directors (in a different capacity according to the different legal entities). In other cases the funds are administered by managers without direct connection with the firm. Nevertheless, a unique relationship exists between these entities which may find their expression in the possibility of the firm borrowing money from these funds on more favourable terms than those it can obtain in the capital market and, of course, reducing initial costs and time when funds are obtained from the capital market. In other words, these funds are acting as part of the firm's funds without being represented in its balance sheet as a source of capital. Even when all the above difficulties are removed one will find it difficult to assess the real value of the firm's assets, for the reason that depreciation is tax deductible. Therefore a firm may adopt different depreciation systems as

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1. J.L.Vaughan (184)
2. J.W.Kendrick (102)

follows:

"1. A straight line method

2. The declining balance method using a rate not exceeding twice the rate which would have been used had the annual allowance been computed under the method described in paragraph (1).

3. The sum of years - digit method; and,

4. Any other consistent method of annual allowance which does not during the first two thirds of the useful life of the property, exceed the total of such allowance which would have been computed under the method described in paragraph (2)".[1]

Davidson and Drake (40) conclude that the relative tax advantage of methods used varies accordingly. However the difference between the accelerated methods - which are preferred to the straight line method - diminish with the longer life service of the assets.

For these reasons it was decided to use the market value of the firm rather than its book value, as explained in the previous chapter. The capital expenditure of a firm is not only a factor of its cost of capital but also the depreciation factor, since the cost of capital is "the discounted rate that is applied to cash flows of the project being analyzed."[2,3]

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1. Davidson and Drake (40) p.444

2. Porterfield (XXII) p.44

3. As will be shown the value of investment (V) in the absence of taxation is

$$V = \sum_{t=1}^{n} \frac{P_t}{(1+k)^t}$$

where P_t is the profit in period t before depreciation, D, and k is the cost of capital. In the case of the existence of taxation at the level - T the depreciation is deductible giving

$$V = \sum_{t=1}^{n} \frac{(P_t - D_t)(1-T) + D_t}{(1+k)^t} = \sum_{t=1}^{n} \frac{P_t(1-T) - \cancel{D_t} + D_t T + \cancel{D_t}}{(1+k)^t}$$

where n approaches infinity - supposing P,T,D and k are constants - the value V approaches

$$V = \frac{P(1-T) + D\,T}{k}$$

thus,

$$kV = P(1-T) + DT.$$

The profit from the investment before taxation should be

$$P = \frac{kV - DT}{1-T}$$

by rearrangement one will get

$$P = \frac{kV}{1-T} + \frac{D}{1 - \frac{1}{T}}$$

Therefore the fraction of the depreciation factor that should be considered is that of the book value since this is the declared deductible element as shown in the footnote. The exact treatment of the aggregate will be shown in the last sub-section to this chapter.

The Risk

In the discussion of risk one has to distinguish between:

1. business risk, and
2. financial risk

The business risk stems from the nature of the business, its "flexibility of technology together with the relative prices of variable inputs. We say the flexibility of technology is high when output can be altered in the short run by adjusting variable factors without any serious decline in their marginal products. Flexibility will also tend to be higher as more inputs are variable in the short run."[1] The profit factor of a business firm, π, depends on (1) the price of its unit output, P. (2) Its unit variable costs, v. (3) The firm's fixed cost, F, and on (4) its volume of output, x.

Thus $\pi = (P-v)x-F$

if one takes the profit's variance as a measure of business risk one gets

$$\sigma_{\pi}^2 = (P-v)^2 \sigma_x^2$$

The interpretation of the last equation is that the greater the σ_x^2 (instability of demand or sales), all other things being equal, the more the business risk will increase. In addition, the business risk depends very much on the unit profitability of output (P-v). Thus the "higher cost variability" will cause decrease of the business risk for a given σ_x^2. Therefore the firm's business risk depends also, implicitly, upon the industry to which it belongs. In the sample chosen for the present study the following results (Table 7-1) provide evidence for this argument.

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1. Sherman and Tollison (171) p.450

Industry	no. of firms	Mean of coefficient of variation of earning per share*	Standard deviation of coefficient of variation
Stores	28	.184	.155
Textile	28	.283	.174
Food	21	.144	.084

*Earnings per share taken are earnings before tax but after interest, depreciation and directors' remuneration, hence they include financial risk and therefore they have an upward bias. However, if the assumption that the distribution of financial risk is uniform for all industry then the results are significant.

Table 7 - 1

Table 7 - 1 shows that the food industry as a whole has the lowest variance amongst the three industries which indicates that this industry has the lowest risk with comparison to the others. A use of another study's[1] data gives the following results - Table 7 - 2

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1. Whittington (XXXV)

Industry	No. of Companies	Average rate of return on Net Assets	Standard Deviation	Coefficient* of Variation	Rank
		%	%	%	
Brick Pottery etc	81	16.5	7.2	43.6	7
Chemicals	89	17.5	7.8	44	8
Metal Manuf.	86	20.1	7.0	34	2
Non-Electrical Eng.	214	20.2	9.2	45.5	11
Electrical Eng.	85	20.5	8.4	41	4
Vehicles	61	17.3	7.8	44	9
Metal Goods	129	19.8	10.6	53	19
Cotton & Man-Made Fibres	51	16.3	5.7	35	3
Woollen & Worset	52	17.4	4.7	27	1
Hosiery etc.	93	15.8	7.6	48.1	15
Clothing & Footwear	70	14.7	9.4	64	21
Food	73	17.6	8.0	45.4	10
Drink	104	12.8	5.5	43	5
Tobacco	7	12.0	5.8	48	16
Paper, Printing etc.	105	17.2	8.0	46	13
Leather etc.	123	15.5	7.9	51	18
Construction	40	18.2	7.9	43	6
Wholesale Distribution	172	14.8	7.0	47	14
Retail Distribution	117	18.0	8.3	46	12
Entertainment & Sport	64	13.6	7.8	57	20
Misc. & Services	139	13.2	6.4	48	17

*Coeffieient of variation is a measure of relative dispersion and used for comparative purposes.

Table 7 - 2

Table 7-2 ranks industrial risk observed over the period 1948-1960. The ranking criterion is the coefficient of variation of the rate of return on Net Assets (Total capital and reserves + interest of minority shareholders + Long term liabilities - Provisions). The sample used in Whittington's study is very large and hence more reliable for industries used in the present study, other than those quoted in Table 7-1. Thus, one can expect that, by and large, an investor (risk averter) or financial analyst will require higher returns for industries with high rank than those with low rank

as a result of the premium required on risk bearing. Viz. a rational investor will require lower returns from the Metal Manufacturing Industry, R_{mm}, (rank 2) than the expected return on the Clothing and Footwear industry, R_{cf} (rank 21), thus $R_{mm} < R_{cf}$.[1]

The business risk of a firm may be measured by the standard deviation of its income around the mean. It is expected therefore that a well diversified firm will lower its business risk as has been shown at the beginning of this sub-section.

Another factor which influences the investors' risk-premium is the skewness of the frequency of distribution of expected earnings. Thus investors will prefer to take investment B rather than A, shown in Figure 7 - 1, although they both have the same means and standard deviations of returns, $\bar{R}$ and σ_R. The reason lies in the fact that the probability of having returns lower than R_o in choosing investment

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1. A similar analogy can be applied to U.S. industrial and commercial industries taking Fisher and Hall (62) results.

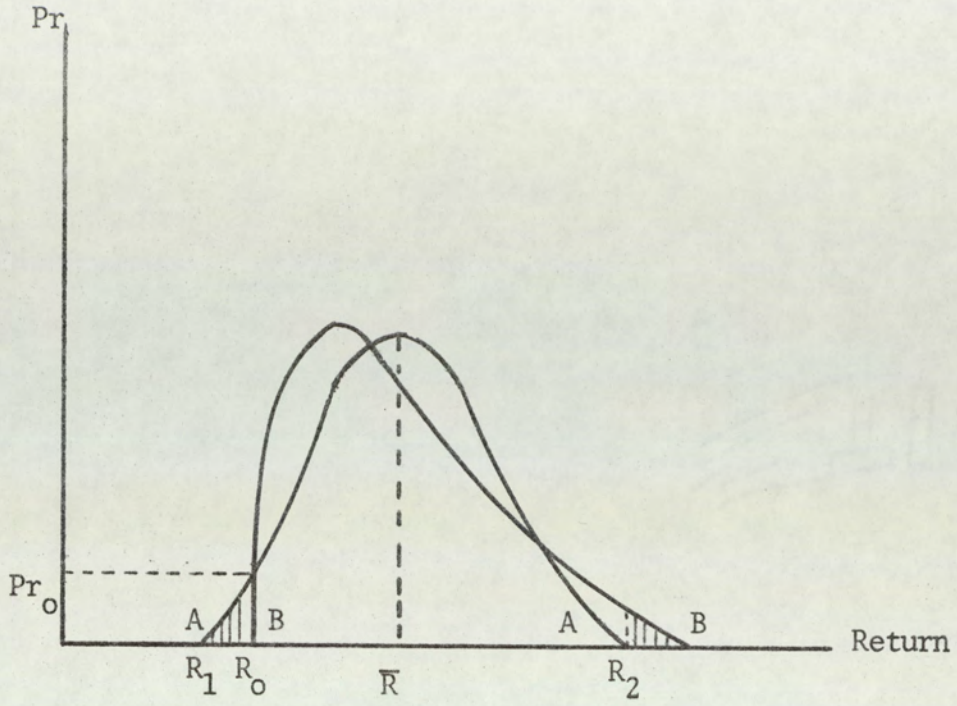

Figure 7-1

B is zero while choosing investment A may give lower returns than R_o. On the other hand the investor's probability of getting higher returns than R_2 are higher in choosing investment B.[1] Arditti (6) argues that "a risk averter is reluctant to undertake any investment that presents him with the possibility - however small - of a large loss and only a limited gain. Skewness is a measure of this assymmetry factor. Consequently, the investor who is a risk averter dislikes negative skewness and likes positive skewness."[2] In fact in his regression analysis Arditti found that "the negative coefficient of the skewness variable means that the market likes positive skewness."[3]

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1. Robichek and Myers (XXIII) ch.5
2. Arditti (6) p.21
3. ibid. p.26.

The Financial Risk

The financial risk is the one added to the business risk. However, the financial risk is borne mainly by the shareholders, which means that only the equity capital is largely affected by this risk. This type of risk is comprised of two elements:

1. risk of bankruptcy (and therefore the risk of losing invested capital)
2. larger variation of returns as a result of the use of non-owners' capital.

Intuitively the difference between business risk and financial risk may be shown in Figure 7-2.

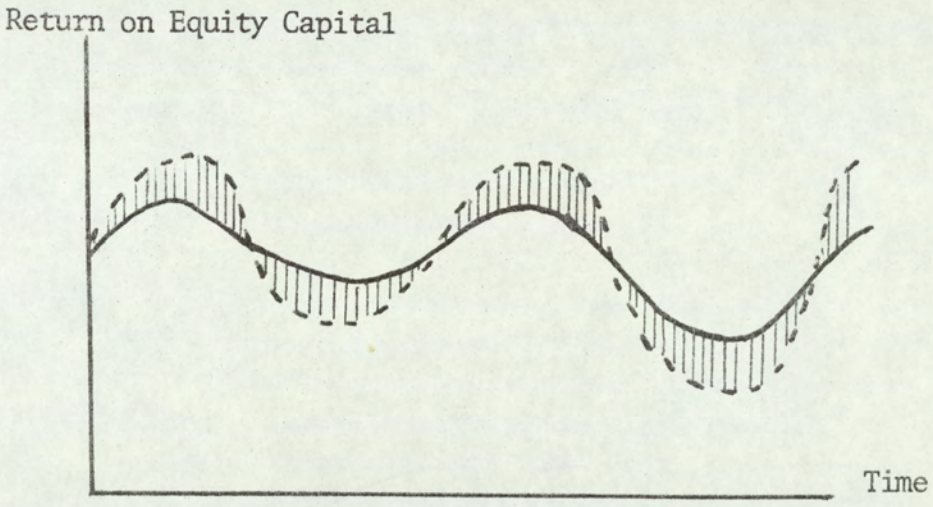

Figure 7-2

The business risk may be described as the amplitude of the hard line in Figure 7-2. Once the firm uses external capital in addition to equity capital in order to finance its investments the amplitude of return on equity represented by the broken line in Figure 7-2 will be greater than the business risk. In other words when a firm operates a financial leverage the financial risk of equity capital is increased. This may lead to questions of the financial structure and valuation of a firm.

Valuation of Securities

By and large an investment decision will be taken when one compares the present value of a future stream of income (discounted by the market rate of interest - in the case of perfect market certainty and the absence of capital rationing) with the initial invested capital. In the event that the former element (P.V.) is greater than the latter element (Io) the investment proposal is considered as worth undertaking. However, when the initial invested capital (outflow) is greater than the present value of future income stream (inflows) one has to reject the investment proposal. When the difference between the two elements (P.V. and Io) is zero an investor will be indifferent to the proposal. The last statement, therefore, fixes the market price of securities with certain future incomes.

Let P_s .... the market price of security S

i .... the market rate of interest which may vary during the period

I_t .... the income from the security S in time t

$$P_s = \sum_{t=1}^{N} \frac{I_t}{\prod_{j=1}^{t} (1+i_j)} \qquad 7 - 3$$

where $\prod_{j=1}^{t} (1 + i_j)$ denotes the product $(1 + i_1)(1 + i_2) \ldots (1 + i_t)$,

or

$$P_s = \int_1^N I_t e^{-\delta t} dt; \quad \delta = \ln(1 + i) \qquad 7 - 3a$$

Equations 7-3 and 7-3a indicate the market price of a security with certain future incomes for a specific period of time assuming that the payments are made at the end of each period as in the case of equation 7-3 and continuous in the case of 7-3a. However, when the stream is of an infinite nature and the inflows are constant over time - market rate of interest is assumed to be fixed - the security's price becomes

$$P = \frac{I}{i} . \qquad 7 - 4$$

The treatment of investment proposal under uncertainty or risk[1] is rather different. Since future streams (inflows) are subject to risk, an investor will require a premium for this degree of risk attached to his investment. A few authors argue that the effect of risk should be reflected in the discounting rate. Thus the discounting rate k will be comprised of (1) the market rate of interest, i, and (2) risk premium expressed in terms of percentage, ρ. The value of such a security therefore is

$$P = \sum_{t=1}^{N} \frac{I_t}{\prod_{j=1}^{t}(1+k_j)} . \qquad 7 - 5$$

Others argue that the treatment of risk in the manner described above is erroneous and inconsistent. The argument is that instead of using risk adjusted discount rate one should attach the risk to the expected cash flow and create a "certainty equivalent" flow. This certainty equivalent should then be discounted by the market discount rate (the market rate of interest which is free of risk).

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1. Fred Weston (XXXIII) suggests the following classes of exposure for different degrees of knowledge of the future:

"1. Alternatives are known
2. Probabilities assigned to outcomes — Risk

1. Alternatives are known
2. Probabilities of outcomes not known — Uncertainty

1. Alternatives are not known
2. Probabilities of outcomes not known — Partial ignorance" p.48

Sharpe points out the confusion around the use of the terms uncertainty and risk. He writes "the term uncertainty is too convenient to abandon. It is used here in its popular sense, to refer to a situation in which the future cannot be predicted with certainty. More to the point it is used as a synonym for risk." (XXV) p.26.

Therefore the value of risky investment is

$$P = \sum_{t=1}^{N} \frac{\alpha_t I_t}{\prod_{j=1}^{t} (1+i_j)} \qquad 7 - 6$$

assign $I^*_t = I_t \alpha_t$ and substitute to get

$$P = \sum_{t=1}^{N} \frac{I^*_t}{\prod_{j=1}^{t} (1+i_j)} \qquad 7 - 6a$$

where α_t is the certainty equivalent coefficient, $0 \leqslant \alpha \leqslant 1$

$$\alpha_t = \frac{\text{Certainty cash flow}}{\text{Risky cash flow}}$$

In order to demonstrate the nature of the error using the risk adjusted discount rate, a comparison of these two methods, in two different periods, is to be made. From the nature of the definition of the two methods, the results of employing them have to be identical. Thus

$$\frac{\alpha_t I_t}{(1+i)^t} = \frac{I_t}{(1+k)^t}$$

for the sake of simplicity suppose that α,i and k are constants over time, hence

$$\alpha_t = \frac{(1+i)^t}{(1+k)^t}$$

however in the next period one should get

$$\alpha_{t+1} = \frac{(1+i)^{t+1}}{(1+k)^{t+1}} = \alpha_t \frac{(1+i)}{(1+k)}$$

The risk adjust discount rate, k, by definition, should be greater than, i, the market rate of interest. Therefore, the expression $\frac{(1+i)}{(1+k)}$ is smaller than 1. Hence α_{t+1} is lower than α_t however α was assumed to be constant over time which results in a contradiction. Thus the risk adjusted discount rate approach is not valid. It is an upward bias of the risk equivalent method,

(a) the greater the cash flows period the greater the bias, and

(b) the greater the risk premium the greater the bias.

Therefore the risk adjusted method is inferior to the certainty equivalent method or as Robichek and Myers put it "this conclusion is completely at odds with the normal assumption that 'a constant discount rate implies constant risk' ".[1] Nevertheless the continued use of the risk adjusted discount rate, for financial analysis, implies that the investors consider distant inflows as more risky than nearer periods of inflows.[2]

Dividend policy and the share value

The previous sub-section leads to the discussion on the numerator and the denominator of equation 7-5, namely what one should consider as (1) his inflows and (2) his rate of discount. This part of the chapter will discuss the former of the two subjects.

Generally speaking there are two schools which discuss the subject of what should be considered as the investors' inflows. These are:

a. Dividend payments to shareholders made throughout the period

b. Earnings per share generated by the firm in each period.

In other words the discussion is around the question of whether the dividend policy adopted by a firm will eventually affect share prices or is it a "mere detail".

Therefore, the supporters of school (b) suggest that the share value will be affected by the firm's earnings regardless of its dividend policy, while the supporters of school (a) argue that dividend policy has a major effect

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1. Robichek and Myers (XXIII) p.83.

2. Van Horne (XXX) suggests that "it may well be that this assumption (risk is increased over time) is appropriate; however, management is unable to consider increasing risk explicitly with this approach and may make serious errors in measuring risk over time. For many projects, risk does increase with the length of time in the future. As a result, the assumption implicit in a risk - adjusted approach may well be valid". p.129-130.

on share price.

A naive approach to share valuation was given by Walter (187) when he made an attempt "to fabricate a theoretical model which depicts the relationship between dividend policies and common stock prices."[1] His argument is that the stock value of a firm is the capitalized value of its dividends plus the capitalized potential dividends through retained earnings. In mathematical terms this could be shown in equation 7-7 below.

$$V_c = \frac{D + \frac{Ra}{Rc}(E-D)}{Rc} \qquad 7 - 7$$

where V_c ..... Present value of common stock

D ..... Cash dividends

E ..... Earnings

Ra ..... The rate of return on additional investment

Rc ..... The market capitalisation rate.

The argument goes on that if the rate of return on additional investment is higher than the market capitalisation the firm has to adopt a low payout ratio. Thus if the firm's objective is to maximize the stock's market value it should follow a corner solution - all or nothing solution - which means in the case where Rc < Ra the firm should not pay a dividend and where Rc > Ra all earnings should be paid as dividends. By doing so the firm maximises its value according to Walter's equation. Secondly, the equation considers dividend policy to be in isolation. It will be shown later this assumption is incorrect. Walter's approach considers the earnings as dominating the stock value in the market since

$$V_c = \frac{0 + \frac{Ra}{Rc}(E - 0)}{Rc} = \frac{Ra}{R_c 2} E \quad \text{in the case where Ra > Rc}$$

and $V_c = \frac{E}{Rc}$ where Ra < Rc.

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1. Walter (187) p.29

The prominent study of Miller and Modigliani (134) pinpoints the condition: that there should be no effect of dividend policy on stock value. They argue that under conditions specified in Chapter 6 p.78 (conditions of a perfect market and certainty - the latter assumption, however, is relaxed at one stage of their analysis) a share value will be the same whether it is based on capitalization of future earnings or on present value of cash dividends. The price of a share - under these conditions - is

$$P_o = \frac{D_1 + P_1}{1 + ko} \qquad 7 - 8$$

where P_o = the share price at the beginning of the period (a year)

P_1 = the share price at the end of the period (year)

D_1 = Dividend paid during the period

ko = the capitalization rate for a firm in that risk class - ko is assumed to be constant.

Suppose that the firm considers a new investment, I, which partially will be financed by issuance of new shares - say m units. Thus,

$$I = mP_1 + (X - nD_1) \qquad 7 - 9$$

where X is the total profit of the firm for the period 0 and n is the number of shares outstanding before the new issue. Therefore the argument in the bracket of equation 7-9 means the firm's retained profits. Thus the value of all the firm's shares is

$$nP_o = \frac{nD_1 + (n + m) P_1 - mP_1}{1 + ko} \qquad 7 - 10$$

Rearrange equation 7 - 9 and substitute mP_1 into equation 7-10 to get

$$nP_o = \frac{nD_1 + (n+m) P_1 - I + X - nD_1}{1+k_o} = \frac{(n+m)P_1 - I + X}{1+k_o} \qquad 7 - 11$$

It appears that D_1 - the dividends paid to shareholders - disappears from equation 7 - 11 and therefore one can conclude that shareholders are indifferent to cash dividends. Consequently the shareholders'

wealth, which is to be maximised, is not affected by dividend policy but only by the prospect of future earnings. In other words, if a shareholder can sell part of his holdings (the new shares received from the firm, when the firm does not pay dividends) if he wants cash or to buy additional shares of the firm, which are issued in order to finance its investments with the cash dividend received, in the case where the firm decided to pay cash dividends to its shareholders (this process could be shown in the "arbitrage" argument) then in both cases the wealth of the firm's shareholders is unchangeable. This implies that dividend policy does not affect share value. This will be affected solely by future earnings generated by the firm. The relaxation of Miller- Modigliani's assumption on certainty does not alter their conclusions. Shareholders can arbitrage since the risk element does not change for the dividend policy. Consequently Miller-Modigliani support their conclusion from another article that "as long as management is presumed to be acting in the best interests of the shareholders, retained earnings can be regarded as equivalent to a fully subscribed, pre-emptive issue of common stock. Hence for present purposes the division of the stream between cash dividends and retained earnings is a mere detail."[1] Many studies lend support to the opposite argument from that of Modigliani and Miller as shown above.[2] The main

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1. Modigliani and Miller (138) p.266

2. For example Lintner (116); Gordon (72); Fisher (61); Baumol (17); Friend and Puckett (65) and Brigham and Gordon (29). Not all the vast literature related to this subject will be covered in this area of study since it is irrelevant for the present study to enter into details of the controversial subject. However, no one can afford to ignore the effect of such a policy, governed by the firm's management - which, as assumed, has to maximize the wealth of its owners. Hence the subject came into discussion as a by-product of the general discussion.

argument contrary to the irrelevance of dividend policy was directed against Modigliani - Miller's assumptions upon which their study is based. Lintner (116) concluded that "unlevered equity values are independent of the particular dividend vector if, but only if, (1) any uncertainty is fully idealized or absent, (2) there are no issue costs and (3) there are no personal tax differentials. Under these restrictions the result holds only because these conditions together with invariant vectors of capital budgets and earnings, reduce all efficient dividend vectors to a set, all of whose (vectors) element have the same present value. Any more general and realistic assumptions result in a well defined optimum dividend vector. The 'dividend theory' that prices are equal to the present values of the cash flow to the investor (that is, cash dividends) remains valid even under fully generalized conditions .....The so called earnings theory is valid if and only if it is stated in forms identically reducible to the valuation of the cash dividend flow to the investor. In particular the significance of the time vectors of earnings (and of company investments) lies in its implications for the prospective stream of dividends, rather than vice versa."[1] The cash dividend paid out by a firm resolves part of the uncertainty of investors. Therefore, an investor will demand a higher return for retained earnings than his initial cost of capital and thus the lower payout ratio the higher the required rate of return of the investor (assuming risk avertion of investors).[2] Furthermore, cash dividends indicate that the firm

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1 Lintner (116) pp267-268

2 Van Horne (XXX) ch.9

can generate cash as a result of its operations and thus increase the confidence of its shareholders. In addition, shareholders regard dividends as tangible while earnings which are not disbursed may be subject to accountancy manipulation, which shareholders do not weight as cash dividends. Another argument opposing Miller-Modigliani's hypotheses is that brought by Lintner (116) who states that even "under idealised neo-classical conditions, except that new issues involve either fixed or variable cash expense, market prices are not independent of cash dividends in any period when there is no borrowing, even if earnings and internal investment streams are fixed forever more."[1] Hence the argument of Miller-Modigliani on the ability of firms to finance their investment by issuance of new stocks without changing the wealth of the shareholders, is invalid. A real world will cause much doubt to be cast on Modigliani-Miller's dividend hypothesis since there are

1. tax differences between capital gains and payments for cash dividends (in favour of capital gains - from the taxpayer standpoint)
2. costs involved in flotation of new issues
3. time gap between the decision and the actual flotation of new issues[2]
4. brokerage fee which shareholders have to pay on the implementation of their decision to change the actual number of shares and structure of their portfolio and
5. "unwillingness to dilute the equity of current shareholders"[3]

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1. Lintner (116) p. 252
2. Baumol (III) p. 74
3. ibid.

In practice, as a few studies suggest, share values are determined by dividends to a larger extent than retained profits. These studies employed multiple-regression analysis with the following variables: (1) dividends paid (2) retained profits (3) growth rate of the firm (4) the firm's size and (5) the firm's leverage ratios (as measured for financial risk). The results show that shares' values are

1. dependent on dividend to a larger extent than retained profit
2. the degree of growth has no significant affect on shares value
3. firm's size is a major element which contributes to the stability of share value and this, perhaps, is one of the criteria considered by investors as a determination for the risk element.[1]

The present study provides empirical evidence for the relevance of dividend policy of a firm. The dividend policy of a firm influences share values to a larger extent than ploughback of earnings. Table 7 - 3 summarises the findings.

Industry	Stores		Chemical		Electrical		Engineering		Industrials		Food		Textile		Total	
R^2	E	D	E	D	E	D	E	D	E	D	E	D	E	D	E	D
.0	2	7	1	-	1	-	-	-	1	-	-	1	4	5	9	13
.1	3	2	1	-	2	-	-	-	-	-	2	1	4	-	12	3
.2	2	3	-	-	1	-	2	-	-	-	1	2	3	2	9	7
.3	3	1	-	-	1	1	-	2	-	1	2	3	4	3	10	11
.4	-	4	-	1	-	2	2	1	1	-	1	1	3	4	7	13
.5	5	-	-	2	-	-	-	2	1	1	-	3	1	4	7	12
.6	6	3	1	-	-	2	1	-	-	1	2	2	5	-	15	8
.7	2	1	1	-	2	2	-	1	-	-	3	2	-	7	8	13
.8	-	4	-	2	1	2	2	1	1	1	3	2	3	2	10	14
.9	4	3	1	-	1	1	1	1	-	-	5	4	1	1	13	10
1.0	1	-	-	-	1	-	-	-	-	-	2	-	-	-	4	-

Table 7 - 3

1. More about this component will be discussed in the next sub-section.

Table 7 - 3 summarises the frequency of distribution of the correlation coefficients of dividends and earnings (before corporate tax) on share price.[1] It is clear that the retained earnings component does not add as much explanation as dividend to share price. This conclusion was drawn from the similarity of the distribution of correlation coefficient of dividends on prices to that of the distribution of the correlation coefficient of earnings on price, as illustrated in Figure 7 - 3.

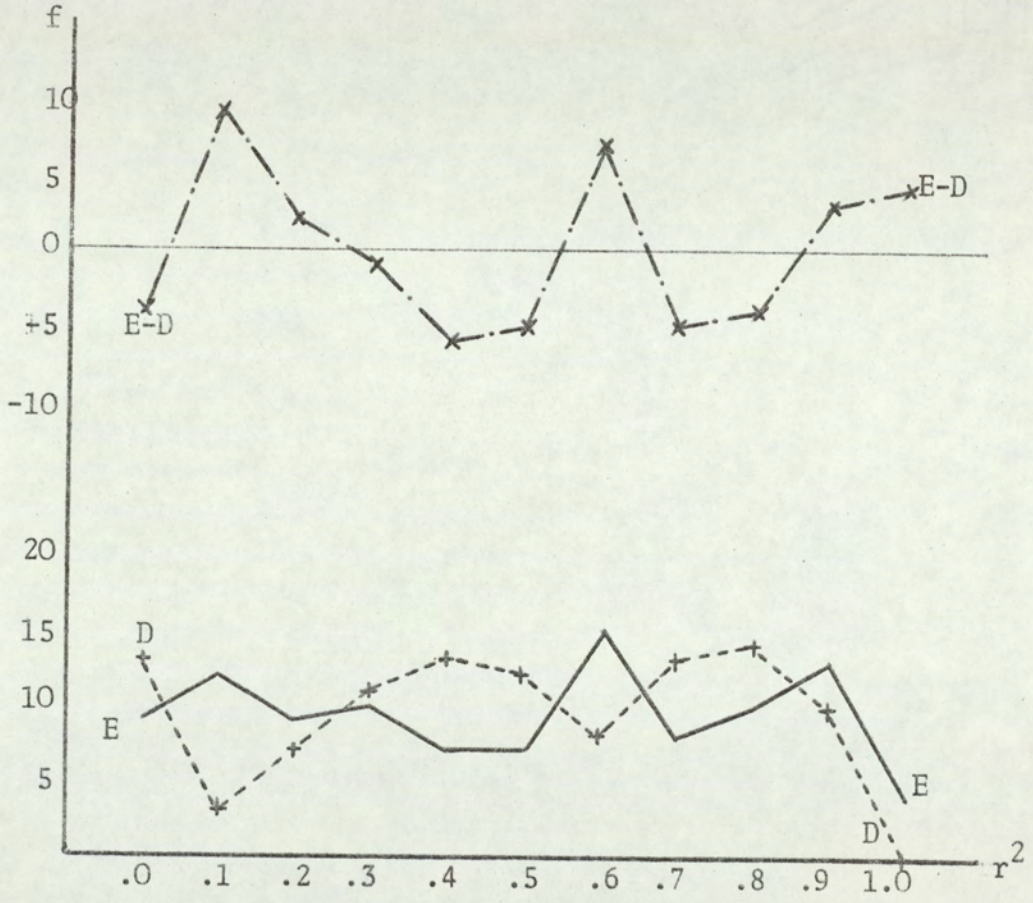

Figure 7 - 3

1. The equations used were linear: (i) $P_t = a+bD_t+ \varepsilon$
(ii) $P_t = a'+ b'E_t+\varepsilon$

The comparative positive skewness of the frequency of distribution of the correlation coefficient, R^2, the earning equation, EE, is due to the added retention of profit variable and is insignificant. It is interesting to examine the distribution of correlation coefficients, R^2, in different industries. It appears, that the retained profits component gave more explanation to share price in the Stores and the Food Industries whereas this component gave less explanation to the prices in Electrical Engineering, Engineering, Chemical, Industrials and Textile companies. The higher degree of significance of the effect of retained earnings in the Food and the Stores industries may be related to the fact that the earnings growth in these industries is higher than that of other industries in the study. The method used in the present study for the measurement of the relevance of dividend policy is not as strong as methods used in other studies but nevertheless lends support to the argument for the relevance of dividend policy under ordinary market conditions.[1]

Robichek and Myers (XXIII)[2] suggest that if the dividends pattern of a firm is known, an investor can then estimate the share value of this firm according to his desired pattern when he weighs the effect of cost dividend paid out by the firm against his subjective pattern of preference γ_i. Where $1 \leq \gamma_i \leq 0$, $\gamma_i = 1$ means that the investor is completely satisfied with the payout policy of the firm.

Lintner (115) suggests, as a result of his field study, that shareholders require ceteris paribus, stable cash dividends rather than volatile dividends (resulting from adopting a fixed payment ratio). These reasons may perhaps lead the firm to reinvest its undistributed profits in projects with a lower

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1. Unfortunately a stronger method of testing the relevance of dividend approach could not be applied in the present study because of the short period covered by the data.

2. (XXIII) ch.6.

rate of return than its cost of capital.[1]

The Capital Structure of a Firm and the Cost of Capital

A firm can finance its investments through several resources, as can be seen in its balance sheet. It can recruit financial resources from:

1. its owners viz. through retained profits or issuance of new shares; increasing equity capital,

2. it can borrow money either from individual lenders, banks, other organisations or by issuance of loans, borrowing from the capital market, and

4. it may use net credit provided by its suppliers through the method of operation.

While the first three financing methods are considered as long run and medium term financing, the fourth method is considered as a short term financing - usually less than a year.

At the beginning of this chapter it was shown that there is an affect of financing methods on the firm's risk and thus its cost of capital. Here an attempt will be made to be more explicit.

As was shown in equation 7-5 the firm's value depends inversely on its cost of capital. Since the objective of the firm, it has been assumed, is to maximise the wealth of its owners, the firm should minimise these costs. The questions to be raised are: (1) what, if any, are the costs of equity? (2) Do these costs vary with the financial mix (capital structure) or is there an optimal capital structure which minimises the cost of capital of the firm?

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1. Baumol, Heim, Malkiel and Quandt (18) found that "the rate of return on equity capital ranged from 14.5 per cent to 20.8 per cent. The rate of return on ploughback, however, ranged from 3.0 to 4.6 per cent, while the rate of return on debt ranges from 4.2 to 1.4 per cent" p.353. Whittington (192) argues that the huge difference between the two rates of return is due to bias in measurement methods, while not denying the fact that differences exist.

In order to illustrate the effect of financial leverage on the cost of capital of a firm it is useful to consider first two different approaches to the valuation of a firm.

First is the net income approach, which suggests that when the cost of equity, k_e, and the rate of interest on loans, i, are held constant ($k_e > i$) - which means that the cost of equity is not affected by financial risk - the total cost of capital of the firms, ρ, will be minimised as the degree of leverage $\frac{L}{E}$ which is increased. Thus, even assuming there is no taxation on incomes, the value of the firm, V, is maximised by financing investments through loans. This stems from the following:

$$O = iL + k_e.E$$

where O denotes the net operating income of the firm. Following Solomons (XXVII,172) average cost of capital

$$\rho_o = \frac{O}{V} = i\frac{L}{V} + k_e\frac{E}{V} = i\frac{L}{E+L} + k_e\frac{E}{E+L} = i\frac{\frac{L}{E}}{1+\frac{L}{E}} + k_e\frac{1}{1+\frac{L}{E}} \qquad 7 - 12$$

$V = E + L$; $\lambda = \frac{L}{E}$

$$\rho_o = i\frac{\lambda}{1+\lambda} + k_e\frac{1}{1+\lambda}$$

however $i < k_e$

$$\lim_{\lambda\to\infty} \rho_o = i.$$

At the other extreme the second approach, the net operating income, assumes that the total cost of capital of the firm, ρ_o and i are constant for all degrees of financial leverage, $\frac{L}{E}$ thus $V_o = \frac{O}{\rho_o}$.

From equation 7 - 12 one gets

$$\rho_o = \frac{O}{V} = i\frac{L}{V} + k_e\frac{E}{V} \; ; \; k_e = \frac{V}{E} \; (\rho_o - i\frac{L}{V})$$

$$V = E + L$$

$$k_e = \rho_o + \frac{L}{E}\rho_o - i\frac{L}{E} = \rho_o + (\rho_o - i)\frac{L}{E} \qquad 7 - 13$$

assume $\rho_o > i$.

Therefore as the leverage, λ, increases the cost of equity is linearly increased. Where the rate on interest increases with the degree of the leverage (increase of debt) the cost of equity, k_e, will increase at a decreasing rate. In fact one can reasonably conclude "that the expected interest rate was likely to rise as a function of λ as λ rose beyond some critical point."[1]

The traditional approach stands somewhere in between the above two approaches. It suggests that at a low degree of leverage the cost of equity, k_e, is considered by investors as constant (thus the effect of the financial risk is negligible) and so is the interest on the loan. Consequently the total cost of capital, ρ_o, of the firm decreases with increasing leverage to some degree. However, after that degree of leverage the rate of interest on debt, i, increases and so does the cost of equity, k_e, as a result of the effect of the financial risk and therefore the cost of capital, ρ_o, of the firm increases as the leverage increases. Hence, one can find,according to the traditional approach, an optimal leverage which minimises the cost of capital to the firm.

Modigliani and Miller's proposition (138) supports the net operating income approach. They argue that the cost of capital of a firm is independent of the degree of leverage. Their proof is based on the following assumptions:

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1. Robichek and Myers (XXIII) p.34.

1. Firms can be classified into homogeneous classes of equivalent return risks $\overline{Y}$.
2. $\overline{Y} = E(Y)$, "The uncertainty of investors concerning the reliability of their 'best estimate' $\overline{Y}$, means that a risk in a world conforming to the M M assumptions exist in a rather special sense."[1]
3. All investors have estimated $\overline{Y}$ and are rational.
4. Perfect capital markets, thus no transaction costs, free and perfect information, no differences in rate of interest for different entities (firms or individuals) and between borrowing and lending.
5. There is no corporate income tax (this assumption has been removed at a later stage of the analysis).

Modigliani - Miller's proposition is that all firms with the same $\overline{Y}$ which belong to the same risk class will have, in the long run, the same cost of capital. Hence the same value, regardless of their leverage.

The proof can be shown as follows. Suppose that the two firms A and B belong to the same risk class with identical $\overline{Y}$ but $\lambda_A = 0$, $\lambda_B > 0$ and $V_A < V_B$. Under these conditions it will pay an investor in firm B to sell his equity capital and borrow money to have an identical personal portfolio with the same degree of leverage to that of firm B and to invest that portfolio in firm A. Thus, so long as $V_A < V_B$, arbitrage will benefit the shareholder of B. However, this process will be followed by all B's shareholders and therefore market forces will decrease V_B to equalise it to the increased value of V_A and thus equating their cost of capital $\rho_A = \rho_B$. Once the assumption of the absence of corporate taxation is removed the income

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1. ibid p.23

of the levered firm is

$$\bar{Y}_T = (1-T)\ \bar{Y} + T.i.L$$

and for the unlevered firm

$$\bar{Y}_T = (1-T)\ \bar{Y}$$

where T is the level of corporate tax.

The value of the unlevered firm will, therefore, be

$$V_T = \frac{\bar{Y}_T}{\rho} = \frac{(1-T)\ \bar{Y}}{\rho}$$

and that of the levered firm

$$V_T = \frac{\bar{Y}_T}{\rho} = \frac{(1-T)\ \bar{Y}}{\rho} + \frac{T\ iL}{i} = \frac{(1-T)\ \bar{Y}}{\rho} + TL. \qquad 7 - 14$$

The term TiL is capitalised by investors at the rate of interest in market i. From the last equation 7-14 it is clear that levered firms get a "bonus" for using non-equity capital. As a result of this effect the value of a firm will increase with the degree of leverage; thus its cost of capital decreases.

There are some criticisms of Modigliani - Miller's assumptions and of the arbitrage process they introduced:

1. The existence of transaction costs limit the arbitrage process of the shareholders. The same argument was applied to the existence of capital gains tax.

2. The rate of interest on borrowed funds is different for individual borrowers and corporations, in favour of the latter.

3. The risk of the individual borrower is greater than that of a corporation since the liability of a corporation is limited where the individual faces a different position in respect to the law (in the case of bankruptcy of the firm).

4. From 3 it stems that the risk of equity is not restricted to risk class and financial risk but other factors should be considered such as the bankruptcy possibility of firms. Such factors may be suggested to relate to firms' size.[1]

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1. Samuels (160) found "no evidence of the larger companies having lower costs of capital". Fisher (61), however, arrived at opposite conclusions.

Figure 7-4 gives a graphical illustration of the differences between Modigliani-Miller's position and the traditional position.

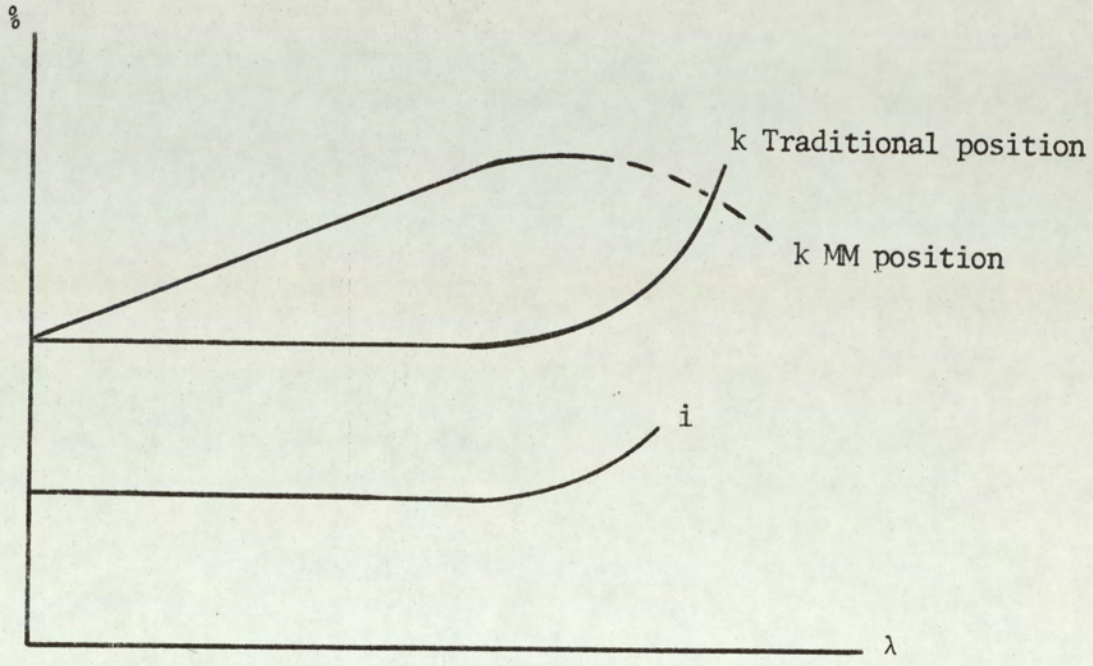

Figure 7 - 4

k in the M M position increases at a decreased rate as an effect of increase in the interest rate on the debt as shown in equation 7-13.

The Measurement of Cost of Equity

It has been shown in this chapter that the cost of equity capital may be influenced by management's financial decision. Porterfield (XXII), however, suggests that the cost of every resource has to encompass two types of costs:

1. Explicit costs
2. Implicit costs.

"The explicit cost of any source of capital is the discount rate that equates the present value of the cash inflows that are incremental to the taking of the financing opportunities with the present value of its incremental cash outflows."[1] On the other hand "implicit costs of capital

1. p.45

are opportunity costs. They are the rates of return on other investments available to the firm in addition to that currently being considered. They also include the shareholders opportunities to invest outside of the firm and his spectrum of opportunities for consumption."[1] Thus the cost of equity capital of a firm is affected by the rate of return on other securities. This was developed by Sharpe (168,170) who suggests that investors utility, U, will be motivated by two parameters: 1. the expected value of return, E_R, and the standard deviation of return σ_R, $U=f(E_R,\sigma_R)$. The standard deviation of return is given, as has been shown at the beginning of this chapter, as an estimate of the investor's risk. It follows that a rational risk averter investor will behave in a way that will maximise his utility viz. increases his return and decreases his risk. As shown in Figure 7-5 investors will wish to move towards the right and

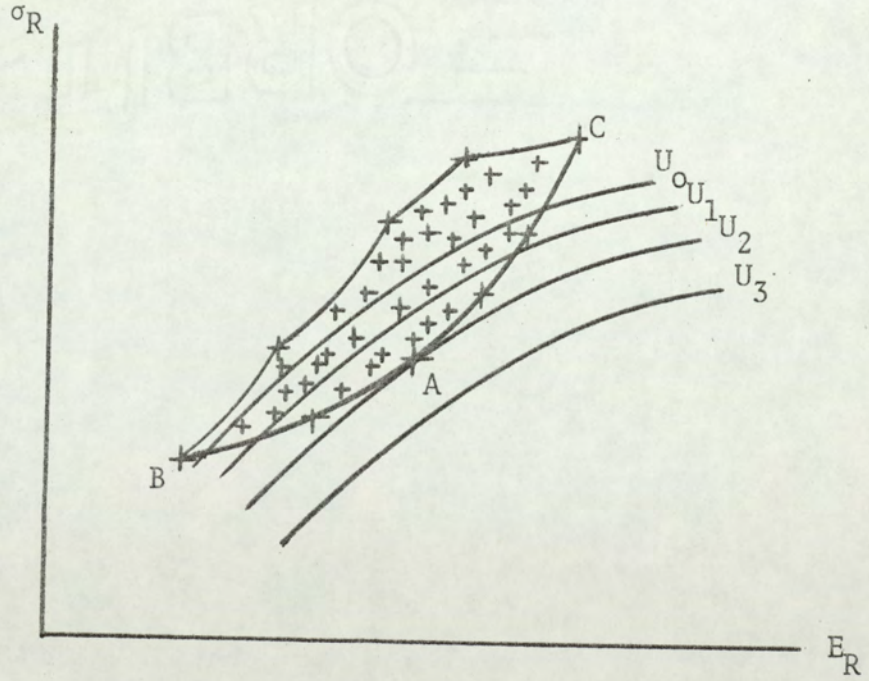

Figure 7 - 5

1. pp.60-61

downwards on the σ_R ; E_R plane. Therefore investors will choose investment A rather than any other investment - represented by points on the σ_R, E_R plane since investment A maximises their utility. However, different investors may have a different family of utility curve. In other words, investment A will not be an optimal investment for some of them. Nevertheless their optimal investment will lie on the "investment opportunity line" ABC, every other investment in Figure 7-5 not on that line will be regarded as not maximising the investor's utility and hence not preferable and therefore it is not an efficient selection. So far the model has described only risky investments. Once riskless securities are introduced the conclusion that all investments which yield returns plotted on the "investment opportunity line" may be desirable, will be altered. In fact only one investment will give the optimal return. Namely the investment on the "investment opportunity line" which tangential to the ray originated

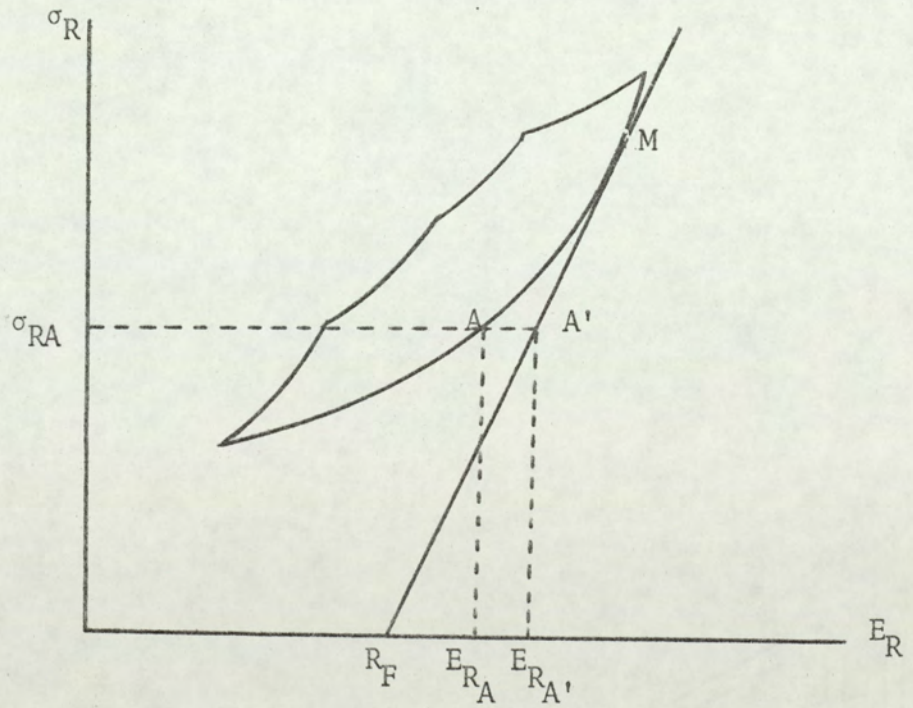

Figure 7 - 6

from the riskless rate of return, R_F, in the case of Figure 7-6 it is investment M. Thus if investors invest in security A they can increase their expected rate of return, while keeping the same degree of risk, σ_R, by lending part of the money at the riskless rate of return, R_F, and investing the other part in investment M (the division of the sum to be lent and that to be invested in M has to be in such a way that the risk of the investment will not change). By using the possibility of lending the expected rate of return to the investor in A is increased from E_{RA} to $E_{RA'}$ when the risk σ_{RA} is kept constant. Nonetheless there will not be only one investment that will have that optimal return. In fact, market forces will drive the price of investment M upwards (from the increase in its demand); and decrease prices of other investments, such as those on the "investment opportunity line", thus increasing the expected return that may be obtained from these investments. Hence reaching the equilibrium shown in Figure 7-7 below.

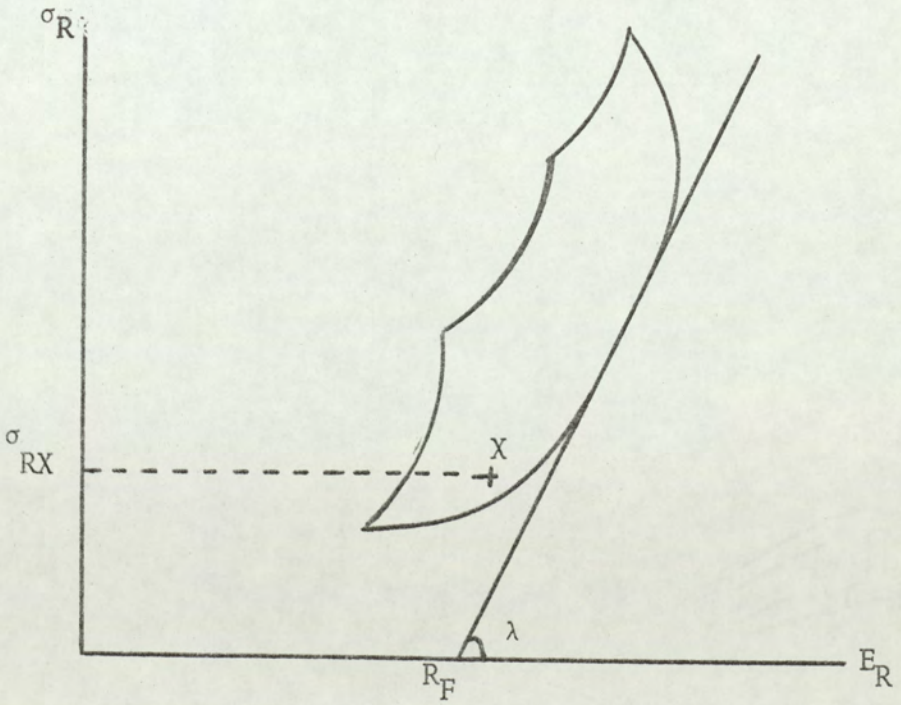

Figure 7 - 7

It follows that the cost of an investment will be determined by three factors:

1. The investments risk
2. The market premium on unit risk - described by the slope of the "capital market line", λ.
3. The pure rate of interest, R_F.

The cost of equity capital of the firm, therefore, will be determined by the above mentioned three factors. Thus the cost of equity capital considers not only the explicit costs but also the implicit ones as discussed at the beginning of this sub-section.

The discussion so far included only efficient investments, i.e.,portfolios. Individual security will be plotted to the left of the capital market line "thus reflecting the fact that investment in only one security is inefficient".[1] A use of the volatility of this security's rate of return relative to the changes in the market performance criterion (getting the security's "characteristic line") may provide the cost of this security. The characteristic line of this particular security passes through the point ($R_M = E_M$, $R_i = E_i$). The slope of such a line, bi, can be found in the following way: Take R_i^* as the predicted value of the rate of return of security i,R_i, by the characteristic line for the value of the return of the market portfolio, R_M. Assuming that all possible values of R_i were lying on such a line, then the probability of each R_i is equal to that of the associated value of R_M.[2] Thus the covariance between the i security's

---

1. Sharpe (XXV) p.86
2. This involves an implicit assumption that there is an agreement between all investors on the future of the security. See Sharpe (XXV) ch.5.

rate of return and that of the market portfolio, M, C^*_{iM}, is

$$C^*_{iM} = \Sigma Pr(R_M)(R^*_i - E_i)(R_M - E_M)$$

But the characteristic line indicates that

1. $R_i^* = a_i + b_i R_M$

and 2. $E_i = a_i + b_i E_M$

Thus

$$C^*_{iM} = \Sigma Pr(R_M) \{(a_i + b_i R_M) - (a_i + b_i E_M)\} (R_M - E_M)$$

$$= b_i \Sigma Pr(R_M) (R_M - E_M)^2$$

$$= b_i \sigma_M^2.$$

However $C^*_{iM} = C_{iM}$

thus $$b_i = \frac{C_{iM}}{\sigma_M^2}$$

The expected return on security i, Ri, becomes:

$$R_i = R_F + b_i (R_M - R_F)$$

substituting $\frac{C_{iM}}{\sigma_M^2}$ for bi to get

$$R_i = R_F + \frac{(R_M - R_F)}{\sigma_M^2} C_{iM}. \qquad 7 - 15$$

The interpretation of the latter equation is straightforward. The return on security comprises the risk free interest rate plus a premium for bearing risk. This premium for security i depends on the price of a pound risk and the amount of risk involved with the security, taken as the covariance between the security's rate of return and that of the market portfolio. It follows that the risk premium will be zero when the market return is equal to the free risk interest rate.

Equation 7-15 is the correct estimate for the cost of equity capital (assuming perfect capital market). It includes the explicit and implicit costs. Unfortunately many complications are involved in the computing procedure required for such a formula. It was thought, therefore, to

consider their costs as subject to their risk, the variance of return around their mean of return (when the effect of the trend is removed)[1] since the present study is concerned with the relative performance of individual securities. The risk free interest considered is the horizontal intersect of the regression line through the boundary of the plotted securities in the E_R, σ_R^2 space. The slope of the regression line indicates the price of pound risk required by the market.

The cost of equity capital, for the purpose of the present study, will be calculated by the method just described.

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1. See Briscoe, Samuels and Smyth (161)

Table 7-4 below summarises the differences in the cost of equity capital for the various firms in the sample.

	$\frac{D}{P} + g_D$	$\frac{D}{P} + g_p$	$\frac{E}{P}$	R	σ^2	E_R
	%	%	%	%	%	%
Stores						
Army and Navy	7.9	12.0	6.1	12.3	1.5	16.3
Bentalls	9.9	7.2	6.8	7.5	1.6	16.4
Bremner	9.6	4.0	8.6	3.9	1.4	16.2
British Home Stores	17.6	18.0	5.7	18.6	2.8	17.6
Burton	10.7	8.5	7.2	8.8	1.7	16.5
Cantors	14.8	14.4	10.0	14.7	6.9	21.9
Court Bros.	12.6	11.3	10.1	11.6	2.0	16.7
Debenhams	6.2	-2.8	6.2	-3.0	1.1	15.7
Doland George	-2.7	-1.0	3.5	-1.3	1.4	16.2
Empire Stores	13.4	20.2	4.5	20.5	5.1	20.0
Fairdale Text.	9.6	6.1	11.2	5.8	1.6	16.4
Forbuoys	18.7	13.5	9.3	13.9	1.4	16.2
Foster Bros.	10.6	9.4	7.8	9.6	0.6	15.2
Freemans (London S.W.9)	7.2	7.1	5.5	7.3	1.2	15.8
Great Universal Stores	10.7	15.3	6.8	15.6	2.4	17.1
Ladies Pride	13.0	11.9	9.3	12.1	4.8	19.7
Lee Cooper	-0.2	-0.6	8.5	-1.0	4.3	19.2
Lloyds Retailers	9.7	-0.4	7.1	-1.0	5.8	20.7
Maple	7.7	3.7	4.6	3.6	3.2	18.0
Marks and Spencer	9.6	11.2	4.3	11.8	0.8	15.4
Dorothy Perkins	13.5	12.5	8.1	12.8	2.9	17.7
Austin Reed	11.1	22.4	9.1	23.2	4.5	19.4
W.H.Smith & Son	14.6	14.1	7.0	14.4	5.2	20.1
H.Samuel	10.1	13.3	6.8	13.6	2.6	17.4
Spirella Group	10.3	2.7	6.8	2.5	7.0	22.0
Steinberg and Sons	11.5	13.5	8.1	13.9	3.7	18.5
United Drapery Stores	9.8	8.2	6.6	8.4	1.6	16.4
F.W.Woolworth	5.3	-1.9	6.0	-2.0	4.0	18.8

Cont.....

	$\frac{D}{P} + g_D$	$\frac{D}{P} + g_P$	$\frac{E}{P}$	R	σ^2	E_R
	%	%	%	%	%	%
Food						
Allied Suppliers	11.1	14.8	8.0	15.2	1.3	15.9
Ass.Biscuit	10.1	5.4	7.3	5.5	2.4	17.1
Ass.British Foods	9.3	7.3	6.2	7.6	3.4	18.2
Ass.Dairies	19.0	46.5	5.7	47.1	21.0	36.7
Ass.Fisheries	6.5	0.7	9.1	0.6	2.6	17.4
Bowyers (Wilt)	20.2	20.1	6.4	20.7	9.2	24.3
Brooke Bond Liebig	14.9	18.9	8.7	19.5	3.5	18.3
Clifords Dairies	11.6	14.1	9.4	14.5	2.9	17.7
Cullens Stores	-1.8	-0.5	4.3	-0.8	1.6	16.4
Fitch Lovell	11.8	11.8	6.8	12.1	7.1	22.1
Kinlock (Provision)	19.2	18.1	9.9	18.9	3.6	18.4
Lockwoods Foods	25.0	39.5	10.6	40.4	23.2	38.9
Moores Stores	6.3	-5.2	6.5	-6.8	1.6	16.4
Northern Dairies	18.5	11.9	8.3	12.3	5.7	20.6
Pricerite	18.6	24.1	6.0	24.5	18.6	34.2
Tate & Lyle	7.3	6.1	12.2	5.8	2.8	17.6
Tesco	27.0	25.0	4.2	25.5	11.7	26.9
Unigate	10.5	12.9	8.0	13.3	2.6	17.4
Unilever	13.5	12.7	9.4	13.0	4.6	19.5
United Biscuits	6.9	6.1	7.4	6.2	2.6	17.4
Wright's Biscuits	7.0	-8.4	5.0	-8.7	2.2	16.9
Textile						
Allied Textile	9.0	8.2	10.9	7.9	2.8	17.6
Atkins Bros.	9.5	14.0	9.8	14.2	2.1	16.8
Blackwood,Morton	54.0	17.5	12.0	18.9	6.3	21.2
British Cotton	2.1	15.7	5.2	15.6	17.6	33.1
Bodycote Knitted	20.9	29.1	7.9	29.3	13.0	16.6
British Mohair	6.0	7.4	7.6	7.1	3.0	17.8
Carpet Inter.	10.6	13.1	9.7	13.4	1.2	15.8
Collett, J.	7.7	20.1	7.6	20.6	7.2	22.2
Corah, N.	7.1	6.4	6.2	6.5	4.8	19.7

Cont.....

	$\frac{D}{P} + g_D$	$\frac{D}{P} + g_p$	$\frac{E}{P}$	R	σ^2	E_R
	%	%	%	%	%	%
Courtaulds	15.2	16.7	8.1	17.2	2.6	17.4
Davenport Knitwear	6.6	2.1	10.5	1.8	3.6	18.4
Doland George	-2.7	-1.0	3.5	-1.3	1.4	24.7
Ellis & Goldstein	9.4	7.6	10.0	7.8	7.6	22.8
Fairdale Textiles	9.6	6.1	11.2	5.8	1.6	29.3
Foster, John & Son	9.9	11.5	9.8	11.5	15.9	31.3
Goodman Bros.	9.7	11.9	10.7	12.1	8.0	23.0
Hicking Pentecost	31.5	15.9	10.6	16.3	7.0	22.0
Highams	6.2	16.2	16.4	16.2	8.1	23.1
Jerome, S. & Sons	10.8	17.2	13.2	17.4	5.9	20.8
Lister	18.5	26.8	7.0	27.5	15.1	30.5
Mallinson,George	3.3	12.3	10.2	12.0	7.0	22.0
Montfort (Knitting)	30.6	23.8	14.4	25.5	9.6	24.7
Reed, William	5.8	15.5	8.0	15.4	13.9	29.2
Sirdar	9.2	11.6	9.4	11.9	14.9	30.2
Sidlaw	20.7	15.9	14.2	16.8	2.5	17.3
Spirella	10.3	2.7	6.8	2.5	7.0	22.0
Stroud, Riley	5.9	11.3	11.2	11.3	6.7	21.7
Woolcombers	-9.0	-4.0	3.3	-4.8	1.1	15.7
Chemicals						
Anchor Chemicals	8.6	9.7	6.3	9.7	4.9	19.8
Albright Wilson	4.4	-3.5	4.9	-3.7	2.3	17.0
Coalite Chem.	14.0	27.1	12.0	27.5	5.5	20.4
ICI	10.1	11.4	6.5	11.7	2.8	17.6
Laporte	4.4	8.6	6.8	8.7	3.8	18.6
Electrical Engineering						
Advance Electronics	15.6	35.5	6.2	36.1	23.9	39.7
BSR	14.9	96.3	9.5	26.9	13.8	29.1
British Electrical Trac.	11.2	9.0	7.7	9.3	1.5	16.2
British Electronic Con.	0.0	4.4	7.0	4.3	5.5	20.4
Decca	7.9	9.3	5.2	9.4	5.1	20.0
EMI	9.9	12.3	5.8	12.6	2.2	16.8
Pifco	15.7	9.8	11.7	10.1	4.9	19.8

Cont.....

	$\frac{D}{P} + g_D$	$\frac{D}{P} + g_P$	$\frac{E}{P}$	R	σ^2	E_R
	%	%	%	%	%	%
Thorn Electrical	19.3	20.8	6.1	21.1	5.4	20.3
Ward & Goldstone	14.5	14.6	7.9	15.1	6.0	20.9
Westinghouse Brake Signal	21.1	20.0	8.3	20.8	5.5	20.4
Non Electrical Engineering						
Amalgamated Metal	-0.7	10.9	5.6	11.2	6.2	21.1
A.P.V.	15.7	15.9	7.4	16.4	2.6	17.4
Duport	14.7	9.3	9.5	9.6	8.7	23.8
Hall, Matthew	21.1	21.7	7.3	22.5	4.7	19.6
Metal Box	10.8	9.5	6.6	9.8	1.0	15.6
Osborn,Samuel	-1.2	0.2	8.0	-0.1	2.9	17.7
Steel Group	12.1	6.2	6.3	6.4	0.6	15.2
Vickers	-1.8	3.9	5.2	3.8	2.5	17.3
Industrial						
BTR	17.4	17.4	9.1	18.1	1.8	16.6
Burco Dean	17.8	31.4	13.3	32.3	22.3	38.0
Kalamazoo	15.8	13.4	4.8	14.0	2.6	17.4
Reed Inter.	4.0	4.2	7.4	3.9	1.5	16.3

where D ... Dividend,

P ... Share price,

g_D... Growth of dividend per share,

g_P... Growth of share price,

E ... Earning per share,

R ... Market return per share, $\frac{D_t + P_t - P_{t-1}}{P_{t-1}}$

σ^2... Variance of the market return per share, and

E_R... Expected return - $E_R = a+b\sigma^2$, a and b are coefficients

$$E_R = 14.65+1.048\sigma^2$$

Table 7 -4

It will be easier to analyse the general pattern of Table 7-4 when looking first at Table 7-5 which provides the industrial average of the different calculation of cost of capital together with their standard deviation,

	N	$\frac{D}{P}+g_D$		$\frac{D}{P}+g_P$		$\frac{E}{P}$		R	
		AVER %	σ %	AVER %	σ %	AVER %	σ %	AVER %	σ %
Stores	28	10.10	4.4	9.06	6.6	7.20	1.8	9.22	6.9
Food	21	12.97	6.8	13.42	12.9	7.95	2.0	13.64	13.3
Textile	28	11.71	11.6	13.22	7.2	8.88	2.7	13.41	7.5
Chemicals	5	8.30	3.7	10.66	9.7	6.30	.7	10.78	10.0
Electrical Eng	10	13.01	5.7	16.20	9.0	7.54	1.8	16.57	9.2
Non-Elec Eng	8	8.84	8.3	9.70	6.3	6.99	1.3	9.95	6.6
Industrials	4	13.75	5.7	16.60	9.8	8.65	3.1	17.08	10.2
(Last 4 industrials)	27	11.01	6.7	13.31	9.2	7.31	1.9	13.61	9.4
Total	104	10.52	8.5	11.48	9.6	7.24	3.2	11.68	9.9

Table 7 - 5

Table 7-5 averages the respective columns of Table 7-4 for each industry. (The last four industries are given also in a separate row which amalgamates them into one industry because the number of firms in each of these four industries is fairly small and may reduce the significance of the results of the analysis). It is clear that the market return per share, R, computed as $R_t = \frac{D_t + P_t - P_{t-1}}{P_{t-1}}$, is significantly higher than any other cost exhibited. The reason for this follows the definition of R_t which takes into consideration the earlier period's price (P_{t-1}). R_t is calculated as an average of the return of a nine year period. But the average may be affected by the extreme values. In fact, share prices changed in three years (1968, 1970 and 1971) in such rates that caused the return, R, to have an upward bias (the Actuaries 500 Share Index increased by 32, decreased by 15 and increased by 15, per cent in 1968, 1970 and 1971 respectively), while Dividend Growth and Share Price Growth were taken as constants. This reason

may also explain the higher standard deviation of the R about the mean. The third average column, the Earnings Yield $\frac{E}{P}$, is given in real terms, as it is followed by the definition of the ratio. The first two average columns, the Dividend Yield plus Dividend Growth ($\frac{D}{P} + g_D$) and Dividend Yield plus Share Price Growth ($\frac{D}{P} + g_P$),are given in nominal terms and therefore these ratios are higher than that of the one given by the Earnings Yield. When the average annual inflation rate is about three per cent all the three ratios will be similar.[1] A comparison of the first three columns of average cost of capital with those given by Samuels (160) and Merrett and Sykes (127) will show that the first three types of cost of capital given in Table 7-5 are consistently lower than those calculated by Samuels and Merrett and Sykes who studied the period 1954-1966. One of the reasons for the differences may account for the differences in the sampling of the three studies. The sample in the current study relies heavily on three industries which cause a downward bias of the total average. However, the second row from the bottom of Table 7-5 which gives the cost of capital of the different ways of calculation and is based on a sample size and structure, similar to the one taken by Samuels, casts doubts on the last explanation proposed for the differences between the costs in the different studies. Another reason for the differences may be because of the time period considered in the different studies. The Table also indicates that among the four biggest industries in the sample (Stores, Textile, Food and Electrical Engineering) the Store industry as a group has the lowest cost of capital (about 10 per cent in nominal terms) where the Electrical Engineering has the highest (about 16 percent in nominal terms). This may indicate that the Electrical Engineering

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1. Consider annual nominal income rate i when the annual inflation rate is a. What is, therefore, the annual income rate in real terms, b? Merrett and Sykes (127) calculate it as b = i - a. This computation is incorrect since it is inconsistent. The correct treatment of such a problem is $\frac{(1+b)^t}{(1+a)^t} = \frac{(1+i)^t}{(1+a)^t}$. The last procedure will be consistent, see Robichek and Myers (XXIII) ch.6 and Wilkes (193).

industry is a growing one whereas the Store industry has a slower growth. The fourth and fifth columns in Table 7-4 give the average return of the firm's security, R, of the investigated period and its variation around the mean σ_R^2. The last column in Table 7-4, E_R, was calculated in the manner described in the previous sub-section. 28 securities were found lying on the $(R;\sigma_R^2)$ frontier from which the parameters of the equation $E_R = a + b\sigma^2$ were calculated by a regression analysis getting:

$$E_R = 14.65 + 1.048\sigma_R^2 \qquad R^2 = .837$$

F ratio = 133.13 (significant at 1 per cent level)

It appears that the cost of equity capital will be 14.65 per cent when there is no volatility of its returns over the period. For 1 per cent increase of volatility return an investor is demanding about 1.05 per cent increase to initial cost. In other words the price of unit risk is about 1.05 per cent.

The Period's Capital Expenses

So far the specific cost of funds has been discussed. This sub-section will discuss the total cost of capital the firm faces. Thus it will make an attempt to integrate the specific cost of funds into one category. Bierman and Smidt (IV) define the cost of capital "as a weighted average of the cost of each type of capital. The weight for each type of capital is the ratio of the market value of the securities representing that source of capital to the market value of all securities issued by the company. The term security includes common and preferred stocks and all interest-bearing liabilities, including notes payable".[1]

1. Bierman and Smidt p.144

It emanates from the definition given by Bierman and Smidt that one should consider the cost of all resources according to the way the market values them.

Let, ρ = the cost of equity capital

i_j = the capitalisation rate for loans

L_j = the market value of the loan j

S = market value of equity capital

V = total market value of the firm

k = cost of capital of the firm

hence, $V_t = S_t + \sum_{j=1}^{n} L_{j,t}$.

The cost of capital of the firm at period t, as the definition suggests, is

$$k = \rho \frac{S_t}{V_t} + i_1 \frac{L_{1,t}}{V_t} + \ldots + i_n \frac{L_{nt}}{V_t} = \rho \frac{S_t}{V_t} + \sum_{j=1}^{N} i_{jt} \frac{L_{j,t}}{V_t} \quad .1 \quad 7 - 16$$

It seems, at first glance, that one should have the market value of all sources of funds in order to calculate the cost of capital of the firm. There are, however, two difficulties:

1. The technical difficulties of collecting and computing the market value of all the firm's securities which will involve a huge amount of data per company.

2. It is apparent that not all the firm's sources are floating and therefore their market price is not available, for example in the case of a mortgage or a personal loan.

One can overcome these difficulties (especially the second one) by adopting the following assumptions:

Suppose that the unfloated loan, j, was quoted and therefore has a market price L_j. As was shown in an earlier sub-section, the market considers the rate of interest on debt as a certain stream. The market price of this loan therefore is

$$L = \sum_{t=1}^{N} \frac{I_{j,t}}{(1+i)^t}$$

---

1. As was explained at the beginning of this chapter it is assumed that it is best for preferred stocks to be treated as debt. See also Marris (125).

where I_j is the stream of income from the loan j. When the loan is not redeemable the debt value is $L_j = \frac{I_j}{i}$

However $I_j = i_{oj}.L_{pj}$ where i_{oj} and L_{pj} are the paid rate of interest on the loan and the par value (book value) of the loan, j, respectively; viz. the payment the firm has to make for the loan which is fixed over a period of time. This payment can be obtained from the firm's balance sheet and the profit and loss account.

It follows from the above that

$$i_j L_j = I_j = i_{oj} L_{pj}. \qquad 7 - 17$$

Substitute equation 7-17 into 7-16 to get

$$k = \rho \frac{S_t}{V_t} + \sum_{j=1}^{N} \left(\frac{i_{oj} L_{pj}}{V}\right)_t. \qquad 7 - 18$$

However the present study is concerned with the capital input (capital expenses) for the period which is kV_t. Hence, by re-arrangement of equation 7-18 one gets

$$kV_t = \rho S_t + \sum_{j=1}^{N} (i_{oj} L_{pj})_t. \qquad 7 - 19$$

As has been explained above, the second expression in equation 7-19, $i_o L_p$ may be obtained from the firm's balance sheet or the profit and loss account. Therefore the computation of the firm's expenses become trivial although the same loans may not actually have a market value.

Since the firm's earnings before tax, interest, depreciation and directors' emoluments are taken as its output, it will be inappropriate not to consider taxation in the calculation of the input factor. Thus all calculations should be made on a pre-tax basis. As one can observe, there is not much of a problem with the costs of loans - these are taken on their pre-tax value. But as indicated in earlier sub-sections, the equity cost of capital will be affected by the level of taxation and the amount that was depreciated. Therefore a provision for these factors should be made.[1]

1. This is so since the period under study is a short one. When one considers an infinite period - as in Modigliani Miller's (138) assumption - the pre-tax cost of equity capital will be affected only by the rate of tax.

Let E = the firm's average earnings before taxation and depreciation but after payments of interest

T = the level of taxation, $1 > T > 0$

ρ = the cost of capital equity (calculated on a post tax basis)

D = the amount depreciated

S = the firm's share price

Equilibrium conditions satisfy

$$\rho S = (\bar{E} - D)(1-T)+D$$

$$\bar{E} = \frac{\rho S - DT}{1-T} \quad ; \quad \bar{E} = \frac{\rho S}{1-T} + \frac{D}{1-\frac{1}{T}} .$$

Thus the pre-tax equity capital expense is therefore not only the simple tax provision but also the proportionate deductible amount of depreciation made under the tax allowance.

Hence equation 7-19 which is calculated on a post-tax basis takes the following form for pre-tax computation

$$kV_{T,t} = \rho\left(\frac{S}{1-T}\right)_t + D_t \frac{1}{1-\frac{1}{T_t}} + \sum_{j=1}^{n} i_j L_{j_t} . \qquad 7 - 20$$

Thus the capital input that management has to consider as its real expenditure is as represented in equation 7-20.[1]

---

1. A similar argument was developed by Arditti and Levy (7).

Equation 7-20 gives an estimate of the capital input of the time sequence. Using this estimate, for the chosen sample and comparing it to the output of the period, as defined in the second sub-section of Chapter 6 as Y_i, one gets the results shown below in Table 7-6.

	$\bar{\pi}$	σ^2_π	E_π	$\frac{\bar{\pi}}{E_\pi}$
Stores				
Army and Navy	.49	.014	1.05	.46
Bentalls	.48	.006	1.01	.47
Bremener	.54	.011	1.04	.52
British Home Stores	.40	.016	1.06	.38
Burton Group	.61	.014	1.05	.58
Cantors	.87	.069	1.31	.67
Court Bros.	1.06	.025	1.10	.96
Debenhams	.53	.007	1.02	.52
Doland George	.39	.033	1.14	.34
Empire Stores	.39	.003	1.00	.39
Fairdale Textile	1.02	.039	1.17	.88
Forbouys	1.07	.037	1.16	.92
Foster Bros.	.77	.013	1.05	.73
Great Universal Stores	.41	.022	1.09	.38
Ladies Pride Outerwear	.90	.108	1.49	.61
Lee Cooper	.80	.022	1.09	.73
Loyds Retailers	.55	.052	1.23	.45
Maple	1.00	.092	1.41	.71
Marks and Spencer	.51	.012	1.04	.48
Perkins, Dorothy	1.00	.020	1.08	.93
Reed Austin	1.21	.139	1.63	.74
Samuel H.	.77	.035	1.15	.67
Smith W.H.	.69	.019	1.08	.64
Spirella Group	.46	.021	1.09	.42
Steinberg and Son	.61	.009	1.03	.59
United Drapery	.69	.018	1.07	.65
Woolworth	.31	.002	1.00	.31

Cont.....

	$\bar{\pi}$	σ^2_π	E_π	$\frac{\bar{\pi}}{E_\pi}$
Food				
Allied Suppliers	.84	.012	1.04	.81
Assoc.Biscuit	1.65	.120	1.54	1.07
Assoc.British Foods	2.97	.278	2.27	1.31
Assoc.Dairies	.96	.033	1.14	.84
Assoc.Fisheries	1.60	.153	1.70	.94
Bowyers (Wilt)	.88	.117	1.53	.57
Brooke Bond Liebig	1.15	.028	1.12	1.03
Clifford's Dairies	.92	.019	1.07	.86
Cullens Stores	.70	.114	1.51	.47
Fitch Lovell	.68	.021	1.08	.63
Kinloch (Provision)	2.80	.478	3.20	.88
Lockwoods Foods	1.07	.061	1.27	.84
Moores Stores	1.07	.153	1.69	.63
Northern Dairies	.97	.023	1.10	.88
Pricerite	.80	.173	1.79	.45
Tate and Lyle	.96	.049	1.22	.79
Tesco	.46	.023	1.10	.42
Unigate	.86	.024	1.10	.79
Unilever	.81	.033	1.14	.71
United Biscuit	1.10	.039	1.17	.94
Wright's Biscuit	.64	.012	1.04	.61
Textile				
Allied Textile	.92	.025	1.10	.84
Atkins Bros.	1.86	.114	1.51	1.23
Blackwood, Morton	1.07	.047	1.20	.89
Bodycote	.51	.188	1.86	.28
British Cotton	.82	.063	1.28	.64
British Mohair	.82	.070	1.31	.63
Carpet Inter.	.62	.074	1.05	.60
Collett, J.	.51	.016	1.06	.48
Corah, N.	.67	.034	1.15	.59
Courtaulds	.89	.013	1.05	.85
Davenport Knitwear	.95	.152	1.69	.56

Cont.....

	$\bar{\pi}$	σ^2_π	E_π	$\frac{\bar{\pi}}{E_\pi}$
Doland George	.38	.016	1.06	.36
Ellis & Goldstein	.59	.010	1.03	.58
Fairdale Textile	.97	.054	1.24	.78
Foster John	.63	.074	1.33	.48
Goodman Bros.,	.57	.014	1.05	.54
Hicking Pentecost	1.20	.049	1.21	.99
Highams	.73	.025	1.10	.66
Jerome, S.	1.15	.397	2.82	.41
Lister & Co.,	.55	.093	1.42	.39
Mallinson, George	.62	.016	1.06	.59
Montfort (Knitting Mills)	1.04	.372	2.71	.38
Reed, William	.54	.029	1.21	.46
Sidlaw Industries	2.73	1.150	6.30	.43
Sirdar	.63	.052	1.23	.51
Spirella Group	.46	.022	1.09	.42
Stroud, Riley	1.17	.089	1.40	.84
Woolcombers	1.09	.121	1.55	.70
Chemicals				
Anchor Chemicals	.51	.017	1.07	.48
Albright Wilson	1.12	.161	1.75	.64
Coalite Chem.	.80	.077	1.34	.60
ICI	.95	.017	1.07	.89
Laporte	.63	.025	1.10	.57
Electrical Engineering				
Advance Electronics	.43	.091	1.41	.31
BSR	.65	.021	1.08	.61
British Electrical Trac.	1.96	.250	2.14	.91
British Elect.Controls	.58	.016	1.06	.54
Decca	.47	.013	1.05	.43
EMI	.72	.037	1.16	.62
Pifco	.58	.054	1.24	.47
Thorn Electrical	.84	.059	1.26	.67
Ward & Goldstone	.68	.014	1.05	.65
Westinghouse Brake & Signal	.80	.061	1.27	.63

Cont.....

	$\bar{\pi}$	σ^2_π	E_π	$\frac{\bar{\pi}}{E_\pi}$
Non Electrical Engineering				
Amalgamated Metal	.34	.026	1.11	.31
A.P.V.	.98	.021	1.08	.90
Hall, Matthew and Co.	1.08	.093	1.42	.77
Metal Box Co.	.59	.002	1.00	.59
Osborn, Samuel	.94	.105	1.47	.64
Steel Group	.67	.032	1.13	.59
Vickers	.89	.023	1.09	.81
Industrial				
BTR	1.02	.024	1.10	.93
Burco Dean	.90	.100	1.45	.63
Kalamazoo	.93	.081	1.36	.69
Reed Inter.	.89	.018	1.07	.83

Table 7 -6

The first two columns of Table 7-6 give the average of operational profitability, $\bar{\pi}$, of all firms in the sample together with their corresponding variance of operational profitability, σ^2_π. That is to say, that for each firm in the sample the periodic output is compared with the corresponding input through a ten year period. Then the mean and variance calculated for the ten year period. As was shown at the end of Chapter 6, the average operation profitability, $\bar{\pi}$, may be used as firm's efficiency criterion which in the case of certainty will show a value just over 1 (depending on the level of the contribution made out of profit towards non-owners' entities such as directors' remunerations). In the case of uncertainty the value π may differ from 1. It can be expected that the value π will be volatile through time around an average $\bar{\pi}$. It can also be expected that a firm should compensate the value of its $\bar{\pi}$ for the degree of dispersion of its π_s, σ^2_π . The higher the firm's σ^2_π the higher should be

its $\bar{\pi}$. A failure of a firm to increase its $\bar{\pi}$ against an increase in its σ_{π}^2 will be considered as the firm's inefficiency. Apparently the results of the first two columns, $\bar{\pi}$ and σ_{π}^2, show a clear efficiency frontier comprising 14 observations. Assuming that the market considers a constant premium for $\bar{\pi}$ against the degree of dispersion, σ_{π}^2, one can imply a regression analysis for the observations which lie on the frontier in order to find the premium's parameter. The regression is of the type $E_{\bar{\pi}} = a+b\sigma_{\pi}^2$, where $E_{\bar{\pi}}$ is the expected operation profitability, a and b are parameters.

It is expected that the parameter a will have a value just over 1 since a zero dispersion will imply average operational profitability, $\bar{\pi}$, equal to just over 1, and a positive value for b. Employing the regression equation to the 14 observations which lie on the efficiency frontier the following results are obtained:

$$E_{\bar{\pi}} = a + b\,\sigma_{\pi}^2$$

$$.988+4.626 \qquad R^2=.818$$

F Ratio = 45.07 (significant at the 1 per cent level)

The value of the parameter a appears to be below the 1 mark which may suggest that the market is prepared to yield over 1 per cent of the firm's input for non-owners entities such as management and contribution for outside institutions. The coefficients of the linear regression provide the ability to compute the expected average operational profitability, $E_{\bar{\pi}}$. This is presented in the third column in Table 7-6. The fourth column of this table presents the ratio of the expected to actual average operational profitability. This may be the measure of efficiency (or inefficiency) of a firm. Before analysing the actual results it is worthwhile to look at the performance of individual industries. These are summarised in Table 7-7 below.

Industry	N	$\bar{\pi}$		σ^2		$\bar{\pi}/E_{\pi}$	
		AVER	σ^2	AVER	σ^2	AVER	σ^2
Stores	28	.685	.063	.032	.001	.597	.034
Textile	28	.882	.223	.119	.048	.610	.045
Food	21	1.137	.396	.094	.012	.784	.046
Electrical Eng.	10	.769	.173	.062	.005	.583	.024
Chemicals	5	.802	.047	.060	.003	.635	.019
Non Electrical Eng.	8	.785	.058	.043	.001	.659	.032
Industrials	4	.936	.003	.055	.001	.767	.014

Table 7 - 7

The industrial average of operational profitability, $\bar{\pi}$, is computed from the first column in Table 7-6 and given in the second column in Table 7-7. The deviation of this industrial average, σ^2_{π}, is given in the third column. The following two columns in Table 7-7, $\bar{\sigma^2_{\pi}}$ and $\sigma^2_{\sigma^2_{\pi}}$, are respectively the average and variation of the second column of Table 7-6. The last two columns of Table 7-7 given the industrial average of efficiency against the expected efficiency, $(\bar{\pi}/E_{\bar{\pi}})$, and its respective variance $\sigma^2_{\pi/E_{\bar{\pi}}}$. It appears that the Stores and the Electrical Engineering industries are the most inefficient industries compared with other industries in the sample with the level of 59.7 and 58.3 per cent respectively. There is no evidence to support the hypothesis that an industrial performance will be associated with its intensity in terms of labour or capital. The last statement will find support when the discussion turns to individual firms performance. Apparently the Food industry shows the highest level of efficiency. These are followed by the Textile industry with efficiency level of 61 per cent.

A glance at the last column of Table 7-6 reveals that 11 firms efficiency is above 90 per cent and 25 firms above 80 per cent where 11 of them belong to the Food industry (out of 21 firms in the sample). 11 firms out of the

top 25 with the best performance during the ten year period are considered to belong to the relative degree of actual to expected return ratio (up to 80%). In other words only 11 firms which lie on the "capital market line" - out of 28 firms - (see Table 7-4) are considered to be among the firms whose efficiency is over 80 per cent. Moreover, firms like British Home Stores, Empire Stores, Great Universal Stores and Marks and Spencer all belong to the Store Industry, Bodycote, Lister and Co., Montfort (Knitting Mills) and Sidlaw Industry, drawn from the Textile Industry, and Tesco (Food), whose average return over the corresponding period is similar to the expected return show a low degree of efficiency all below 50 per cent. Firms like ICI, Vickers, Reed International and Courtaulds are examples of very big firms, in terms of book value, whose actual returns were below their expected returns but are found among the best 25 performers. Therefore, the size of a firm, in terms of book value, is not a good explanation for the low degree of efficiency, as one may propose, since many big firms are found among the 24 best performers.

Two questions emerge from the conclusion that there is no association between the size of the firm and its predicted performance. They are

(i) whether a relationship exists between the level of firms performance and its level of directors' ownerships. Putting the question differently: will firms with a high proportion of directors' ownership perform better than firms with a low level?

(ii) is there association between a firm's performance and its directors' remunerations?

Table 7-8 contains the answers to these questions.

Industry	Holdings AVER	Holdings S.D.	Income AVER	Income S.D.	Perfo-Hold b	Perfo-Hold r	Perfo-Inc b	Perfo-Inc r	Hold-Inc b	Hold-Inc r
Stores	.262	.245	.064	.063	-.007	.00	.489	.16	-.007	-.03
Textile	.236	.249	.092	.055	-.139	-.16	-.741	-.17	.002	.00
Food	.163	.138	.037	.032	-.725	-.46*	-1.125	-.17	.009	.04
Elect.	.066	.071	.045	.055	-.814	-.36	-1.016	-.35	.155	.20
Chem.	.033	.063	.046	.063	-1.255	-.57	-1.293	-.63	1.057	1.00**
Eng.	.020	.031	.050	.054	1.859	.24	-2.713	-.78*	-.280	-.12
IND.	.037	.031	.037	.031	-3.781	-.75	-4.244	-.85	.969	.96*
Last 4 Industries	.043	.055	.045	.055	-1.009	-.34	-1.682	-.53**	.341	.36
Total	.179	.212	.061	.055	.178	-.18	-.794	-.21*	.031	.12

* Significant at 5 per cent level

** Significant at 1 per cent level

Table 7 - 8

Table 7-8 gives Industrial proportion of holdings of firms' equities by their directors and, the proportion of the remuneration of firms' directors out of the firms total earnings before interest and tax (EBIT). Industrial averages and their standard deviation are given. These are presented in the first four columns of the Table. It appears that proportion of holdings in firms' equities and remuneration of their directors are inversely related to the capital intensity of the industry. Thus the higher the capital intensity of the industry the lower the proportion of its equities held by its directors and the smaller the proportion of its directors' remunerations out of its EBIT. In fact directors in the Store Industry held (26.2 ± 24.5) per cent of their firm's equities and (23.6 ± 24.9) per cent in the Textile industry. The directors' income in these industries were, respectively, (6.4 ± 6.3) and (9.2 ± 5.5) per cent of their EBIT. While in the four industries Electrical Engineering, Chemicals, Non Electrical Engineering and

other Industrials, the proportion of equities holding by directors is (4.3 ± 5.5) per cent and their income was (4.5 ± 5.5) per cent of the industries EBIT. Regression analyses were made in order to determine the relationship between the firms performance, $(\bar{\pi}/E_{\pi})$, and its directors' equities holding and their proportion of remuneration in EBIT, PER.= a + b*HOLD. and PER.= a + b*INC. The regression coefficients b and the correlation coefficients, r, are given in the columns 5,6,7 and 8. In fact the results show on one hand that there is a negative correlation between the proportion of the equities held by firms' directors and the firm's efficiency - this tendency was found in all industries with the exception of the Non Electrical Engineering. In the Store Industry no correlation was found between the two variables. On the other hand a negative correlation coefficient was found between the firm's efficiency and the proportion of its directors' remuneration in all industries with the exception of the Store Industry. This may suggest that a firm's directors do not consider the firm's efficiency as a guide when reviewing their remuneration. The last two conclusions that a firm's efficiency is negatively correlated with (1) the proportion of its directors' holdings in its equity, (2) the proportion of its remuneration of its directors in its EBIT may suggest that a firm's directors who are also its owners have other objectives than to maximise the wealth of the firm's shareholders. (The last two columns in Table 7-8 show that there is a poor correlation coefficient, however positive, between the proportion of directors' remuneration in EBIT and the proportion of the directors' equity holdings which may cause a rejection of the hypothesis that directors maximise their own wealth.) Therefore, firms' directors are not necessarily seeking the wealth maximisation of the firms' shareholders no matter who they are; the general public or themselves.

The next chapter will illustrate a difficulty of measurement, inherent in the effect of growth on the results obtained. A unique estimation will be provided for the solution of this problem.

CHAPTER 8

SUMMARY AND CONCLUSIONS

The previous chapter examines empirically the model suggested at the end of Chapter 6. This chapter will discuss the implications of the results obtained in Chapter 7 while offering some adjustments to the calculations. The problem of capitalised growth, for which the adjustments are needed will be presented together with an estimate solution. The last part of the chapter is a brief summary of the thesis.

Adjustments

Suppose that a share price in period o, P_o, is determined by a capitalization of a known flow of earnings, Ei s, during the N periods, the capitalization rate is denoted by r. Therefore

$$P_o = \int_1^N E_t e^{-\delta t}\, dt \; ; \; \delta = \ln(1+r) \qquad 8 - 1$$

When one assumes a flow of constant earnings over an infinite period, i.e. $E_1=E_2=.....=E_t=.....$, the share price will be, at any time,

$$P = \frac{E}{r}$$

Suppose that a shareholder expects changes in the pattern of the infinite flow of earnings which will be of the following form:

$E_1=E_2=.....=E_{N-1}$ and $E_N=E_{N+1}=.....$ Yet E_N can be written as $E_N=E_{N-1}+\varepsilon$. The share price at time o will be, therefore

$$\begin{aligned}
P_o &= \int_1^\infty E_t e^{-\delta t} dt \\
&= \int_1^{N-1} E_1 e^{-\delta t} dt + \int_N^\infty E_N e^{-\delta t} dt \\
&= \int_1^{N-1} E_1 e^{-\delta t} dt + \int_N^\infty E_1 e^{-\delta t} dt + \int_N^\infty \varepsilon\, e^{-\delta t} dt \\
&= \int_1^\infty E_1 e^{-\delta t} dt + \int_N^\infty \varepsilon\, e^{-\delta t} dt \\
&= E\int_1^\infty e^{-\delta t}\, dt + \varepsilon \int_N^\infty e^{-\delta t} dt \\
&= \frac{E}{r} + \varepsilon \int_N^\infty e^{-\delta t} dt. \qquad 8 - 2
\end{aligned}$$

It is clear that the share price will vary with time, as shown in equation 8-2, until the period t=N. The relation between the share price in two successive periods (in the time interval $0 \leq t < N$), say o and 1, will be

$$P_1 = P_o + \varepsilon^* r \qquad 8 - 3$$

The second term of the RHS of equation 8-3 is the capitalized growth.[1] It indicates a larger present value of the stream of ε as this flow becomes one year closer to realization. This capitalization growth has no relevance to the input of the current period. One should, therefore, make the right provision so as to exclude such factors in the capital input of a firm during the period investigated. When the flow of earnings increase at a constant rate, the share price, with no respect to time, will be $P = \frac{E}{r-g}$ 8 - 4

where g stands for the rate of growth of earnings ($r > g$). Rearrange equation 8-4 to get $r = \frac{E}{P} + g$

Thus, if one wants to eliminate the effect of growth, one has only to subtract the growth rate from the capitalization rate. This is a rather naive approach, since

1. a firm cannot obtain a constant growth rate over an infinite period, where the growth rate of a firm exceeds the normal growth rate of the GNP. This approach, implicitly, does not reckon with this possibility.
2. it does not pay proper attention to irregular payments the firm may expect to receive in the future.

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1. Hamada (86) p.437

The appropriate elimination of growth from the cost of capital may be illustrated as follows: recall equation 7-15

$$\rho = R_F + \frac{(R_M - R_F)}{\sigma^2_{R_M}} \text{cov}(R_i, R_M) \qquad 7 - 15$$

The capitalized growth affects the second term of the RHS of equation 7-15. Assume that the price of a pound risk, $\frac{R_M - R_F}{\sigma^2_{R_M}}$, is not affected by the growth rate, only the $\text{cov}(R_i, R_M)$ will be affected.

The rate of return on security i during period t, R_{it}, is defined as

$$\begin{aligned} R_{it} &= \left(\frac{D_t + P_t - P_{t-1}}{P_{t-1}}\right)_i \\ &= \left(\frac{D_t + P_t}{P_{t-1}}\right)_i - 1 \\ &= \left(\frac{D_t}{P_{t-1}}\right)_i + \left(\frac{P_t}{P_{t-1}}\right)_i - 1 \\ &= R^*_{it} + \tilde{g}_{it}. \end{aligned} \qquad 8 - 5$$

The same analogy will be applied to the market portfolio, giving

$$R_{Mt} = R^*_M + \tilde{g}_{Mt} \qquad 8 - 6$$

Substitue 8-5 and 8-6 into $\text{cov}(R_i, R_M)$, giving

$$\begin{aligned} \text{cov}(R_i, R_M) &= \text{cov}(R^*_i + \tilde{g}_i, R_M + \tilde{g}_M) \\ &= \text{cov}(R^*_i, R^*_M) + \text{cov}(R^*_i, \tilde{g}_M) + \text{cov}(\tilde{g}_i, R_M) + \text{cov}(\tilde{g}_i, \tilde{g}_M) \end{aligned} \qquad 8 - 7$$

The second and third terms on the RHS of equation 8-7 are assumed to be very small, since the correlation coefficient between growth and return is rather small and therefore the second and the third terms have negligible values. Thus the systematic risk comprises two components

1. the risk involved with returns (with absence of growth) - $\text{cov}(R^*_i, R^*_M)$
2. the risk involved with the growth of returns of the security i and that of the market portfolio - $\text{cov}(\tilde{g}_i, \tilde{g}_M)$

Therefore one should subtract the value of the term $\frac{(R_M - R_F)}{\sigma_M^2} \text{cov}(\tilde{g}_i, \tilde{g}_m)$ from the value of ρ to get the adequate cost of capital for the calculation of the periodic capital input. But the difficulties of employing this approach are are many. In order to make some approximations for the growth factors, this study considers a similar approach to that suggested by equation 8-3. It is assumed here that the growth of all firms is equal to the normal growth of the GNP during the period 1962-1971.[1] The deviation of individual growth from the growth of the GNP was subtracted from the cost of capital as calculated in Chapter 7. Therefore firms which have a high cost of capital, due to a relatively high growth rate, will now have a lower cost of capital and consequently a lower capital input. Firms which had a lower growth rate than that of the GNP and consequently may have had a lower capital input will now have higher costs. The results of these adjustments are presented in Tables 8-1 and 8-2.

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1. The growth of the GNP at current factor cost prices based on income data during this period was 8.74 per cent. Income and Expenditure 1972 (V) p.11.

Stores	$\bar{\pi}$	σ^2_π	$E_{\bar{\pi}}$	$\frac{\bar{\pi}}{E_{\bar{\pi}}}$
Army and Navy	.60	.020	1.25	.48
Bentalls	.44	.005	1.13	.39
Bremener	.41	.007	1.14	.36
British Home Stores	.86	.074	1.61	.53
Burton Group	.60	.014	1.20	.50
Cantors	1.18	.137	1.95	.61
Court Bros.	1.23	.033	1.34	.92
Debenhams	.31	.002	1.11	.28
Doland George	.29	.020	1.24	.23
Empire Stores	.91	.018	1.23	.75
Fairdale Textile	.87	.028	1.30	.67
Forbouys	1.51	.075	1.62	.94
Foster Bros.	.80	.014	1.20	.67
Great Universal Stores	.68	.060	1.52	.45
Ladies Pride Outerwear	1.09	.162	2.06	.53
Lee Cooper	.57	.012	1.19	.48
Loyds Retailers	.42	.030	1.32	.32
Maple	.79	.058	1.50	.52
Marks and Spencer	.60	.018	1.23	.49
Perkins, Dorothy	1.32	.035	1.35	.98
Reed Austin	3.95	1.555	6.16	.64
Samuel, H.	1.03	.058	1.51	.68
Smith W.H.	.94	.033	1.34	.70
Spirella Group	.36	.014	1.20	.30
Steinberg and Son	.81	.016	1.22	.66
United Drapery	.67	.017	1.22	.55
Woolworth	.20	.001	1.10	.18
Food				
Allied Suppliers	1.42	.031	1.32	1.07
Assoc.Biscuits	1.27	.068	1.57	.81
Assoc.British Foods	2.79	.242	2.35	1.18
Assoc.Dairies	.96	.033	1.34	.72
Assoc.Fisheries	1.07	.059	1.51	.71
Bowyers (Wilt)	1.78	.598	3.11	.57
Brooke Bond Liebig	3.09	.588	3.09	1.00

Cont.....

	$\bar{\pi}$	σ^2_{π}	$E_{\bar{\pi}}$	$\frac{\bar{\pi}}{E_{\bar{\pi}}}$
Clifford's Dairies	1.37	.039	1.38	1.00
Cullens Stores	.46	.055	1.49	.31
Fitch Lovell	.79	.029	1.31	.61
Kinloch (Provision)	2.80	.478	2.86	.98
Lockwoods Foods	1.73	.061	1.53	.70
Moores Stores	.56	.039	1.38	.40
Northern Dairies	1.14	.033	1.34	.85
Pricerite	1.70	1.007	3.50	.23
Tate and Lyle	.83	.037	1.37	.61
Tesco	1.38	.249	2.37	.58
Unigate	1.18	.049	1.45	.81
Unilever	.81	.033	1.34	.60
United Biscuits	.94	.028	1.31	.72
Wright's Biscuits	.34	.003	1.17	.31
Textile				
Allied Textile	.89	.023	1.27	.71
Atkins Bros.	3.53	.728	3.53	1.00
Blackwood, Morton	1.97	.982	4.43	.44
Bodycote	.51	.188	2.17	.24
British Cotton	1.09	.097	1.74	.63
British Mohair	.76	.060	1.52	.50
Carpet Inter.	.89	.030	1.32	.68
Collett J.	1.08	.070	1.58	.68
Corah, N.	.59	.026	1.29	.46
Courtaulds	1.72	.056	1.50	1.15
Davenport Knitwear	.67	.076	1.62	.42
Doland George	.33	.012	1.19	.28
Ellis and Goldstein	.56	.009	1.16	.49
Fairdale Textile	2.77	.401	2.72	1.02
Foster John	.70	.091	1.71	.41
Goodman Bros.	.66	.018	1.23	.53
Hicking Pentecost	1.20	.049	1.45	.83
Highams	1.09	.056	1.50	.73
Jerome, S.	2.08	1.501	6.00	.35
Lister & Co.	1.34	.603	3.12	.43
Mallinson,George	.76	.025	1.28	.60

Cont.....

	$\bar{\pi}$	σ^2_π	$E_{\bar{\pi}}$	$\frac{\bar{\pi}}{E_{\bar{\pi}}}$
Montfort (Knitting Mills)	1.04	.372	2.67	.38
Reed,William	.67	.050	1.45	.46
Sidlaw Industries	2.73	1.150	4.94	.55
Sirdar	.70	.066	1.56	.45
Spirella Group	.36	.014	1.20	.30
Stroud,Riley	1.33	.115	1.84	.72
Woolcombers	.66	.062	1.53	.43
Chemicals				
Anchor Chemicals	.54	.019	1.24	.44
Albright Wilson	.66	.072	1.59	.41
Coalite Chem.	.80	.077	1.62	.49
ICI	1.14	.026	1.29	.89
Laporte	.62	.025	1.28	.49
Electrical Engineering				
Advance Electronics	1.64	2.094	7.79	.21
BSR	1.75	.166	2.00	.84
British Electrical Trac.	1.98	.255	2.35	.83
British Elect.Controls	.48	.011	1.18	.41
Decca	.46	.014	1.20	.38
EMI	.94	.067	1.56	.60
Pifco	.61	.061	1.52	.40
Thorn Electrical	1.68	.293	2.48	.68
Ward and Goldstone	.97	.031	1.32	.73
Westinghouse Brake & Signal	.80	.061	1.52	.52
Non Electrical Engineering				
Amalgamated Metal	.38	.033	1.33	.29
A.P.V.	1.71	.057	1.50	1.14
Hall,Matthew and Co.	4.67	2.448	8.86	.53
Metal Box Co.	.63	.003	1.12	.56
Osborn,Samuel	.60	.046	1.42	.42
Steel Group	.58	.024	1.28	.45
Vickers	.71	.015	1.21	.59

Cont.....

Industrial	$\bar{\pi}$	σ^2_π	$E_{\bar{\pi}}$	$\bar{\pi}$ / $E_{\bar{\pi}}$
BTR	2.29	.103	1.77	1.29
Burco Dean	.90	.100	1.75	.52
Kalamazoo	1.36	.172	2.01	.65
Reed Inter.	.70	.012	1.18	.59

Table 8 - 1

Industry	$\bar{\pi}$ / $E_{\bar{\pi}}$ AVER	$\sigma^2_{\bar{\pi}}$
Stores	.532	.045
Textile	.589	.087
Food	.700	.068
Electrical Eng.	.543	.055
Chemicals	.543	.030
Non Electrical Eng.	.501	.097
Industrials	.762	.096
Last 4 Industries	.565	.075
Total	.591	.073

Table 8 - 2

The results presented at the end of Chapter 7 (Table 7-6) assume, implicitly, a uniform growth for all firms. Therefore stocks which attained a similar growth to that of the growth of the GNP will not have changes in their (i) average operational profitability, $\bar{\pi}$, and (ii) the level of dispersion about the mean, $\bar{\pi}$,σ^2_π. Stocks which attained a high level of growth will increase their average operational profitability,$\bar{\pi}$. For example British Home Stores (nominal growth = 17.9); Empire Stores (growth = 20.2); Great Universal Stores (growth = 15.3); Marks and Spencer (growth = 11.2); and Smith W.H. (growth = 14.1) all belong to the Store Industry,

Allied Suppliers (growth = 14.8); Brooke Bond Liebig (growth = 18.9) ; Lockwoods Foods (growth = 39.0); Pricerite (growth = 24.1); and Tesco (growth = 25.0) all in the Food Industry, Atkins Bros. (growth = 14.0); Collett S. (growth = 20.1); and Courtaulds (growth = 16.7) in Textiles, BSR (growth = 26.3); and Thorn (growth = 20.8), in Electrical Eng., BTR (growth = 17.4); and Kalamazoo (growth = 13.4), in Industrials, all obtained growth higher than the average growth of the GNP and after allowance for the growth improved their $\bar{\pi}$.

On the other hand, stocks which obtained lower growth than that of the GNP were "penalised" to meet the growth rate of the GNP and therefore their $\bar{\pi}$ decreases. Among the stocks which fall into this group one can find the following: Bremner (growth = 4.0); Debenhams (growth = -2.8); Lee Cooper (growth = -0.6); and Woolworth (growth = -2.0); all in the Store Industry, Cullens Stores (growth = -0.5); Moores Stores (growth = -5.0); and Wright's Biscuit (growth = -8.4), all in the Food Industry, Davenport Knitwear (growth = 2.1); and Woolcombers (growth = -4.0); in Textiles, Albright Wilson (growth = -3.5), Chemicals - all show lower $\bar{\pi}$ in Table 8-1 compared to those in Table 7-6. It appears, therefore, that the efficiency frontier may be altered by the changes that occur through the process of deduction of the access of growth from the cost of capital. The efficiency frontier is comprised of 16 firms (whose $\bar{\pi}$ is the highest in its group σ_π^2). When plotting, the point in a π, σ_π^2 plan indicates that the market does not consider a constant premium for unit volatility of π, σ_π^2 . The best curve to fit this frontier is a polynomial equation of the following form:

$$1.092 + \underset{(3.412)}{7.895}(\sigma_\pi^2) - \underset{(12.253)}{13.592}(\sigma_\pi^2)^2 + \underset{(11.383)}{10.102}(\sigma_\pi^2)^3 \qquad 8 - 8$$

where the figures in parentheses are the standard error of each of the coefficients. The volatility profitability of each firm, σ^2_{π}, may indicate, by using this equation, the required profitability by the market, $E_{\bar{\pi}}$. The first term of the equation shows that, in circumstances where there is no volatility of profitability during the period, the market requires that firms will produce 9.2 per cent more than the output needed to cover the input cost as the contribution towards non-owners entities. The third column of Table 8-1 is a product of the use of the equation 8-8 for each firm. The fourth column in this table is the actual to expected ratio of profitability and is used as a yardstick for measurement of performance. Table 8-2 gives the average performance of each industry together with its deviation. It appears that the Food industry has performed better than other industries with an average of 70 per cent actual to expected profitability ratio. The Store industry has the worst performance. Comparison of Tables 7-7 with 8-2 shows that there is no change in the order of performances although as a result of the adjustment for growth, the degree of performance of each industry has declined. Table 8-1 shows that, after the adjustment of growth, the actual profitability $\bar{\pi}$ has changed from that stated in Table 7-6 but nevertheless there are no fundamental changes in the ordering of performance. By and large the conclusions drawn at the end of Chapter 7 still hold.

Summary and Conclusions

The thesis looks into Business Administration from two points of view: Marketing and Finance.

One of the most delicate points in Marketing studies is investigated and clarified. The thesis examines the behaviour of the distribution channel while illuminating the relationships which exist in different channels. The

empirical evidence provides powerful support to the model developed. It is shown that there are three types of relationships in the distribution channels:

1. democratic,
2. autocratic and
3. anarchical

It is found that the third type of relationship does not last. The long-run objective of firms, either manufacturing or distributing, appears to establish enduring associations in the channel. This does not mean that the distribution channels are always managed peacefully. There are many disagreements and conflicts between channel members. There is an implicit cost, or an opportunity cost, stemming from conflicts. Channel members become aware of this cost and try to avoid it. There is a tendency towards the establishment of democratic channels. Differences do exist between channels according to the varied nature of products preserving both the general trend of co-operative channel and the relevance of the negotiation interval. At this point the thesis proceeds to discuss the question of measuring business performance.

Performance (or efficiency) is determined by the ability of the management of a firm to adapt itself to market conditions while keeping its objectives. The popular measurement of interfirm performance is the rate of return on assets. However this measurement is shown to be of limited significance, although it may be used as a yardstick in measuring the dynamic performance of one firm. Another method for measuring interfirm performance is that of comparing the actual output (in physical units) to actual input factors (also in physical units). Four difficulties are met with when this measurement of performance is utilized:

1. It fails to express changes in market conditions.
2. Whether management has fully utilized new market conditions to minimise input factors used in production. When relative prices of input factors and/or output change it will be difficult to assess performance unless production functions are given.
3. No consideration is given to qualities of input factors and output.
4. The use of physical units assumes the non-existence of such intangible input factors as education; skill; investment in R & D; the level of competition in the market and legal restrictions.

Timmer (179) suggests building a probabilistic production function for the use of interfirm comparison. By so doing the effect of the extreme is diminished. Farrell (59) and Ball (13) prefer to consider the actual input-output ratio of each input factor, for each firm, obtaining an efficiency frontier. Against this frontier the individual firm's performance will be measured. Ball considers only one output, value added, and two input factors; labour (in physical units) and capital, taken as the book value of the capital employed by the firm. This last approach introduces two ratios of efficiency: (1) technical efficiency (labour/output), and (2) capital efficiency (capital value/output). But this approach does not give a consideration of the costs of inputs. Rowan and Dunning (157); Dunning and Barron (48); Beattie (19); Manzly (123); Kendrick (123); Reddaway and Smith (151); and Jorgenson and Griliches (96) all consider the cost of input factors, but actually adopt different points of view. Rowan and Dunning (157) realising the difficulties in considering production functions, use a map of indifference curves. Consequently an interfirm comparison of performance can be made by ranking them, without however stating the degree of difference in performance.

Amey (I) takes a different attitude. Aware of the various market imperfections and other intangible assets used by firms, he suggests the

comparison of a firm's ex-post profit with its ex-ante profit. The justification for such an attitude is that a firm, knowing its advantages and limitations, can plan its objectives when all its possibilities are considered. The actual results achieved are then compared with those planned, showing the level of performance of the firm. Usually, however, pro-forma balance sheets of firms are not published, so an external investigator cannot make such comparisons. The model suggested in this thesis integrates the two different approaches of Rowan and Dunning and Amey, and makes use of stock market information.[1]

When one sets stock exchange data against actual results published by various firms, an interfirm comparison can be made which is based on the utility of the investor. This study assumes that the objective of management is to maximise the wealth of its owners (maximising their utility). The description of the behaviour of such a utility curve is shown in Figure 6-2, from which it is clear that investors are more sensitive to changes in capital efficiency than to changes in labour efficiency. Thus the character of the utility curve is not one of unit elasticity, as is mistakenly assumed by some other scholars.

Many problems are involved in using stock exchange data. The strongest reservations regarding the reliability of such data are expressed by the school of the random walk hypothesis {e.g. Granger (75), Mandelbrot (122), and Fama (56)}. Nevertheless, share prices are bounded from below and above (between those limits share prices are characterised by random walk). The best approximation for a share price is the geometric average of the lower and the higher limits {Marris and Singh (126)} when appropriate attention

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1. This model may also be employed for estimating the value of unquoted firms.

is given to stock splits, the issues of stock dividends and rights.

The discussion on risk shows that it is comprised of two components: (a) business and (b) financial. The former stems from the nature of the business (therefore different industries may be prone to different risks), while the latter depends on the capital structure of a particular firm. The element of risk is only one component of the cost of equity capital which determines the value of a share. The relevance of dividend policy is also discussed and, again, it is proved empirically that the dividend policy of a firm influences its market value. The financial leverage of a firm comes under discussion as another factor which influences risk. The most accurate method of measuring cost of capital is that related to the portfolio theory. This cost of capital takes into consideration the explicit and implicit (opportunity) costs. This can be shown in mathematical form as follows (equation 7-15)

$$R_i = R_F + \frac{R_M - R_F}{\sigma_M^2} C_{iM}$$

where R_i ..... the cost of capital of security i,

R_F ..... the risk free interest rate,

R_M ..... the return on the market portfolio,

σ_M^2 ..... the variance of returns of the market portfolio, and

C_{iM} ..... the covariance between the rate of return on security i and that of the market portfolio, M.

The different costs of capital are presented in Table 7-4. This indicates the importance of the implicit costs. Table 7-5 shows the differences in the explicit cost for various industries.

The thesis demonstrates how one should integrate accounting data with data taken from the stock exchange for the purpose of estimating the capital expenses of a firm during a given period. Table 7-8 indicates that the proportion of holdings in firms' equities and remuneration of their

directors are inversely related to the capital intensity of the industry. The lower the proportion of a firm's equities held by its directors the smaller the proportion of its directors' remuneration out of its earnings before interest and tax. This table also reveals that firms' performance is negatively correlated with (1) the proportion of its directors' holdings in its equity, and (2) the proportion of its remuneration of its directors in its earnings before interest and tax. It also shows a poor correlation, however positive, between directors income and their proportion of holdings in the firm's equity.

In addition the thesis presents the problem of growth and its influence on valuation of securities. It indicates that there are many difficulties in identifying the growth element in the cost of capital. Table 8-1 provides the performance of individual firms together with their deviation. The employment of a polynomial regression on these firms which lie on the frontier gives the price that the market attributes to one unit of deviation from the mean of the actual to expected ratio. This provides the estimation of the actual performance for each individual firm as given in the last column of Table 8-1. Table 8-2 shows the industrial average of performance indicating that the Food Industry performed better than others, while the Store Industry had the worst performance.

The results may suggest the conclusion that the directors of firms do not necessarily seek maximisation of the wealth of the firms' shareholders, as the examined model assumes. Rowan and Dunning (157) presented a table, summarising results of a questionnaire in which managers were asked to rank given variables which they see as their most motivated objectives. The results show that only 16.5 per cent of managers see as their prime objective the maximisation of the rate of return on shareholders' funds, while 52.8 and 25.2 per cent of them, respectively, rank the rate of return

on total assets and growth of sales as their prime objective. This may partially explain the relatively low performance of many firms in the present study: it explains only the output of the ex-post profits. The other part, which may complete this explanation, concerns the firms' shareholders; who do not seek from these particular firms to maximise their wealth, as assumed, but seek different ends. E.g. It may be found that firm A holds a substantial number of shares in firm B; which latter may buy A's output as its input factors. Thus A will not sell the shares it holds in B as long as it benefits from such holdings. This process will of course support the share price in the stock market and increase the value of the firm's ex-ante profits.

APPENDIX A

As was shown at the beginning of Chapter 7, 104 firms were selected in the sample. This was taken from firms listed in the Financial Times and on Moodies cards at 31st December 1971 and which also existed in 1962. The sample for each industry was selected randomly. At first it was thought to take a sample of the size of 101 firms from the manufacturing and distributing sectors, 75% taken from the Stores, Textile and Food Industries. However, investigation of the firms in the sample revealed that one cannot clearly classify the operation of three firms. All the three may equally belong to two industries-Textile and Stores. It was then decided to include them in both samples increasing the total number of the sample to 104. When an analysis was prepared for all industries provision was made to eliminate double counting. The selected firms are:

The Stores Industry

Army and Navy Stores Ltd.
Bentalls Ltd.,
Bremener & Co., Ltd.,
British Home Stores Ltd.,
Burton Group Ltd.,
Cantors Ltd.,
Court Brothers (Furnishers) Ltd.,
Debenhams Ltd.,
Doland, George Ltd.,
Empire Stores (Bradford) Ltd.,
Fairdale Textile Ltd.,
Forbuoys Ltd.,
Foster Brothers Clothing Ltd.,
Freemans (London S.W.9) Ltd.,
Great Universal Stores Ltd.,
Ladies Pride Outerwear Ltd.,
Lee Cooper Ltd.,
Loyds Retailers Ltd.,
Maples & Co., Ltd.,

Food

Allied Suppliers Ltd.
Associated Biscuit Manufacturers Ltd
Associated British Foods Ltd.
Associated Dairies Ltd.
Associated Fisheries Ltd.,
Bowyers (Wiltshire) Ltd.,
Brooke Bond Liebig Ltd.,
Cliford's Dairies Ltd.,
Cullen's Stores Ltd.,
Fitch Lovell Ltd.,
Kinloch (Provision Merchants) Ltd.
Lockwoods Foods Ltd.,
Moores Stores Ltd.,
Northern Dairies Ltd.,
Pricerite Ltd.,
Tate & Lyle Ltd.,
Tesco Stores (Holdings) Ltd.,
Unigate Ltd.,
Unilever Ltd.,

Cont.....

Stores (continued)

Marks and Spencer Ltd.,
Perkins, Dorothy Ltd.
Reed, Austin Group Ltd.,
Smith, W.H.& Son (Holdings) Ltd.
Samuel, H. Ltd.,
Spirella Group Ltd.,
Steinberg & Sons (London & S.Wales) Ltd.,
United Drapery Stores Ltd.,
Woolworth F.W.and Co., Ltd.,

Textile

Allied Textile Companies Ltd.,
Atkins Brothers (Hosiery) Ltd.,
Blackwood,Morton & Son (Holdings) Ltd.,
Bodycote Knitted (Holdings) Ltd.,
British Cotton & Wool Dyers Ltd.,
British Mohair Spinners Ltd.,
Carpet International Ltd.,
Collett, J.Ltd.,
Corah, N.(St.Margaret) Ltd.,
Courtaulds Ltd.,
Davenport Knitwear Ltd.,
Doland George Ltd.
Ellis & Goldstein (Holdings) Ltd.,
Fairdale Textiles Ltd.,
Foster, John & Son Ltd.,
Goodman Brothers & Stockman Ltd.,
Hicking Pentecost & Co., Ltd.,
Highams Ltd.,
Jerome,S. & Sons (Holdings) Ltd.,
Lister & Co., Ltd.,
Mallinson, George & Sons Ltd.,
Montfort (Knitting Mills) Ltd.,
Reed, William and Sons Ltd.,
Sidlaw Industries Ltd.,
Sirdar Ltd.,
Spirella Group Ltd.,
Stroud, Riley & Co., Ltd.,
Woolcombers (Holdings) Ltd.

Food (continued)

United Biscuits (Holdings) Ltd.,
Wright's Biscuits Ltd.,

Chemicals

Anchor Chemicals Co., Ltd.
Albright & Wilson Ltd.,
Coalite & Chemical Products Ltd.,
Imperial Chemical Industries Ltd.,
Laport Industries.

Electrical Engineering

Advance Electronics Ltd.,
BSR Ltd.,
British Electrical Traction Co.Ltd.
British Electronic Controls Ltd.
Decca Ltd.,
EMI Ltd.,
Pifco Holdings Ltd.,
Thorn Electrical Industries Ltd.
Ward & Goldstone Ltd.,
Westinghouse Brake Signal Co.,Ltd.

Non Electrical Engineering

Amalgamated Metal Corporation Ltd.
APV (Holdings) Ltd.
Duport Ltd.,
Hall, Matthew & Co., Ltd.
Metal Box Co., Ltd.
Osborn,Samuel & Co., Ltd.
Steel Group Ltd.,
Vickers Ltd.,

Industrials

BTR Layland Industries Ltd.,
Burco Dean Ltd.,
Kalamazoo Ltd.,
Reed International Ltd.,

APPENDIX B

This appendix is part of a comprehensive study that was compiled for a large scale British retail organisation. This was at a time when the U.K. was negotiating the terms of joining the European Economic Community. The study was primarily concerned with the effects of the enlarged community on this organisation.

RETAILING IN EUROPE

Table 1 lists the twenty-five largest public retail companies in Europe. The ranking criterion was the firms' earning power in the years 1966 - 1968 (where information is available). This ranking is reverse ranking which means that firm no. 1 has the lowest earning power and the last firm in the list has the highest earning power.

The list includes nine British firms, nine French, three German, two Swedish, two Belgian and one of each of the following countries: Italy, Holland, Switzerland and Spain.

At first glance we can see that the British firms as a group achieved high earning power and the French firms as a group ranked as the lowest earning power.

Marks and Spencer shows relatively stabilized earning power and is among the three firms which rank as the highest earning power.

Chart 1 shows how the firms achieved their earning power. The variable factors are their assets turnover (the sales to assets ratio), which shows how a company is employing its capital. The second variable is their profit margin (profit to sales ratio) this ratio helps to explain variation in the earning power (profit to assets ratio). It assesses the relationship between a firm's income and its costs.

The U. K. firms as a group identify with the highest profit margin and have the lowest assets turnover among the European firms.

Marks and Spencer achieved high earning power due to the fact of a high profit margin (the highest among all other firms investigated). On the other hand its assets turnover is among the group of firms which achieved a low assets turnover.

The French firms as a group show a very low profit margin which is, more or less, stable but their assets turnover is very high.

The German firms show similar results to the British ones when there is substitution between profit margins and assets turnover.

Since the industry we are dealing with is labour intensive, Chart 1 cannot represent the firms' performance, therefore Chart 2 shows a more accurate estimation of the firms' performance.

Chart 2 represents relative output to input ratios, therefore we can compare/rank performance of firms who produce relatively one output more than the other firms, but not less in the other output. In other cases comparisons cannot be made.

Chart 2 shows that Marks and Spencer has higher productivity than other firms and stable performance, although its capital efficiency is not as good as the German firms.

PROFIT MARGIN %

ASSETS TURNOVER

GB
F
D
Belg.
Switz.
Swed.
It.
Holl.
Spain

▲ ... 1966
● ... 1967
■ ... 1968
✱ ... 1969
▼ ... 1970

HOLLAND
1. ALBERT HEIJN

SWEDEN
1. AHLEN & HOLM
2. NORDISKA KOMPANIET

GERMANY
1. KARSTADT
2. KAUFHOF
3. WECKERMAN

FRANCE
1. AU BON-MARCHÉ
2. BAZAR DE-L'HOTEL-DE-VILLE
3. GUILHARD-PERRACHON
4. DORKS RÉMOIS FAMILISTÈRE
5. SOCIÉTÉ GALERIES LAFAYETTE
6. PRINTEMPS
7. PARIS-FRANCE
8. DU LOUVRE
9. CARREFOUR S.A.
10. NOUVELLES GALERIES

U.K
1. ALLIED SUPPLIERS
2. BRITISH HOME STORES
3. BURTON
4. DEBENHAMS
5. G. UNIVERSAL
6. MARK & SPENCER
7. UNIGATE
8. TESCO
9. SAINSBURY

BELGIUM
1. G. B. ENTREPRISES
2. A L'INNOVATION

SPAIN
1. GALERIAS PRECIADOS

ITALY
1. LA RINASCENTE

SWITZER.
1. GLOBUS

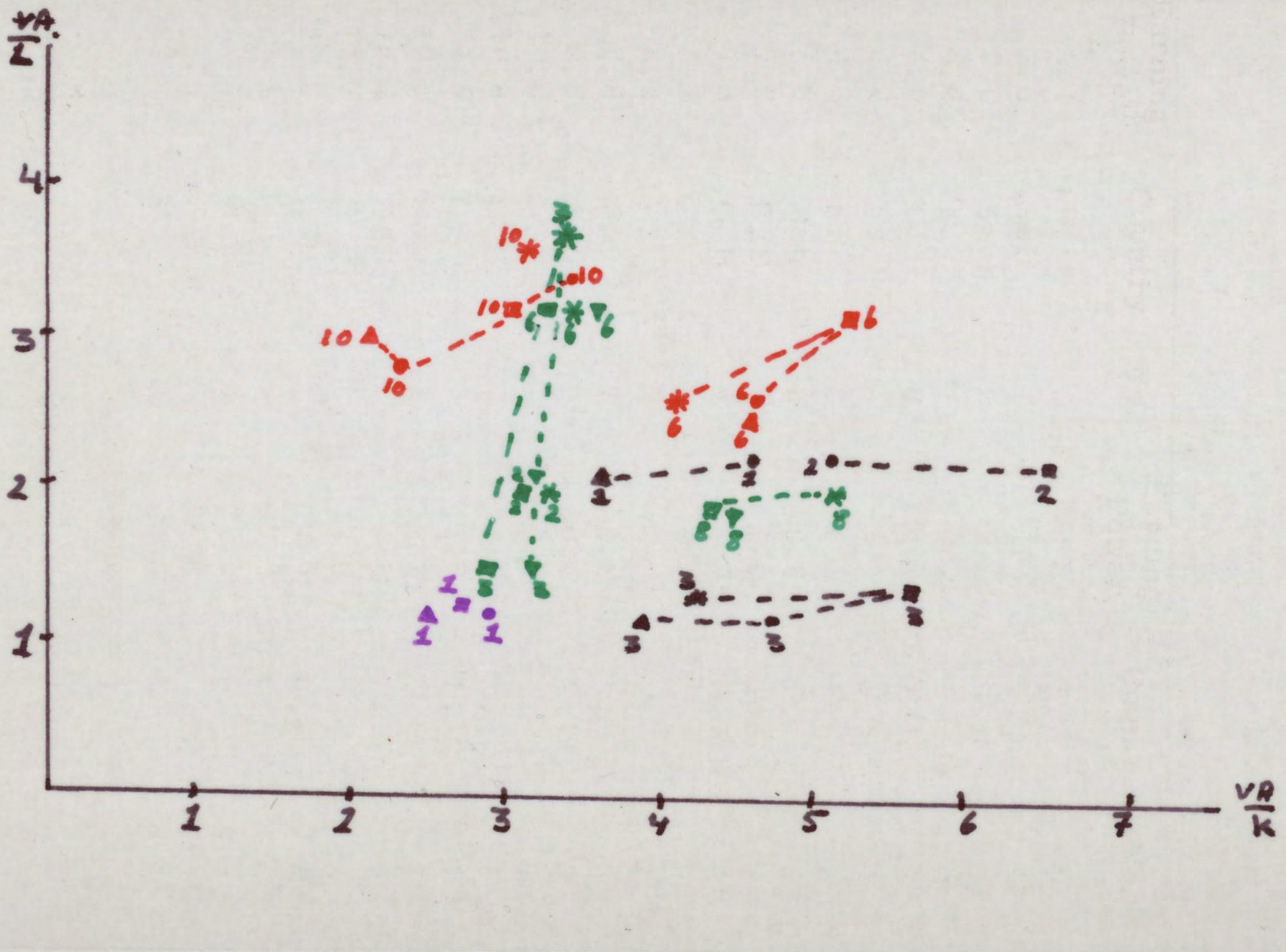
VA/L
4
3
2
1
1
2
3
4
5
6
7
VA/K

TABLE 1

Year	1966			1967			1968			1969		
	Country	No.	Earning Power	Country	No.	Earning Power	Country	No.	Earning Power	Country	No.	Earning Power
1	F.	5	0.1	F.	5	0	F.	5	0	G.B.	4	9.5
2	Bel.	2	2.8	Swit.	1	1.5	F.	1	0	G.B.	7	10.0
3	Swed.	2	3.0	Swed.	2	3.0	Swit	1	2.3	G.B.	3	10.5
4	F.	1	3.2	F.	1	3.2	Swed.	2	3.1	Bel.	1	12.2
5	Swit.	1	4.0	F.	6	4.4	Bel.	2	5.6	G.B.	9	13.1
6	F.	4	4.4	F.	4	6.1	F.	4	6.7	F.	9	13.3
7	F.	6	4.8	F.	2	6.5	F.	2	7.0	G.B.	1	14.5
8	F.	8	6.8	Bel.	2	6.6	F.	6	8.2	G.B.	2	18.5
9	F.	2	7.0	G.B.	3	8.0	Sp.	1	8.3	G.B.	2	25.6
10	G.B.	3	7.3	G.B.	4	8.7	G.B.	4	9.0	G.B.	8	32.8
11	F.	9	8.2	Sp.	1	10.1	F.	9	9.0			
12	It.	1	8.4	F.	8	10.2	F.	7	9.4			
13	Swed.	1	8.6	F.	7	10.2	G.	3	10.1			
14	F.	7	9.0	F.	9	10.4	G.B.	3	10.2			
15	G.B.	7	10.0	It.	1	10.4	F.	8	10.2			
16	G.	3	10.8	G.B.	7	11.6	It.	1	10.7			
17	Sp.	1	11.5	G.	3	11.8	Bel.	1	10.7			
18	G.B.	1	12.5	Swed.	1	12.2	G.B.	1	13.6			
19	Holl.	1	15.6	G.B.	1	12.9	Holl.	1	15.3			
20	G.B.	2	16.7	G.B.	2	17.0	G.	2	16.3			
21	G.	1	20.1	Holl.	1	17.6	G.B.	2	18.3			
22	G.B.	6	22.1	G.	1	19.2	G.B.	6	22.1			
23	G.	2	22.2	G.B.	6	21.4	F.	3	24.6			
24	G.B.	5	27.6	G.B.	5	25.9	G.B.	5	25.8			
25	F.	3	30.8	F.	3	37.0	G.B.	8	46.8			

GREAT BRITAIN

Allied Suppliers
British Home Stores
Burton
Debenhams
Great Universal Stores
Marks and Spencer
Unigate
Tesco
Sainsbury

FRANCE

1. Au Bon-Marché
2. Bazar de-L'Hotel-de-Ville
3. Guichard-Perrachon
4. Docks Rémois-Familistère
5. Société Anonyme des Galeries Lafayette
6. Printemps
7. Paris-France
8. Société du Louvre
9. Carrefour

GERMANY

1. Karstadt
2. Kaufhof
3. Neckermann

SWEDEN

1. Ahlen & Holm
2. Ab Nordiska Kompanie

BELGIUM

G. B. Entreprises
A L'Innovation

ITALY

1. La Rinascente

HOLLAND

1. Albert Heijn

SWITZERLAND

1. Globus

SPAIN

1. Galerias Preciados

FRANCE

1. Au Bon Marché - Department stores

   Bon Marché of Brussels acquired 22% interest in the firm in 1964.

2. Bazar de-L'Hotel-de-Ville, S. A. - Department stores in France and and French Overseas Territories.

3. Guichard-Perrachon & Cie (Casino) - Chain of supermarkets and stores, canners and bacon curers and food manufacturers.

   On 31st December 1968 the company had 1,645 branches of which 1,364 were traditional grocery stores and 281 were supermarkets.

4. Docks Remois-Familstère - Manufacturers and distributors of food products and household stores, operating a chain of stores throughout Northern France.

5. Galeries Lafayette - Department Stores and Fashion Houses - holds a substantial minority interest in the Belgian Grand Magasin à la Bourse group which is mainly a subsidiary of the Belgian Sarma chain. They have a London subsidiary as well and also hold other interests in various parts of the French-speaking world.

6. a. Printemps and Galeries Anspach have jointly participated in the development of Belgian shopping centres and stores.

   b. 'Prisunic is something of a self-service Grants store with a supermarket in the basement and some discount items scattered here and there. Low-price private brands are pushed. At least at this stage of Europe's evolution, Prisunic seems a winning combination.' (Edward A. McCreary "The Americanisation of Europe" NY 1964).

      Prisunic, which is part of the Printemps-Prisunic-Sapac (own chain of department stores, fashion houses and bazaars throughout France) complex, has conducted its wide-reaching operations under a variety of arrangements. It owns some stores outright, participates in joint ventures with polygot sets of associates in other cases and in still other instances acts as a buying office and voluntary chain headquarters for independent proprietors. It has been a minority stock-holder, subordinate to the French SCOA

trading company, in an African subsidiary and has otherwise been involved in stores in Africa and the West Indies. It participates with French, Belgian and Greek associates in developing a very interesting and apparently successful Athenian chain that uses the names 'Etavik' and, in the more modern stores, 'Prisunic'. Sponsorship of a Brazilian grocery chain called "TUDO" is reported to have given Prisunic and some of its French associates much less satisfactory results. More recently, it has become a managerial and financial participant, along with a Spanish merchant and with British, French, Swiss, Spanish and Kuwait investors, in Simago, probably the most successful of all the current foreign retailing ventures in Spain.

7. Paris - France S. A. - Department store owners.

8. Société du Louvre - The group has three main divisions - hotel, property and department stores, owning the hotels Grillon du Louvre and de Palais d'Orsay in Paris and others in provincial towns through its subsidiary Extension Hôtelière Immobilière. The property interests have played an increasingly important part in group affairs so that in 1967 they made the largest contribution to profits.

   The store division has been making losses but these have been decreasing partly as a result of extending the closing hours to permit evening shopping, and satisfactory trading by the subsidiaries, Prisunic-Marenge and L'Aquitaine, the latter operating in the Bordeaux area.

9. Carrefour - in 1970 had 24 outlets including 13 hypermarkets (more than 2, 300sq. m.). It also operates in Belgium, Switzerland, Italy and the UK.

GERMANY

1. Karstadt, a German company, is involved in joint ventures with the Monopol stores of Luxembourg.

   Five Organisation Buying Centres, 58 stores, in addition there are 60 of Kepa.

2. Kaufhof is the second largest departmental store group and has 132 branches with total sales floor space of 589, 900 sq. m.

3. a. Neckermann a leading mail order firm dropped out of a tentative agreement with La Redoute, the leading French mail concern, in 1966.

b. It is the largest mail order house in Europe. It also owns 34 departmental stores, 1 food supermarket, 96 chain stores and 2 ordering agencies. Mail order business accounts for 39% of sales. The company also conducts a comprehensive after-sales service for its customers from more than 100 service centres. Subsidiary companies carry on business of travel agents, insurers, own and manage real estate, supply mortgage facilities and manufacture textile products for the parent company.

c. Neckermann, which has mainly concentrated its operations within Germany, but which has some external interests, has been an active 'price breaker'.

d. The French Government was once reported to have encouraged French expansion on the part of the German Neckermann mail order firm to provide a competitive stimulus to the domestic market.

NETHERLANDS

1. Albert Heijn - Food Manufacturers and Distributors whose chain of retail outlets is expanding the range of its wares (125 supermarkets; 269 self-service stores; 23 counter stores and bakery stores; 1 'Formosa' and 3 'Wimpy' restaurants; 12 'Albert's Corners', 1 brunch room.)

2. On 1st February 1966 an important change was effected in the structure of the Bijenkorf Group; statutory name of the parent company was changed to Bijenkorf Beheer N.V. This company is entrusted with the management and servicing of the various operating companies which, till the date mentioned, formed part of N.V. Magazijn de Bijenkorf. Sub-companies: N.V. Magazijn de Bijenkorf (operating of 3 large department stores, viz at Amsterdam, The Hague and Rotterdam); N.V. HEMA (51 department stores spread throughout the country); N.V. Sportmagazijn Perry van der Kan (10 shops for sports and travelling goods and toys); E. van de Hart (operates a department store and wholesale business); N.V. Galeries Modernes (9 department stores); N.V. Stoffenhandel V/L A. van Dan (5 department stores).

BELGIUM

1a. The Belgian expansion which went both North and South, was spearheaded by the Innovation firm of Brussels. Innovation set up a subsidiary to operate department stores in France under the name Inno-France, which in part is associated with outside capital. Several Inno stores were opened in the Paris metropolitan area and elsewhere, but with disappointing results. Various analysts have noted many weaknesses in the Inno-France operation including excessive real estate costs, inadequate junior managerial staffing and development, weak internal security, unattractive merchandising, an undesirable image among French consumers and harassment by weak authorities. French interests, including Galeries Lafayette, eventually acquired most of Innovation's share in the stores. Priba, a large variety chain jointly owned by Innovation and Bon Marché of Brussels led the major expansion to the North. Priba Nederland was also unsuccessful and was eventually sold to the Dutch Vroom & Dreesmann complex. Innovation is also reported to have tried to set up stores in Italy but again without success.

b. Participants: Prisunic (50%) - Uniprix - Priba; Le Manteau; Inno-France; Societe d'Expansion Charies-Quirot; SA Textile Corporation.

2 G. B. Entreprises S. A. - Department stores, supermarkets, bazaars, wholesalers and retailers.

The enlarged group controls 10 department stores and supermarkets (food), 13 household electric appliances, radio and television stores, 28 restaurants and 8 launderettes.

ITALY

La Rinascente - Department stores, multiple stores and supermarkets.

On January 31st 1968 the company operated 7 stores under the name of Rinascente, 117 stores under the name of UPIM and 46 stores (supermarkets) as SMA.

SWITZERLAND

The Elobus organisation of Zurich has stores in both Basle, Switzerland and nearby Mulhouse, France.

SWEDEN

Ahlen & Holm A. B. Department store owners

Owned the Tempo stores in Denmark which proved to have very poor and inaccessible location which is not profitable.

SPAIN

Galerias Preciados S. A. - Department store operators

The company is the leading Spanish department store group, owning and operating a number of department stores throughout Spain, chiefly in Madrid, Barcelona, Zaragosa, Valencia, Seville, Malaga and Las Palmas. In 1964 the Federated Department Stores, a U. S. chain, acquired a 10% of the capital from the Fernandez family, who exercised majority control, at a cost of slightly under $4 million as the first step in the development of a proposed internationalisation programme.

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Value added and return on capital as measures of managerial efficiency: comment*

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D.M. Beattie in his article [1] tries to defend the return on capital as a criterion for measuring managerial efficiency rather than using the value added concept. He bases his conclusions on three arguments:

1) it is more closely related to a primary management objective;
2) it enables a more useful analysis to be made of the reasons for high or low efficiency; and
3) it gives very similar results to the value added based index when used to rank firms in order of their efficiency [1].

In this paper I attempt to show that at least two of these conclusions are not accurate.

I

The first argument suggests that since profit is one of the primary objectives of the firm, or as it has been put, "the basic objective of a private enterprise firm is to earn profit for the owners on their stake in the business—their capital" [2], it has to be taken as the criterion by which to measure managerial efficiency. But the firm probably has several objectives, for instance: to increase sales, to maximize directors' remuneration, to increase exports, to increase the employees' satisfaction, to contribute to the improvement of social welfare and so forth.

Robichek and Myers in their discussion on the objectives of firms pointed out that the "... wide separation between the owners and managers of large American firms has led to consistent speculation that managers are serving their own ends rather than the shareholders'. For instance it has been argued that firms try to maximize sales, subject to a constraint in that 'satisfactory' rate of profit must be achieved on invested capital" [3]. The maximization of the rate-of-return, therefore, will not necessarily be the firm's primary objective. Even if it is one of the primary objectives of the firm, is it justifiable to ignore the weight of all other objectives, which is what is done when the rate-of-return is used as the criterion? Furthermore, Beattie argues that "profit represents both interest on capital and reward for the owners of the business for taking the risks. If the return on capital is higher than the 'market rate' of interest on capital, then it can be argued that the firm has performed well, to the benefit of its owners and, quite possibly, to the benefit of the community. Therefore, return on capital could be considered as a logical measure of managerial efficiency ..." [5]. In other words it has been suggested that the rate-of-return (symbol i) comprises two factors, namely, interest on capital (r) and premium on risk-taking (ρ), $i=r+\rho$. Under the assumption of perfect and competitive markets all firms with the same risk class will obtain the same expected rate-of-return. It emanates from the above statement that in instances where Firms A and B obtain rates of return i_A and i_B respectively, where $i_A<i_B$, Firm B will be regarded as more efficient than A regardless of their specific risk class. In the case of imperfect markets this argument will be much more complicated and not as simple as it has been presented.

II

Beattie uses in his article a value added index to measure the firm's performance. This index is based on a logical idea, that of looking at the efficiency ratio which comprises net output in the numerator and input in the denominator, where the output is the firm's value added and the input the firm's expenses.

$$\eta = \frac{\text{Value added (firm's net output)}}{\text{Cost of capital and labour (firm's input)}}$$

* I wish to thank Professors E.S. Kirby and J.M. Samuels and the assessor for helpful comments on an earlier draft of this paper.

his measure is correct we can compare/rank iency of two or more firms where η will be the king criterion.

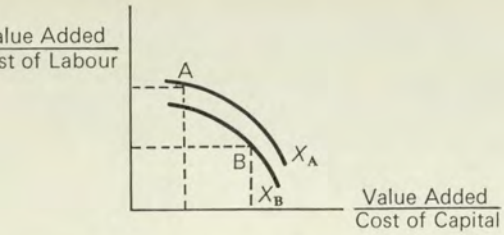

Figure 1

us consider two hypothetical firms:
Firm A (capital intensive) and Firm B (labour ensive) produce the same amount of output (value led) and use the same amount of input (cost of our and cost of capital), as shown in Figure 1. cording to Beattie's version these two firms will w the same η and hence are equally efficient. estigation of Beattie's index will lead us to the clusion that the greater the area enclosed by the n plotted, the abscissa and the ordinate, the ater is the firm's efficiency. If we look at the same n's curve of production, labelled as X_A and X_B pectively (see Appendix), it would appear that m B is less efficient, at least from the social point view, than Firm A, since Firm B produces rela-ly less output than Firm A.[1]
Beattie assumes that the rate of substitution be-een the factors of production (the firm's inputs) ie, our and capital, is unity. That is to say that all the ns which are plotted on the same unit elasticity ve are equally efficient, as shown in Figure 2.
In other words two Firms A and B having the ne value added and the same expenses will be ined as equally efficient, although one of them may ve an optimal allocation of resources and the other

[1] According to Jorganson and Griliches ([6] p. 249) mploying data on both quantities and prices, movements ng the production function may be separated from shifts in production function. Shifts in the production function are ntified with changes in total factor productivity".

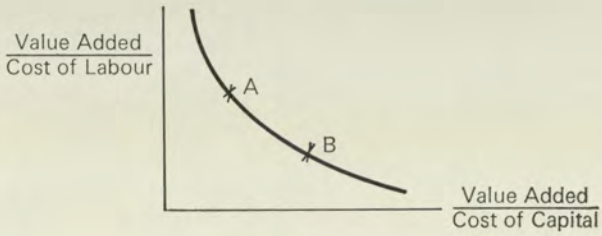

Figure 2

may not. Furthermore, the suggested version will lead us to the conclusion of unity trade-off between capital efficiency $\left(\frac{\text{value added}}{\text{cost of capital}}\right)$ and labour productivity $\left(\frac{\text{value added}}{\text{cost of labour}}\right)$. But it has been pointed out by Beattie that management and owners are more sensitive to capital efficiency than labour efficiency [5], which means that marginal substitution between these two elements is different from unity. Therefore, in order to remove this inconsistency the denominator of the index suggested has to be changed so as to give expression to the substitution factor of the two elements.[2]

It is shown in Beattie's paper that a high correlation coefficient is found between returns on capital and value added indices of firms in six interfirm comparisons [7].

Beattie's value added index states:

$$\frac{\begin{array}{l}\text{Profit } (P) + \text{Wages and Salaries } (W) \\ \quad + \text{National Insurance and Pensions } (I) \\ \quad + \text{Depreciation } (D)\end{array}}{\begin{array}{l}\text{Interest on Capital } (rK) \\ \quad + \text{Wages and Salaries } (W) \\ \quad + \text{National Insurance and Pensions } (I) \\ \quad + \text{Depreciation } (D)\end{array}}$$

As it is indicated by Beattie, the denominator and the numerator both comprise the same three elements, W, I, D; thus the index could be written:

[2] It appears that Beattie has not distinguished between private and economic efficiency.

$$\eta = \frac{P+C}{rK+C}$$

where η = the firm's efficiency
P = profit
r = the national rate of interest
K = capital employed
C = wages and salaries + national insurance and pensions + depreciation $(W+I+D)$

t can be anticipated that a high correlation coefficient will be found between this index and the rate-of-return, since the rate-of-return (symbol i) is equal to P/K, to which Beattie refers.

Furthermore, we anticipate that a higher correlation coefficient will be found in capital intensive firms than in labour intensive firms, because abour intensive firms have higher labour expenses, e, greater C. Therefore, the results obtained on the relationship between the value added index and capital intensity are not surprising.

It follows that for such differences—when an efficiency comparison is required—it is necessary to look at the type of index referred to above, rather than at the rate-of-return. Furthermore, where the firm's profit is zero, the use of the rate-of-return criterion will result in an absurdity.

To conclude, I have not tried to diminish the importance of the rate-of-return as a financial decision tool especially as regards investment decisions. It can give indications concerning the firm's managerial performance—a very important as well as complicated subject—but it is subject to errors and biases mainly when inter-firm comparisons have to be made. It may be possible to reduce these levels of errors by using an appropriate value added index, but not all Beattie's arguments for doing this can be substantiated.

APPENDIX

We can assume that the firm employs two factors of production —namely labour and capital—in order to produce its output, which we consider as its value added.

Under the assumption of specialization of the production factors, the production curve will be concave to the origin as shown in Figure 3.

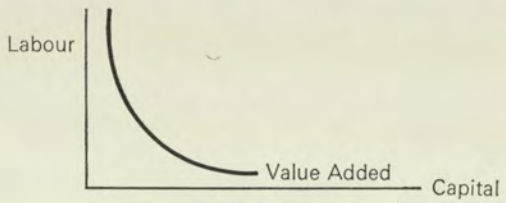

Figure 3

In order to normalize the production curve, the two sides of the equation

$$VA = f(L,K)-$$

where VA = value added—taken here as the firm's output
L = labour used by the firm—one of the firm's two factors of production
K = capital used by the firm—the firm's other factor of production

may be divided by VA, to get

$$1 = f\left(\frac{L}{VA}, \frac{K}{VA}\right)$$

The explanation of this expression is that it is necessary or useful to look at the relative input (L, K) used to produce one unit of output (VA).

This does not imply any change in the curve's character; it retains the same form.

To adhere to the method used in the article, the procedure must be to follow the reverse ratios VA/L, VA/K; in other words, to look at the mirror-image of the production curve. This is shown in Figure 4.

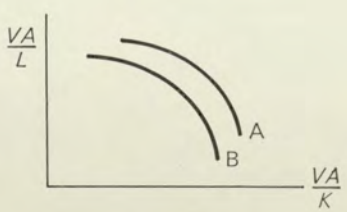

Figure 4

It must be remembered that it is not necessary for firms to have the same production curve. Even within industry, the same phenomenon will be found.

FERENCES

1] Beattie, D.M., "Value Added and Return on Capital as asures of Managerial Efficiency", *Journal of Business ance*, Vol. 2, No. 2 (Summer 1970), p. 22.

2] *Ibid.*, p. 24.

3] Robichek, A.A., and Myers, S.C., *Optimal Financing isions*, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965, 4. See also [4].

[4] Amey, L.R., *The Efficiency of Business Enterprises*, London: Allen and Unwin, 1969.

[5] See Beattie, D.M., *op. cit.*, p. 23.

[6] Jorganson, D.W., and Griliches, Z., "The Explanation or Productivity Change", *Rev. of Econ. Studies*, Vol. 34, 1966.

[7] See Beattie, D.M., *op. cit.*, p. 27.