Managerial Real Investment Incentives under
Corporate Income Taxation

by

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I declare that this thesis is my own work and that I have disclosed all the sources used in its preparation.

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CONTENTS

PREFACE

CHAPTER 1. CORPORATE OBJECTIVES

1.1 Introduction 1

1.2 Determinants of Corporate Objectives 3

(a) Managerial Motivation 3
(b) The Corporate Environment 22

1.3 Theory of the Firm and the Role of Profit 35

(a) Theory of the Firm 35
(b) Critique of the Theory 37
(c) The Role of Profit 39

1.4 Managerial Motivation and Corporate Income Taxation 48

(a) Preliminary 48
(b) The Income Effect 52
(c) The Substitution Effect 62

CHAPTER 2. THE NATURE AND EFFECTS OF RISK AND UNCERTAINTY

2.1 Introduction 71

2.2 The Domar-Musgrave Analysis 73

2.3 Risk or Uncertainty? 77

2.4 Some Effects of Uncertainty 90

2.5 Incentive Effects of Tax Loss Offsets under Uncertainty 111

CHAPTER 3. CORPORATE REAL INVESTMENT DECISIONS

3.1 Introduction 120

3.2 Diversification Strategy 122

3.3 Investment in Existing Lines 148

(a) Net New Investment 148
(b) Replacement of Fixed Assets 162
CHAPTER 4. THE ROLE AND DETERMINANTS OF PROFIT

4.1 Introduction 178

4.2 Profit in Relation to Diversification Strategy 179

4.3 Profit and Investment in Existing Lines 194
   (a) Demand 194
   (b) Costs 198
   (c) Pricing Policy 214

4.4 The Medium of Decision 217

CHAPTER 5. CORPORATE TAX CHANGES AND INVESTMENT

5.1 Introduction 222

5.2 Effects of Changes in Corporate Tax Rates 224

5.3 Tax Investment Incentive Measures 243
   (a) Preliminary 243
   (b) The Case for the Incentive Measures 245
   (c) Critique of the Incentive Measures 252

APPENDIX. A DIGEST OF THE DOMAR-MUSGRAVE ANALYSIS 266

BIBLIOGRAPHY 295

FIGURES

3.2-1 Scope for Diversification 135
   I The Optimum Asset Curve 274
   II The Equilibrium Position 277
   III Tax Sensitiveness 279
   IV No Loss Offset 281
   V Full Loss Offset and Constant Tax 288
   VI Full Loss Offset and Variable Tax 290

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This study was originally intended to deal with corporate tax policy in relation to the financing of investment and tax incidence, as well as the incentive to invest. However, as Domar has remarked, 'there is just so much one can do in one paper' [51, p.156]. The desired treatment of the latter aspect of the overall relation between corporate taxation and business behaviour left no room, under the regulations, for the two former aspects. Whether this is considered reasonable in the circumstances, or merely downright bad management of the available space, depends very much on one's views about the conclusions of this study and the methods by which they have been reached.

The approach adopted is based firstly on the belief that effects of corporate taxation on investment incentives depend on the choice of a theory of investment and of a theory of the role of profit in relation to investment. The approach is based secondly on the conclusion that in neither case is a satisfactory explanation readily available from the literature which could be adopted on an overall basis after brief introductory justification. This is especially true of the theory of profit. Accordingly, much of the study is devoted to the eclectic construction of theories of positive behaviour in these two interrelated areas.

A subsidiary purpose of the study is to test the alleged applicability to corporate real investment of the 1944 analysis of effects of income tax changes on risk-taking by Domar and Musgrave. This influential
analysis acts as a point of departure for the present study, and it is suggested that the edited version of their article contained in the Appendix should be read before embarking on the main study. Organization of the subject matter, particularly of the first two Chapters, has been considerably influenced by the Domar-Musgrave analysis or, more specifically, by the dissection of the various strands of their argument which seemed appropriate for purposes of understanding and criticizing their conclusions. Like Domar and Musgrave this study refers to proportional income or profits taxation.

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*****
CHAPTER 1
CORPORATE OBJECTIVES

1.1 Introduction

On the role of corporate objectives Williamson has observed: 'in all cases except where profitability is at best the minimum sum necessary to prevent take-over, the policies the firm pursues will depend on the form of its objectives' [264, p.15]. Ansoff expressed a similar opinion in stating that proposed courses of action by a corporation will be tested for the extent to which they are likely to close the gap between the corporation's current position and the set of objectives established. [7, p.26].

This Chapter therefore examines how objectives are determined, whose objectives are important for decision-making purposes, and the respective roles of real investment and profit (or profitability) in corporate objectives. Although the latter do not constitute business behaviour, or even fully explain it, their identification provides an essential foundation for the analyses of real investment decision-making and effects of corporate income tax changes in later Chapters.

Relevant aspects of the Domar-Musgrave analysis of effects of income tax changes on investment are progressively introduced during the course of discussion. These aspects are compared with their closest counterparts in the corporate sphere to test the alleged applicability of this analysis to real investment decision-making from
the viewpoint of objectives or preferences. This comparison culminates in the final Section with a critique of the Domar-Musgrave results; and preliminary conclusions are drawn from the same viewpoint about effects of corporate income tax changes on real investment decisions.
1.2 Determinants of Corporate Objectives

(a) Managerial Motivation

Separation of control from ownership of corporations is a major institutional fact of modern corporate life. As Mason states: 'almost everyone now agrees that in the large corporation the owner is, in general, a passive recipient; that typically control is in the hands of management; and that management normally selects its own replacements' [176, p.4]. Shareholders have in fact exchanged control for liquidity. [Berle and Means, 14, p.286]. (1)

The decline of shareholder influence provides tremendous potential scope for the exercise of discretion by managements. In particular, it is extremely likely that a firm's business will be conducted, not primarily for its shareholders' benefit, but for the sake of the enterprise itself. [Maurer, 177, p.186]. As Williamson argues: 'Surely it is significant that the second and third chapters of Genesis record that where discretion exists it is apt to be exercised, and that merely to charge someone to be a good and faithful servant is not adequate to secure his performance' [265, p.3].

(1) In a recent study of the extent of management control among the 200 largest nonfinancial corporations in 1963, Larner compared his findings with those of the 1929 study by Berle and Means. He concluded that 'it would appear that Berle and Means in 1929 were observing a "managerial revolution" in process. Now, 30 years later, that revolution seems close to complete, at least within the range of the 200 largest nonfinancial corporations' [150, pp.786-7]. Larner found that managerial control had substantially increased in each of the major industrial groups since 1929.
There is typically little that shareholders can do to prevent or reverse this state of affairs. Effective criticism of management may be very difficult, if only for lack of specialized knowledge and access to relevant information. Management itself tends to be self-perpetuating, largely through transfer of its monopoly power over time by a process of executive ascension and retirement. Also, 'the proxy machinery has...become one of the principal instruments not by which a stockholder exercises power over the management of the enterprise, but by which his power is separated from him' [Berle and Means, 14, p.139]. Moreover, large institutional investors, such as insurance companies, rarely attempt to interfere in the affairs of corporations whose shares they purchase. [Gordon, 96, p.vii; Williamson, 265, p.22].

As Marshall observed, separation of control from ownership frees management from effective criticism for anything less than gross negligence. [174, pp.317-8]. Shareholders' power is likely to be limited to demanding a minimum performance level of management. [Papandreou, 197, pp.197-8]. Managerial motivation, not that of shareholders, underlies the formulation of corporate objectives and the decision process, although management typically does not bear the main financial risks involved and does not directly benefit from the profits of successful decisions. Whether corporate objectives and decisions are incompatible with shareholders' interests will depend on the degree to which the self-interest of those in control may run parallel to the interests of ownership and, insofar as they differ, on the checks on the use of power which may be established by political, economic, or social conditions.
1.2(a)

The corporate stockholder has certain well-defined interests in the operation of the company, in the distribution of income, and in the public security markets. In general, it is to his interest, first that the company should be made to earn the maximum profit compatible with a reasonable degree of risk; second, that as large a proportion of these profits should be distributed as the best interests of the business permit,...and finally, that his stock should remain freely marketable at a fair price [Berle and Means, 14, p.121].

Domar and Musgrave believe that 'the rationale of real investment decisions would move along similar lines' to those of financial investment. [52, p.422]. By providing only the 'risk-taker' with investment preferences they implicitly assume that management and shareholders exhibit similar preferences; or, in Berle and Means' terminology, that there is either an exact parallel between the self-interests of control and ownership, or that checks of sufficient strength exist on use of managerial power to enforce the same result. Since neither of these conditions usually obtains in practice, it would seem that Domar and Musgrave either overlooked the differences between real and financial investment caused by separation of control in the former case, or that they would deny the importance of these differences.\(^2\)

A considerable literature is devoted to the question of how a firm should proceed if its objective is 'the greatest satisfaction of common stockholders' preferences' [Lintner, 155, p.292]. This objective, to which the implicit Domar-Musgrave assumptions actually correspond

\(^2\)

The latter explanation is more probable, especially as Domar and Musgrave referred to 'the manager of a corporation about to decide which of his plants he should expand,...' [52, p.422].
when corporate real investment behaviour is considered, is generally identified with maximization of the market value of shares, or of net worth. [E.g. Gordon, 91; Gordon and Shapiro, 95, p.142; Lintner, loc.cit. and 159, p.50; Lorie and Savage, 161, p.57; Roberts, 212, p.199; Solomon, 235, p.74]. Some participants in this normative debate claim that firms do in fact try to maximize the market value of shares, even when control is separated from ownership. Roberts, for instance, believes that a management with separate powers 'would appear to be in the best position' [loc.cit.] to achieve this objective. Walter, however, feels that market value maximization need not be the sole objective of corporate managements [261, p.281], while Gordon states: 'It is possible that the influence of other objectives subordinates the influence of maximization of the stock value in corporate financing policy' [91, p.234].

In this study the view is taken that exercise of managerial self-interest rules out market value maximization as a positive corporate objective, and that the market value of shares enters managerial calculations as a principal security constraint. Implicit identification of the normative objective with the Domar-Musgrave investor preference assumptions is therefore potentially fatal to the claim that their analysis applies to, and correctly describes, managerial investment behaviour. Their analysis depends heavily on arguments about investment behaviour derived from investor indifference curves, whose properties result from their preference assumptions. Unless it can be shown that these preferences correspond reasonably closely
to managerial motivation, the Domar-Musgrave analysis is off to a bad start in its bid to explain corporate reactions to profit tax changes. (3)

The set of investor preferences adopted for purposes of their analysis is quite straightforward. They assume, first, that for any individual the marginal utility of income declines with increasing income, and second, that the marginal disutility of risk-taking rises with increasing risk. We also assume the marginal utility of income to be independent of risk and vice versa. Our analysis being limited to the immediate effects of a tax on investment, without regard for secondary effects such as changes in wealth, this assumption appears reasonable [52, p.402].

Domar and Musgrave also consider an alternative set of preferences.

If income utility is...assumed constant, the second assumption (increasing disutility of risk-taking) must be applied, since the tax will produce no effects on risk-taking whatsoever, if both income utility and risk disutility are held constant [52, p.403 , n.9].

Investment yield (y) 'is regarded as a compensation for risk-taking' [52, p.397], is net of all monetary costs of investment, and includes a return for 'the personal "effort" of making the investment' [52, p.398].

If the return on risk-taking is close to zero - that is, if market prospects are extremely poor - the investor will take little risk, if any. As the market improves, he will take more risk. Finally, as his income increases, due to improved market

(3) Domar and Musgrave claim that their investor preferences = shareholder preferences = managerial preferences. If it is now accepted that shareholder preferences ≠ managerial preferences, then their investor preferences = managerial preferences only if their investor preferences ≠ shareholder preferences. The disability attaching to the Domar-Musgrave analysis is therefore already serious. Also, suppose that managerial preferences do correspond to the Domar-Musgrave investor preferences within the narrow scope of the latter (yield and risk). It would still be possible for managerial investment behaviour to differ in response to objectives which have no counterpart in the Domar-Musgrave analysis.
conditions, he may once more become less willing to take risk [52, p.407].

Domar and Musgrave define risk in the following passage.

Of all possible questions which the investor may ask, the most important one, it appears to us, is concerned with the probability of the actual yield being less than zero, that is, with the probability of a loss. This is the essence of risk. Since the investor is not only interested in the probability of a negative return, but also in the chances of suffering losses of various magnitudes, the coefficient of risk should be defined more precisely as a function of losses and their probabilities. This can be done most simply by defining risk as...r, i.e. the summation of all possible losses multiplied by their respective probabilities...[52,p.396]

The investment behaviour of a Domar-Musgrave investor is therefore determined (apart from tax considerations) by interaction between his progressively-increasing dislike of risk, as the extent of his risk-taking expands, and his (perhaps) diminishing enthusiasm for further increments of income as the level of his expected income rises. 'In the extreme case, the investor who insists on a given income, irrespective of the risk involved, will be taking higher and higher risk as the rate of the tax increases' [52,p.407,n.4].

It would be practically impossible to deal with the motivation underlying corporate behaviour within the same extremely simplified framework employed by Domar and Musgrave for their individual financial investor. Detailed discussion of corporate attitudes and policies towards risk and uncertainty is deferred until Chapter 2. Even the question of investment yield or profit is not one that can be tackled head-on, since corporate profits do not normally accrue directly to those making decisions. Clearly the first task is to conduct a detailed examination of the factors motivating corporate managements.
As Berle and Means have observed, 'we must know the controlling individual's aims before we can analyse his desires' [14, p.122]. Many psychologists would consider a single-goaled individual most unusual [McGuire, 180, p.74], and managers, like anyone else, have a host of personal motives including profit, sex, food, and saving souls [Katona, 131]. More fundamentally, however, managers aim for achievement and long-run survival in their positions [Cyert and March, 44, p.9]. Marris [173, p.49] states that, in interviews with 100 successful top managers, Henry [112] found them to be psychologically well-integrated persons who nevertheless possessed strong drives towards achievement. These subjects were ambitious and active in the sense of being impelled to move continually onward and upward at least until nearing retirement. It was found that these managers constantly try to maintain and improve their performances within their firms. Social conventions are thought to play a significant part in the development of business goals [Streeten, 246, p.282], for example, by way of managers' position in the social structure.

More than any other type the business executive is many-sided and multi-motivated. He has professional ethics, he feels a sense of public service and is not insensitive to public opinion. He is both a member of the corporate rich and an Organization Man. But it seems that the nearer he gets to the top, the more he is of the former and the less of the latter [Marris, 173, p.51].

Ethics should not, however, be equated with altruism. Marris points out that, if a professional code does exist, 'it is particularly likely to be afflicted with contradictions' [173, p.52], especially when the firm's interests conflict with those of society. The response of
managers to such incompatibilities is likely to be aggressive pursuit of narrowly-defined material self-interest. This has obvious implications for manager-shareholder relations, since 'the interests of ownership and control are in large measure opposed if the interests of the latter grow primarily out of the desire for personal monetary gain' [Berle and Means, 14, p.123].

The widespread freedom of managers to pursue their own self-interest in business dealings casts doubt on the adequacy of the traditional definition of rationality in the theory of the firm. This definition states that action is rational if it is consistent with the goal of maximum profits. [E.g. McGuire, 180, p.56]. Papandreou believes that 'rationality is consistent with the maximization of other things as well as profits' [197, p.206], while in Baumol's view:

People's objectives are what they are. Irrationality surely must be defined to consist in decision patterns which make it more difficult to attain one's own ends, and not in choosing ends that are, for some reason, considered to be wrong [11, p.47].

Baumol is surely correct here. Managerial rationality may be defined as the pursuit of management's self-interest through corporate decision processes. Since action which will further self-interest is not necessarily given or apparent in conditions of uncertainty, rationality is more specifically defined as the pursuit of perceived self-interest. Problems relating to its perception will be considered in Chapter 2.

Williamson suggests that 'the criteria for selection of goals to be included in the [managerial] subset are two: What satisfactions is the environment particularly
well-suited to satisfy? What needs does the environment create?" [265, p.29]. Remuneration conforms to each of the above criteria.

Managers determine one another's salaries and are far from elastic in supply. They represent a non-competing group in relation to the rest of the population and are typically paid considerably more than would be necessary in the long run to discourage them from turning to alternative occupations...But to say that managers, as a class, determine their own remuneration does not necessarily imply that they can take any sums they care to name. They are not acting collectively or conspiratorially and not necessarily even monopolistically. They are probably working within a system of rules developed from their own functional needs and based on their own norms...The system of compensation is the result of the function, but must also, through motivation, affect the way the function is performed, i.e. must affect policy [Marris, 172, pp.89-90; also Williamson, 265, p.35].

In order to understand the implications of the system of compensation, it must be appreciated that 'in manufacturing, democracy in the sense of government by all is unknown. The only alternative to government by all is government by pyramid, and it has everywhere prevailed' [Marris, 173, p.92]. Secondly, for authority within a hierarchy to be exercised in reverse order to income is normally out of the question. [Simon, 224, pp.32-3]. Managerial remuneration may thus become an organizational status symbol. However, remuneration tends to be 'sticky': it does not increase as the direct result of profitable decisions, but rather as the individual rises in the hierarchy and, of course, as the size of the hierarchy itself increases. Therefore, if managers wish to increase their remuneration for reasons of prestige, as well as purchasing power, they will be interested, not only in rising within the existing hierarchy, but also in working to create circumstances whereby the hierarchy may be appropriately enlarged. That is, for
reasons of material self-interest, they will seek to induce expansion of the size of the firm, and may moreover subordinate the profitability of decisions to this goal.

The incentive effects of bonus schemes depend on whether bonuses vary with both profitability and scale, or whether the amount depends on profitability alone. The latter, scale-independent type favours maximization of profitability, perhaps at the expense of growth. On the other hand,

under most typical scale-dependent schemes, even managers receiving more than half their remuneration in bonus could be behaving rationally if they permitted quite substantial downward variations in rate of return in exchange for the possibility of accelerated growth, provided only that significant other utility were associated with expansion as such [Marris, 173, pp.69-70].

The reason for this is that scale-dependent formulae make use of an apparent tendency for a given percentage increase in firm size to be associated with a smaller percentage increase in the number of managers. These formulae therefore provide an incentive to expand size relative to the number of people with whom a total bonus must be shared. It is therefore very significant that (as Marris reports [173, p.70]), whereas schemes of the scale-dependent type have been widely adopted, those depending on profitability alone have not. 'Dare we suggest that it is because managers rather than shareholders devise them?' [loc.cit.].

Classical economics, which always depicted work as a source of purely negative utility, could never envisage the non-financial aspects of managerial motivation.

(4) Penrose implies that bonuses are really designed to make respectable high compensation levels, which might otherwise be questioned by public opinion. [200, p.28n].
The most important spurs to action by the businessman, other than the desire for goods for direct want-satisfaction, are probably the following: the urge for power, the desire for prestige and the related impulse of emulation, the creative urge, the propensity to identify oneself with a group and the related feeling of group loyalty, the desire for security, the urge for adventure and for "playing the game" for its own sake, and the desire to serve others...These motives can be satisfied more or less through monetary rewards. They can also be satisfied in good part by other attractions which the large corporation offers its business leaders [Gordon, 96, p.305].

The 'other attractions' to which Gordon refers consist essentially in providing the means whereby managerial aspirations can be fulfilled. Bearing in mind that opportunities for managers to transfer between firms are restricted, the association between management and firm is one of mutual benefit.

Organization is required to exploit the advantages of large scale, and persons capable of providing this acquire considerable bargaining power. In the resulting balance, it is impossible to confine the senior executives to a purely immanent role, and, indeed, it might almost seem as if the institutions of managerial capitalism were developed to serve this class, as much as any other [Marris, 173, p.112].

By virtue of organizational need managers are therefore in a position to exercise and acquire considerable power and prestige, subject to the requirements of reasonable security. As to the nature of this power and the manner of increasing it, Gordon states:

The corporation executive possesses power by virtue of his position of authority in a firm which is itself powerful. His power is a product of his position rather than of personal wealth. Power in this case means authority over subordinates, control of the disposal of vast resources, and great influence over persons and affairs outside the firm. The corporation is a vehicle through which power comes to be held and exercised...Power thus secured increases with the size of the firm. Here lies an important explanation of the tendency of many firms to become larger, even if sometimes the profitability of such expansion is open to serious question [96, pp.305-6].
Prestige may be defined for present purposes as recognition of one's success in an executive capacity by superiors, colleagues, subordinates, and competitors, etc. It is accorded to management on the basis both of demonstrated capacity to produce 'results', and of the power base - the firm and its associated resources and influence. Success may be variously defined in terms of aggregate turnover, total profits or assets, and profitability (which differs from profits in not necessarily depending on the scale of operations). Each of these is a possible corporate objective and therefore also a candidate for the criterion of success. However, the enjoyment of prestige is functionally related to the exercise and increase of power, so that the means whereby managers increase their power are very likely also to be those whereby prestige is enhanced. Thus, if by achieving expansion, a manager improves both his own position and those of his colleagues and subordinates, his prestige will doubtless increase within the firm. (5) According to Galbraith, his prestige and that of his firm, would also rise in the business community, at least in the United States.

The income of a businessman is no longer a measure of his achievement: it has become a datum of secondary interest. Business prestige...is overwhelmingly associated with the size of the concern which the individual heads. American business has evolved a system of precedence hardly less rigid than that of

(5) Correspondingly, if a manager seeks to increase his own power at the expense of his colleagues, obstacles to group consensus may be encountered.
Victorian England. It is based almost exclusively on corporate assets [85, p.29].

As is well-known, managers operate in teams or groups. If an organization controlled by a group is to remain viable, there must be a working consensus between the participants even though each is seeking to attain separate personal goals. [Cyert and March, 44, p.9; McGuire, 180, p.31]. In Williamson's opinion this need for consensus precludes the arbitrary assignment of objectives. [265, p.8]. However, despite '...the obvious potential for internal goal conflict inherent in a coalition of diverse individuals and groups' [Cyert and March, 44, p.27],

the best short description of the motivation induced by social existence in a managerial group is that of a drive towards efficient, well-organised expansion, associated with a persistent search for new opportunities from a set which is perceived as finite, at least at any one moment of time [Marris, 173, p.61].

This hypothesis is supported by the fact that, as already described, managers as individuals are able to achieve their desire for power and prestige through expansion, in addition to increasing their remuneration. Expansion also appears compatible with consensus inside the managerial group to the extent that it does not obviously offend particular interests within that group. Moreover, in view of the discipline imposed by the hierarchical structure of firms, 'the policy bias of an organization as a whole can be thought of as resulting from the preferences of its individual members weighted by their relative influence.

(6) Galbraith's remarks apply to prestige outside the firm and do not invalidate a previous statement that managerial remuneration is an organizational status symbol.
position' [Marris, 173, p.103]. Therefore, if it can be shown that the self-interest of senior management is especially served by pursuing the goal of expansion, this explanation of individual motivation may be plausibly generalized to apply to the firm as a whole. Marris suggests that such a step is justified by the relative immobility of senior management.

Once an otherwise bureaucratic organization is permitted to grow, while high-level mobility continues to be inhibited (as is empirically the case in firms), ...it provides a powerful motive for senior officials to attempt to induce expansion and thus create higher vacancies into which they themselves are surely most likely to be appointed. There can be no doubt at all that this fundamental characteristic of the interaction between salary system, organizational structure and poor transfer market provides a real and powerful motive for inducing internal expansion in every modern business [173, p.101].

Other factors may be cited to support this view, for instance that prestige tends to be more a perquisite of senior than of junior management, especially prestige accruing from sources outside the firm. Senior management is more likely to be concerned with its 'image' in the business and financial communities.

The preceding discussion implies that modern corporate managements are potentially so strongly motivated towards growth that, ceteris paribus, no external stimulus beyond that of available investment opportunities is required. Yet it is a demonstrable fact that not all firms are growth leaders and that many of quite large size appear to opt for the quiet life. This may be due to lack of the necessary motivation towards growth, or this motivation may have been frustrated by other factors. Changing technologies, with which a firm is unable to keep in step, may, for instance,
have eroded its product-market scope. Alternatively, the desire to grow may have been lost through disappointments or simply because management no longer values growth sufficiently. In any case, the assumption that management is entrepreneurially competent, as well as properly motivated 'merely provides us with a class of firms which are capable of growing' [Penrose, 200, p.33]. A firm that is efficiently managed may still not be very enterprising. (7)

Lack of enterprise in an otherwise efficient management may be explicable in terms of the utility derived by management from a given growth rate. The extent to which utility is obtained from growth through additional remuneration, power and prestige is affected by management's fundamental desire for security and long-run survival, from which utility is also derived. [Lintner, 157, p.525]. This is especially relevant to senior management, for whom the personal consequences of financial failure or take-over would be relatively serious. [Marris, 17, p.103]. Desire for security is thus assured an important place in a firm's policy bias; and growth and security normally constitute the two main dimensions of managerial utility. 'Indeed, we do not care whether the

(7) Penrose defines enterprise as 'a psychological predisposition on the part of individuals to take a chance in the hope of gain, and, in particular, to commit effort and resources to speculative activity' [200, p.33]. Since 'the problem of entrepreneurial judgment is closely related to the organization of information-gathering and consulting facilities within a firm, and... leads into the whole question of the effects of risk and uncertainty on, and the role of expectations in, the growth of firms' [200, p.41] - managerial competence is discussed in Chapter 2. It is noted here as a constraint on growth motivation.
growth and security motives are regarded as primary, intermediate, "fundamental" or, for that matter, proximate..., given the facts of corporate life, they dominate' [Marris, 173, p.105]. Desire for security operates as a constraint on other aspects of managerial motivation. One explanation of inter-firm differences in the degree of 'enterprise' demonstrated is therefore managerial predilection for security. This is determined both by temperament and by pressure of circumstances, and the emphasis it receives will vary both as between firms and in a given firm over time.

The notion of managerial expense preference provides a further possible explanation for deficiency in growth motivation. Thus, in some cases 'it is not a general expansion of the entire scale of the enterprise that is desired, but a selective expansion of the expenditures that most contribute to managerial satisfactions' [Williamson, 265, p.30].

The notion of expense preference is developed... for the purpose of making the connection between motives and economic activity... Such an indirect approach seems to correspond to Marshall's observation [175, p.92] that although "desires cannot be measured directly," they can be measured "by the outward phenomena to which they give rise"...

By expense preference I mean that managers do not have a neutral attitude toward all classes of expenses. Instead, some types of expenses have positive values attached to them: they are incurred not merely for their contributions to productivity (if any) but, in addition, for the manner in which they enhance the individual and collective objectives of managers [Williamson, 265, p.33].

Managerial expense preference is an offshoot of the important concept of 'organizational slack', which 'consists in payments to members of the [corporate] coalition in excess of what is required to maintain the organization' [Cyert
and March, 44, p.36]. Slack is by no means confined to management: it can include, inter alia, dividends, prices, wages, and public services provided by firms. But management, as Cyert and March explain, is favourably placed in this regard.

From time to time virtually every participant in any organization obtains slack payments. However, some participants ordinarily obtain a greater share of the slack than do other participants. In general, we would expect that members of the coalition who are full-time, in a position to perceive potential slack early, or have some flexibility in unilateral allocation of resources will tend to accumulate more slack than will other members [44, p.37].

Expense preference is therefore the process by which slack is generated by management for its own benefit. In particular, managements will tend to have strong preference for remuneration and numbers of staff employed. [Cyert and March, 44, p.241; Simon, 222, pp.117-8, and 224; Thompson, 250, pp.101-2; Williamson, loc. cit.]. In accounting terms these roughly correspond to administrative and selling expenses and may be jointly described as 'staffing'.

Preference for staffing serves managerial aspirations for remuneration, power and prestige, and may contribute to security as well. [Barnard, 10, p.159; Cyert and March, 44, p.242]. As such, this preference is normally exercised in conjunction with the growth motive, 'since expansion of staff and emoluments can scarcely proceed independently of the expansion of physical facilities,...' [Williamson, 265, p.36]. Also, availability of suitably qualified staff often

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(8) Expense preference, in the form of discretionary spending for investment, also expresses managerial motivation towards expansion of the firm. [Cyert and March, 44, pp.240-44].
acts as a principal constraint on the growth rate attainable. [Penrose, 200, pp.45-55].

In some cases, however, this preference is exercised in lieu of the growth motive or, at least, to an extent which is out of phase with realized expansion rates. Depending on a firm's resources, it is clear that benefits which, in the long run, may be safely taken only as a result of growth may, over periods of surprising length, also be taken without (sufficient) growth. Increased jurisdiction within a fixed-size firm is, within limits, a substitute for promotion in an expanding firm. Cyert and March state:

That staffs have a tendency, sometimes legitimate and certainly natural, to grow has been widely observed. What may appear originally as a legitimate expansion, however, can, in the absence of binding constraints, easily lead to a general condition of excess staff throughout the firm. Indeed, the steady accumulation of excess staff may be difficult to resist as long as the firm is not confronted with adversity. [44, p.242].

Excess staff is relatively likely to be found in established firms of at least medium size, supported by 'discretionary profit' - defined as 'that amount by which earnings exceed... [the] minimum performance constraint' [Williamson, 265, p.36] - in conditions of imperfect competition.

In the long run the position of such firms may become untenable, as explained by Marris in describing effects of organizational slack generally. He states that such firms will grow more slowly for given security, experience less security for given growth rates, or, more likely, experience low security and slow growth together. In a 'bad' case, the firm would be growing slowly, be earning a poor rate of return, be compelled to adopt a relatively high retention ratio in order to finance even this modest growth rate, and hence be
displaying a low valuation ratio and be in considerable danger of take-over [173, p.270].

The predominant managerial objectives of growth, security and organizational slack are apparently inconsistent with normative maximization of shareholder satisfaction, and, therefore, with an implicit preference assumption of the Domar-Musgrave analysis, as applied to the corporate scene. Although relative emphases on these objectives vary markedly between firms, it does not seem that such variations will always affect the gap between managerial behaviour and that consistent with maximum shareholder satisfaction.

This is especially likely of variations in investment behaviour, which turn on the quality of managerial enterprise, or the ability and desire to grow. Sustained growth is sought, if at all, for managerial self-interest, and not primarily for shareholder satisfaction. Managerial security is preserved by, inter alia, maintaining safe levels of the market value of shares, instead of maximizing this normative objective. Managerial slack payments are generally contrary to shareholder interests, especially if they dissipate competitive strength and are excessive in relation to earnings potential.

Objections to profit maximization as a managerial goal are discussed later. In this Section managerial self-interest has been described in terms of other

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The valuation ratio is defined as the ratio of current market quotation of all issued securities (excluding debt) to net assets. [173, p.xviii]. Marris regards the valuation and leverage ratios as managements' principal security constraints.
objectives, without explicit reference to their relations with profit. Therefore, it cannot yet be stated that managerial attitudes to profit do not correspond to the Domar-Musgrave preference assumptions. However, in addition to the inconsistency involving their implicit assumption of identity between shareholder and managerial interests, it is already apparent that profit may be ranked differently in relation to other managerial objectives than is yield among the preferences of a Domar-Musgrave investor. At this stage profit has not even been admitted as a managerial objective proper, whereas yield is the sole positive objective of their investor.

The import of these differences cannot be clarified until the nature of the 'managerial state' has been further examined. Comparisons with the Domar-Musgrave world are therefore carried over pending discussion of the corporate environment and the role of profit.

(b) **The Corporate Environment**

It has been argued that long-run survival depends on chance not motivation [Alchian, 2, p.213], and that 'when the future outcomes of present decisions are uncertain, motivation does not constitute a criterion for each entrepreneur' [Enke, 73, p.568]. These views fail to recognize the true role of motivation in corporate behaviour.

The impact of motivation on behaviour is conditioned by both the internal and external environments. The latter, the world outside the firm, also affects motivation indirectly through its influence on the internal environment.
The objectives selected by corporate managements devolve from this interaction between collective motivation and environment: they represent motivation as translated into criteria for action, subject to the lets and hindrances imposed by environmental factors. Certain of these factors had to be introduced for purposes of examining the nature of motivation. For instance, the hierarchical structure of firms is one important feature of internal environments, whilst separation of control from ownership is an indication of the extent to which external factors affect (or do not affect) the formulation of objectives.

The main influence of the external environment relates to the competitive conditions in each of a firm's actual and potential markets. These conditions, in conjunction with its competitive advantages and disadvantages, determine the firm's opportunities for profitable growth (in Ansoff's terms, its 'product-market scope'). [Ansoff, 7, pp.68, 108; Penrose, 200, p.31; Standish, 238, p.83]. The characteristics of a given product market broadly depend on the stage reached in the life cycle of the industry concerned. This cycle typically follows a path consisting of several stages. Initially firms concentrate on forging their competitive strength within the industry, and on absorbing the new technology which gave rise to the industry. Eventually its structure may become concentrated as the result of competition in its formative stages: attention is likely to focus on internal productive efficiency during this period. If the industry does settle down within an oligopolistic framework, competition for market shares may develop in anticipation of the stage when
1.2 (b) saturation of demand and high costs of further penetration identify the industry as mature. [Ansoff, 7, pp.70-1]. Alternatively, one firm may establish monopolistic sway, or concentration may never eventuate, so that competition among a considerable number of firms remains effective.(10)

Given the strength of a firm's motivation towards expansion, its objectives, and particularly their priority at any time, will both be influenced by the nature of the current phase of the life cycle of each industry in which the firm is interested, whether actually or potentially. Kmenta and Williamson [138] tested a proposition similar to this with reference to United States railroads over the period 1872-1941. Their particular purpose was to explain 'the likely changes in investment behaviour which occur as the industry passes through a fairly predictable set of institutional and growth phases' [138, p.172]. They found that 'a "single model" approach to explain investment behaviour breaks down when applied to differing stages of railroad development. On the other hand, the stage-of-growth models have produced very satisfactory results...' [138, p.180]. That is, changing competitive circumstances in, and the degree of maturity of, an industry determine the extent to which expansionary tendencies are reflected in investment behaviour.

Competitive circumstances have an important bearing on managerial security. As already stated, the desire for

(10) In the latter case, entry into the industry would probably be quite easy, but the mortality rate would normally also be high owing to a competitive struggle for survival. [Williamson, 265, p.20].
security operates as a constraint on the growth motive. Thus, as Williamson explains:

Where the range of behavior that is consistent with survival is narrowly bounded, the question of motivation is of small importance. However, some firms appear to have access to advantages that bring substantial relief from the threat of extinction. Here an understanding of motivation may be essential [265, p.11].

Leaving aside the question of whether Williamson implicitly understates the number of firms that are so favoured, it follows that a firm's growth motivation will be completely constrained by security considerations when a state of effective competition prevails in each of its existing and potential markets. (11) The same applies if these markets have matured, since one firm's gain can then only result in another's loss. Lesser degrees of competition in existing markets, together with the potential availability of new markets, allow growth motivation to be reflected in working objectives. However, lack of competition is of little help if accessible industries are already mature, i.e. if demand is already saturated and/or the costs of further penetration are prohibitive.

For some resourceful firms the external competitive environment stimulates more than it constrains. Man is 'a learning...pattern-finding and concept-forming animal' [Simon, 229, p.272]. Successful growth ventures may therefore strengthen motivation and cause objectives to be

(11) In Machlup's opinion, 'for competition to be effective it is not necessary that competition is either pure or perfect or that all or any of the markets in which the firm buys or sells are perfect' [167, p.19, n.9].
revised in favour of higher growth rates. Increases in competitive strength over time may enhance managerial aspirations. Competitors' successes may influence motivation through a 'demonstration effect'. Priorities may be re-thought in terms of competitive strength and opportunities by new brooms in top management.

Numerous other factors in the external environment condition managerial motivation, including constraints and responsibilities imposed by law and public opinion, such as anti-trust legislation [Ansoff, 7, p.59] and sanctions against elimination of competitors by violent means. The desire to attract external resources argues for pursuit of goals that are reasonably compatible with this aim. [Standish, 238, pp.83-4]. Fear of take-over, probably synonymous with disaster for top management, is also likely to exercise a certain influence on some managements. [Marris, 173, p.262].

The translation of motivation into working objectives is affected by a firm's internal environment in two principal ways: first, by what may be termed the existing state of the firm; and second, by the process employed to formulate and revise objectives, and to order their priorities over time.

The existing state of the firm refers to its age and size, the amount and types of resources controlled (including managerial resources), the nature of its existing business, its past history, its current growth and profit performances, and its internal structure. Age, size and resources, together with the nature of the existing business, largely determine a firm's scope in the external
environment. Larger and older (i.e. established) firms tend to have many competitive advantages over small firms, and their scope is also usually much wider. [Penrose, 200, p.204]. Thus, as a firm grows in size, its ability to grow becomes stronger, at least up to a certain point.

According to Penrose,

There is considerable evidence that small firms, because of their size alone, are restricted by their environment to certain types of opportunity where the prospects of continued expansion are extremely limited...[Their growth]...may be more controlled by the environment than by the quality of resources or the enterprise and ingenuity of entrepreneurs,... [200, p.215].

However, as the number of 'large' firms undoubtedly increases over time, some small firms must overcome these disadvantages and become large themselves. This is attributed mainly to superior entrepreneurial ability, which gives those possessing it a choice of possible activities comparable to that of a firm with large financial resources. These firms demonstrate their ability by selecting fields in which growth (and profit) opportunities are good. Their success testifies to the strength of their desire to expand\(^{(12)}\), and implies that, without the necessary motivation (\textit{inter alia}), firms will not grow.

The importance of availability of resources to back up growth motivation transcends their total size. As Penrose explains:

\textit{Strictly speaking, it is never resources themselves that are the 'inputs' in the production process, but only the services that the resources can render...The important distinction between resources and services is not their relative durability; rather it lies in the fact that resources consist of a

\(^{(12)}\)

That is, to their enterprise. See note 7 above.
1.2(b)  

bundle of potential services and can, for the most part, be defined independently of their use, while services cannot be so defined, the very word 'service' implying a function, an activity..., it is largely in this distinction that we find the source of the uniqueness of each individual firm [200, p.25].

Resources tend to be rather inflexible in practice, both in total capacity and type of use. [Ansoff, 7, p.41]. This applies to fixed assets, managerial and staff resources and, in total terms, to the availability of finance. However, this is a further source of inter-firm differences. The amount of expansion that may be contemplated in a given period is limited by availability of managerial resources over and above those required to carry forward the firm's existing operations at an appropriate level of activity. [Penrose, 200, p.201]. In addition it is necessary that these resources should be of appropriate quality and skills, so that the constraint also depends on the complexity of the desired expansion, whether it will occur in areas closely related to existing activities, and whether it will require skills and knowledge not possessed by the firm. (13) These factors determine the quantity and types of managerial resources required.

There is a close and mutual relation between objectives and resources. On the one hand, a firm's objectives determine both the amount and types of resources required and, in part, the extent to which those resources will grow over time. On the other hand, the amount and types of a firm's resources govern both the formulation of objectives

(13) Managerial preference for staff may, as already noted (p.19), overcome the problem of shortage of human resources for expansion purposes, provided that the staff engaged is of suitable quality and skill.
at any time and, depending on rates of change of the
different types of resources controlled, revisions of
objectives and their priorities over time are also
affected.

These considerations raise a number of complex issues,
not the least of which concerns application of the
Domar-Musgrave analysis to corporate behaviour. Their
analysis was 'limited to the immediate effects of a tax on
investment, without regard for secondary effects such as
changes in wealth,...' [52, p.402]. (14) Now it is impossible
to confine an analysis of corporate behaviour in this
respect. In the first place, firms' reactions (if any) to
profits tax changes may only be fully worked out over the
conventional long run. Over this period the effects of
growth on the size of firms and on their productive
opportunities are likely to produce changes or revisions of
objectives: these changes need to be analysed. Secondly,
as Domar and Musgrave noted in connection with their
individual investor, changes in wealth may cause changes in
motivation. [52, p.421]. Changes in resources affect a
firm's preoccupation with security, among other effects.

The mutual relation between resources and objectives
over time can, however, best be studied in terms of the
process whereby objectives are translated into action, viz.
through the decision-making process. The same applies to

(14)
However, Domar and Musgrave also stated: 'The
indifference map could also have been expressed in dollar
amounts. Then the pattern would have been independent of
changes in wealth, which would have been reflected in a
shift of the optimum-asset curve' [loc.cit., n.7].
the nature of a firm's existing business and its current performance, which act as points of departure for purposes of revision of objectives. The past history of a firm inevitably determines its present situation and exercises upon both revision of objectives and the decision process the influence of precedent. [Cf. Hurwicz, 117, p.116].

Formulation of a set of objectives constitutes the first stage in rational decision-making under uncertainty. A hierarchy of goals, sub-goals and criteria of choice for reaching those goals is required, since uncertainty may prevent the goals themselves from acting as an adequate basis for choice; i.e. the outcome of a given strategy is uncertain and it may be impossible to infer from the goals alone that this outcome will be superior to those of other available strategies. [Latané, 151, pp.144-5].

The process by which the above hierarchy is constructed and revised will intimately affect the nature of the goals, their priorities (including the sequence in which they receive attention), and the manner in which they control the decision process. Inter-firm differences in the first-mentioned process may therefore cause otherwise inexplicable variations between firms in their reactions to given environmental disturbances, such as a tax change. For instance, a disturbance may precipitate a conflict of objectives. In these circumstances probably no two managements would resolve the conflict in exactly the same way.

It is necessary first to establish who is responsible for formulating and revising objectives and, in fact, whose objectives they are. A firm may be regarded as a coalition
of interests comprising shareholders, management, workers, creditors and customers, etc. Each of these groups may have substantially different collective goals, and would like to see those goals reflected in the firm's objectives. The 'stakeholder' theory of objectives suggests that objectives balance the claims of the groups concerned. [Ansoff, 7, p.34]. Papandreou argues that objectives grow out of interaction among the various participants in the form of a general preference function. [197, Vol.2, pp.183-219].

These explanations neglect 'the obvious potential for internal goal conflict inherent in a coalition of diverse individuals and groups' [Cyert and March, 44, p.27]. In practical terms of power and opportunity management alone will normally set and revise objectives, except in conditions of great adversity.

Although we thereby reduce substantially the size and complexity of the coalition relevant for most goal setting, we are still left with something more complicated than an individual entrepreneur. It is primarily through bargaining within this active group that what we call organizational objectives arise. Side payments, far from being the incidental distribution of a fixed, transferable booty, represent the central process of goal specification. That is, a significant number of these payments are in the form of policy commitments [Cyert and March, 44, p.30].

Goal formulation and revision by way of bargaining within the active managerial group reflects these authors' view that 'people (i.e. individuals) have goals; collectivities of people do not' [44, p.26]. The bargaining process must, however, be somewhat constrained by the hierarchical power structure of management, and also by the degree to which policy-making is centralized. [Ansoff, 7, p.35].
Although other groups in the coalition are normally passive, there are limits to managerial freedom of action, 'applied via share price, prices at which resources (especially financial resources) will be supplied, and customer and competitor reactions' [Standish, 238, pp.84-5]. These limits are reflected in various constraints self-imposed by management for its own security. (15)

Regarding the type of consensus which is likely to emerge from the bargaining process, Cyert and March state:

Actual organizational goals cannot normally be described in terms of a joint preference ordering. Studies of organizational objectives suggest that agreement on objectives is usually agreement on highly ambiguous goals. The studies suggest further that behind this agreement on rather vague objectives there is considerable disagreement and uncertainty about subgoals, that organizations appear to be pursuing different goals at the same time. Finally, the studies suggest that most organization objectives take the form of an aspiration level rather than an imperative to "maximize" or "minimize", and that the aspiration level changes in response to experience [44, p.28; also Alt, 4, Blau, 19, and Kaplan et al., 129].

It appears therefore that the bargaining process itself does not produce consensus in any great depth. However, a considerable number of organizational factors co-operate to ensure that there will normally be a sufficient degree of de facto agreement for working purposes. First, as already stated, objectives are constrained by scarcity of resources. Successive resource allocations effectively simplify problems of future allocations by narrowing the range of available alternatives. Control systems, such as budgets, facilitate the disposition of scarce resources. These exert a stabilizing influence on objectives over time. The force

(15)
See footnote 9.
of precedent also exerts a stabilizing influence on objectives. Moreover, internal functions may be disposed so as to mutually constrain active coalition members. As mentioned above, disagreement would tend to be limited by the hierarchical structure of firms.

To a degree conflict is not settled but sidestepped in what amounts to a 'continuous bargaining-learning process' [Cyert and March, 44, p.28]. People have limited time to spend on particular aspects of the overall problem. They may often neglect to test fully the consistency of new policy demands with existing goals, whether for lack of skill or on account of the particular sequence of demands which precedes the new issues. Also, since attention to sub-goals is largely determined by a firm's existing information-processing systems, conflict is to some extent avoided by the devices of sequential attention (i.e. considering one goal at a time) and quasi-resolution (active pursuit of all goals in conflict). [Ansoff, 7, p.37; Cyert and March, 44, Ch.5]. As Dorfman observes:

Typically a business firm watches manifold consequences of its operations including rate of profit, value of its shares, sales volume, share of market, et hoc genus omne, and is not willing to increase its performance in any one of these respects at unlimited sacrifice in the others [53, p.608].

By implication goal conflict largely relates to what Marris terms 'proximate objectives' [173, p.105], which express in operational terms a management's desire for growth and security. 'The latter in turn result from a more basic managerial utility system, incorporating a number of psychological, sociological and economic variates, such as dynamic aspiration, self-identification, class
orientation, and desire for power, status, wealth and personal security' \textit{[loc.cit.]}. The relation between managerial motivation and a firm's external and internal environments describes the methods by which management will strive to satisfy these most basic desires.
1.3 Theory of the Firm and the Role of Profit

(a) The Theory of the Firm

The above discussion of motivation and other factors determining corporate objectives has neglected both the conventional Theory and the relation of profit to objectives. However, the Theory is still too persuasive and well-established to be left entirely out of account, and, moreover provides an excellent basis from which to determine the role of profit in corporate objectives.

Also, a variant of the Theory's extension to conditions of risk and uncertainty, namely expected return maximization, was used in the Domar-Musgrave analysis of effects of income tax changes on investment.

The Theory states that a firm's sole objective is to maximize net revenue (profit), given input and output prices and a technologically-determined production function. Perfect competition and perfect foresight are assumed.

[Cyert and March, 44, pp.5-6; McGuire; 180, p.56]. Profit maximization is assured by the condition that output will be produced up to the point at which MR-MC = 0, the lowest point on the average cost curve for the given product. At this point the system is in equilibrium. Moreover, by virtue of the particular brand of rationality assumed by the Theory, a firm always tends toward this state.\(^{(16)}\)

Rationality, in the economic theory of the firm, implicitly assumes no action will be undertaken by the business enterprise that will move it away from its

\(^{(16)}\) Theories of monopolistic competition, oligopoly and monopoly have taken the basic Theory as given and have extended it to different market situations. [Chamberlin, 33; Robinson, 214; Stigler, 245].
goal of maximum profits. Furthermore, it assumes that the decision maker, faced with two or more alternatives that will result in various outcomes, will invariably select the alternative that will tend to move the firm to (or closer to) profit maximization [McGuire, loc. cit.].

Essentially, therefore, the Theory is of the steady-state type concerned with successive equilibria; it is not really capable of distinguishing the long from the short term. It does not aim to describe or predict the whole range of a firm's behaviour, but to explain price determination and optimum output and resource allocation in a given price system. [Cyert and March, 44, p.15; Krupp, 143, Ch.1; McGuire, 180, p.19; Penrose, 200, pp.10-11]. The real existence of the firm is incidental to these purposes; in fact, 'the concept of the firm to the economist is in reality the concept of the entrepreneurial role, which is treated as though it were the firm for purposes of theoretical analysis' [McGuire, loc. cit.].

Owing to its assumption of perfect foresight and specified rationality, the basic Theory does not deal with problems connected with formation of expectations or with prediction of competitors' behaviour and other aspects of uncertainty. [Cf. Simon, 229, p.256]. Even when extended to take account of uncertainty, the Theory treats the entrepreneur as mainly a passive 'risk bearer' who is unable to reduce the risk or uncertainty of enterprise, but must accept or decline it according to his nature. [Penrose, 200, p.58].

The Theory's static assumptions and preoccupation with equilibrium set fairly strict limits to the degree of a firm's expansion. The firm is assumed tied to given
products and markets. Growth is regarded as 'nothing more than an increase in the output of [these] given products...' [Penrose, 200, p.11], and is limited to the extent that the firm may not proceed beyond the 'optimum size' of these outputs. Without some change in external conditions (by definition beyond the firm's policy control) or knowledge, rising production costs will eventually halt expansion. Inter-firm differences in growth rate over the long period are not envisaged because compensating forces generated by cost differences tend to bring these rates back to equality. [Marris, 173, p.246].

(b) Critique of the Theory

A voluminous literature is devoted to criticism and defence of the Theory, particularly its advocacy of profit maximization. One widespread criticism, that firms cannot maximize profits owing to risk and uncertainty, will be examined in Chapter 2. Attention is directed here to the question, whether profit maximization will be selected as a firm's prime objective or even as an objective at all. The answer to this question will clarify the relation between profit and managerial motivation.

It was stated above that the real existence of the firm is incidental to the purposes of the Theory, for which the concept of an entrepreneurial role is sufficient. The Theory is concerned neither with the nature of the firm as an organization, nor with the whole range of its behaviour. Indeed, 'to some economists it has seemed implausible that
a theory of an organization can ignore the fact that it is one' [Cyert and March, 44, p.8]. Machlup touched on this paradox in a recent review article.

The model of the firm in that theory is not, as so many writers believe, designed to serve to explain and predict the behavior of real firms; instead it is designed to explain and predict changes in observed prices (quoted, paid, received) as effects of particular changes in conditions...In this causal connection the firm is only a theoretical link, a mental construct helping to explain how one gets from the cause to the effect. This is altogether different from explaining the behavior of a firm [167, p.9].

Machlup labels the belief, that the firm as a theoretical construct can be identified with the firm as an empirical concept, as the 'fallacy of misplaced concreteness' [loc. cit.].

Moreover, according to Machlup, the Theory is not designed to explain and predict the behavior of individual producers, only the effects of mass behaviour.

The point is that a model of a theoretical firm in an industry consisting of a large number of firms can do with a much smaller number of assumptions, provided the model is used to predict, not the actual reactions of any one particular firm, but only the effects of the hypothetical reactions of numerous anonymous "reactors" (symbolic firms). If it were to be applied to predictions of reactions of a particular firm, the model would have to be much more richly endowed with variables and functions for which information could be obtained only at considerable effort and with results that may or may not be worth the cost of the required research [167, pp.8-9].

Since the purpose of this study is to explain the behaviour of individual 'real' firms, the Theory is clearly unsuitable. In particular, it is unable to describe the processes by which firms achieve sustained growth: in fact, as already stated, it predicts that growth will be non-sustainable without exogenous increases in demand volume. Two reasons for the Theory's inability may be
1.3(c)  

mentioned. First, there is the assumption that a firm is tied to given products and markets. Second, as Machlup explains: 'For certain economic problems the existence of the firm is of the essence. For example, if we study the size distribution of firms or the growth of the firm, the organization and some of its properties and processes are the very objects of the investigation' [167, p.10].

(c) The Role of Profit

The question now is whether the goal of profit maximization must be rejected along with the Theory for purposes of analyzing individual firm behaviour and growth. It is at least unlikely that a firm would achieve profit maximization in the manner described by the Theory, which appears to assume that optimum output of a given product is less than its capacity output. If it is then true 'that the efficiency of the variable factor is customarily greatest at or near the point of capacity output,...businessmen do not determine their scale of operations by reference to marginal cost and revenues at all: they simply produce all that they can sell' [Eiteman, 72, p.913]. Secondly, there may be an "optimum" output for each of the firm's product-lines, but not an "optimum" output for the firm as a whole. In general we have found nothing to prevent the indefinite expansion of firms as time passes...It should be clear...that in rejecting the notion of an optimum size of firm in this context we are not quarrelling with the concept of the optimum size of firm as it appears in the "theory of the firm," since the "optimum firm" in that context is merely the optimum output of a given product [Penrose, 200, pp.98-9 and p.99, n.1].

Also, unit costs need not necessarily rise as firms grow larger. Various economies may be reaped, both from a firm's
size and from the growth process itself. [Penrose, 200, pp.88-103]. In practice, therefore, there may exist no equilibrium at which firms can attain maximum profits. This contrasts with the Theory, in which 'the sufficient conditions for equilibrium insure a maximum (rather than a minimum) of net revenue' [Cyert and March, 44, p.6].

If no equilibrium exists for maximization purposes, over what time period would a firm be likely to seek to maximize profits? As Simon observes, the Theory is somewhat ambiguous on this matter. [229, p.262]. However, as growth is a long-run objective, it may instead be enquired whether growth is compatible with long-run profit maximization.

Penrose claims that, where growth refers to expansion of fixed assets, the two are interchangeable.

The assumption that the managers of firms wish to maximize long-run profits derived from investment in the enterprise itself has an interesting implication for the relation between the desire to grow and the desire to make profits. If profits are a condition of successful growth, but profits are sought primarily for the sake of the firm, that is, to reinvest in the firm rather than to reimburse owners for the use of their capital on their "risk bearing", then, from the point of view of investment policy, growth and profits become equivalent as the criteria for the selection of investment programmes. Firms will never invest in expansion for the sake of growth if the return on the investment is negative, for that would be self-defeating. To increase total long-run profits of the enterprise in the sense discussed here is therefore equivalent to increasing the long-run rate of growth. Hence, it does not matter whether we speak of "growth" or "profits" as the goal of a firm's investment activities [200, pp.29-30].

These arguments exemplify Cyert and March's observation that'...it is difficult to document the proposition that the firm is pursuing goals other than profit maximization without encountering a claim that the firm's activities are somehow consistent with "long-run profit maximization, ..."
Profit certainly is a condition of successful growth, but not necessarily maximum profit. Penrose assumes that firms must depend solely or mainly on retained profit to finance growth of fixed assets, whereas a major (and, within limits, growing) proportion of gross investment expenditure is covered by annual depreciation charges. [Domar, 51]. Expansion may also be partly financed from external sources over the long run. Penrose's statement that 'profits are sought primarily for the sake of the firm...rather than to reimburse owners...' denies the fact that (long-run) profit maximization is the objective of a management whose primary aim is to serve the owners' interests. Such a management would be likely to distribute a relatively greater proportion of profits to owners than one mainly interested in growth. [Williamson, 264, p.3]. Also, a profit-maximizing management would reinvest in the firm only if external investments, including financial investment, offered lower returns. Factors other than profit evidently supervene. [McGuire, 180, p.78; Rothschild, 215, pp.308-9].

Penrose also believes that separation of control from ownership will cause managements to equate long-run growth and profit maximization; that is, although the profit motive may be weaker in such firms than in small, owner-managed firms, it may also be stronger because the personal

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They brand this claim as the '"long run" dodge' [loc. cit.] and believe that '...ultimately it makes only slightly more sense to say that the goal of a business organization is to maximize profit than to say that its goal is to maximize the salary of Sam Smith, Assistant to the Janitor' [44, p.30].
preferences of businessmen are more rigidly controlled in
the interests of the firm. [200, p.27]. Machlup extends
this argument as follows:

In principle I would expect three different views
to be taken regarding the relative independence of
corporate management: (1) Whereas owners would run
their business chiefly with a view to a maximum of
money profits, managers run it with several
supplementary and partly competing goals in mind.
(2) Whereas owners, especially wealthy ones, would
often allow nonprofit considerations to enter their
decision-making, managers have a sense of dedication
and identification with the business that makes them
the more single-minded seekers of profits. (3) Even
if managers are inclined to indulge in seeking other
goals as long as profits look satisfactory, they are
as professionals, trained in the art and science of
management, able to make better profits than the owners
could ever hope to make running their [167, p.5].

Previous discussion of managerial motivation and the
corporate environment indicated that management will pursue
its own self-interest unless constrained by effective
competition. The nature of this self-interest argues
strongly for acceptance of the third view listed. That is,
although professional managers doubtless would make a better
job of maximizing profit than shareholders, they have no
particular reason to do so because their collective
self-interest seeks satisfaction in terms of other goals,
particularly those of growth and security. Maximum profit,
over whatever period, is, for reasons that can only be
fully explained as part of an analysis of how managements
set out to achieve these goals in their decision-making,
not compatible with maximum sustained growth and desired
security levels. For instance, managements are unwilling,
for security reasons, to establish performance norms that
they may be unable to maintain. Attempts to maximize
profits are likely to cause undesirable fluctuations in the
market values of shares [Baumol, 11, pp.93-4], quite an unnecessary and avoidable hazard for managements with discretionary power who are not subject to effective market competition. (18)

More generally, Marris describes the relation between profit and collective managerial self-interest in the following terms:

When a man takes decisions leading to successful expansion, he not only creates new openings but also recommends himself and his colleagues as particularly suitable candidates to fill them... So personal ability also becomes judged by achieved growth, and the encouragement of growth becomes a motive for not only collective but also individual advancement, thus reinforcing the basic connection. True, if personal promotion were in fact decided by shareholders' committees, ability... might be judged by achieved profits, but when, as is in fact the case, an individual manager's rate of advance is determined exclusively by peers and superiors, it is more likely to be governed by criteria derived from the collective situation of the managerial class, which, we have now seen, means favouring expansion. This does not mean that a man's profit-earning ability will necessarily be ignored, for profits are required for growth and minimum profit is necessary for a minimum valuation ratio [security constraint]. But it does mean that a man is unlikely to be judged by his ability as a profit

(18) Kamerschen has made a recent study to 'determine whether the extent of management control exerts an important influence on the rates of return in [the largest corporations]' [128, p.432]. His conclusion that 'it generally does not' [loc.cit.] should be interpreted as support for Machlup's third view of the effect of control-ownership separation, quoted above. That is, an entrepreneurially-competent, growth-oriented management is better equipped than owners to earn profits, and its decisions will tend to lead the firm into bigger markets where profitability is also higher. This type of management is therefore especially likely to earn greater profits, as a consequence of nonprofit-oriented motivation, than owner managements. If published profits do not always reflect this situation, that is probably due to organizational slack. It is important to distinguish the lower emphasis on profits that accompanies control-ownership separation from any reduction in a firm's propensity to generate profits. Kamerschen does not make this distinction. [128, p.444].
maximiser. By contrast he may well be judged by his ability to maximize, or at least promote, organizational growth [173, p.102].

It is therefore concluded that, in the absence of effective competition, a growth-minded management will not seek to maximize profits: it will instead rationally seek profits that are satisfactory for security purposes and to assist in financing expansion. Correspondingly, a management interested mainly in emoluments and staff accumulation would also not attempt to maximize profits. [Machlup, 167, p.23, n.13; Williamson, 265, pp.43-4].

In short, the failure of profit maximization coincides with the freedom of management from effective competition.

From previous discussion of the influences of environment it will be recalled that 'where the range of behavior that is consistent with survival is narrowly bounded, the question of motivation is of small importance' [Williamson, 265, p.11]. Behaviour is so bounded when effective competition prevails in each of a firm's actual

(19) According to Williamson, for such a management to select a profit-maximizing position, the marginal substitution rate between profit and staff must be zero. Since this implies that marginal utility of staff in the vicinity of the profit-maximizing position must also be zero, 'either staff must be "objectively" valued only for its contribution to profit or the benefits associated with expanding staff must be exhausted before...[the profit-maximizing position] is reached' [loc.cit.]. Given a positive preference for staff, the first possibility is rejected, while the second represents an unlikely limiting condition. Cyert and March [44, pp.246-7] arrive at similar conclusions.

(20) These conclusions are widely supported in the literature including, inter alia, the following: Ansoff, 7; Baumol, 11, pp.45-53 and 13, p.1085; Cyert and March, 44, pp.8, 10, 237-40; Duesenberry, 56, p.133; Gordon, 97; Kaysen, 132, p.90; Lintner, 157, pp.523-4; Machlup, 167, pp.4, 11, 23; Marris, 173; pp.102, 241; McGuire, 180, Chs.4, 5; Papandreou, 197, p.206; Simon, 229; Williamson, 264, p.16; Williamson, 265, pp.4, 18.
and potential markets. Machlup defines 'effective' competition as follows:

A firm is exposed to heavy, vigorous, or effective competition if it is kept under continuing pressure to do something about its sales and its profits position. Under this "competitive pressure" the firm is constantly compelled to react to actual or potential losses in sales and/or reductions in profits, so much so that the firm will not be able to pursue any objectives other than the maximization of profits - for the simple reason that anything less than the highest obtainable profits would be below the rate of return regarded as normal at the time. [That is] competition is effective if it continually depresses profits to the level regarded as the minimum tolerable. What makes it effective is not part of the definition, but has to be explained by the conditions of entry, aggressive attitudes on the part of existing firms, or imports from abroad. [167, p.18].

Thus, although normally a management would not rationally seek to maximize profits, it may be forced to adopt this objective by competitive pressures for security purposes.

It is now necessary to make a sharp distinction between the short and long term aspects of this problem. Effective competition is synonymous with adversity and means that a firm must adopt profit maximization as its short-run goal. This, it is believed, is incompatible with both long-run profit maximization and long-run security, because investment in projects with future benefits will be passed over. [Ansoff, 7, p.32]. Also, it is obvious that such a firm will not achieve sustained growth. Effective competition therefore restricts both a firm's objectives and, unless conditions change, its future.

Firms most likely to suffer effective competition are small and relatively young. Most would have limited

See also note 11 above.
entrepreneurial ability and resources at their disposal, and

are of necessity confined to those fields where the only requirements for getting some kind of a start are a little capital and perhaps a training or skill which is widespread among the non-professional working population. It is in this type of field where we find the peculiar combination of circumstances characterizing the position of firms that cannot be expected to grow—a high rate of entry, and a high rate of exodus, low profit rates and a low level of technical progress [Penrose, 200, p.221].

These are the firms to which the profit maximization objective is most likely to apply. It is significant that the sort of firm described by Penrose would also be characterized by a lack of separation of control from ownership. In general, the real investment behaviour of such firms is unlikely to be of significant long-run interest.

That some new and small firms eventually become large is due mainly to the quality of their entrepreneurial and managerial ability, as well as to resources and a non-rigorous element of luck. Managements of these firms are not attracted to fields in which growth and profit opportunities are limited. Although at a competitive disadvantage relative to existing large firms in any field of the latter's choice, they would take advantage of the fact that even the largest firms are often unable to utilize all possible profitable opportunities for expansion. [Penrose, 200, p.222].

It is concluded that, except in the limiting case of effective competition, profit is not a managerial objective as such, but that satisfactory profits are required for growth and security. More precisely, examination of
corporate decision-making will show that growth-minded managements rationally aim to optimize rates of return on amounts of resources employed in relation to the maximum growth rates safely attainable. [Ansoff, 7, pp.40-1; Marris, 173, pp.241, 251]. Managements not entrepreneurially-motivated may optimize profitability by maintaining productive and administrative efficiency of existing operations. In many cases, however, investment and productive efficiency do not completely determine the profit result, because managerial slack payments trade-off part of earnings capacity for preferred expenses. Slack payments include excess expenditures in non-preferred categories resulting from managerial inefficiency.
1.4 Managerial Motivation and Corporate Income Taxation

(a) Preliminary

In 1.2(a) above it was stated that the Domar-Musgrave preference assumptions must satisfy two requirements to be relevant for purposes of analyzing corporate investment reactions to tax changes. Firstly, because their analysis does not distinguish between managerial and shareholder self-interest, reasonable similarity between the interests of these respective groups is necessary. Secondly, preference assumptions should correctly and adequately describe managerial motivation. Evidently neither requirement has been satisfactorily met. Managerial interests diverge significantly from those of shareholders, as underlined by the fact that management typically regards market value of the firm's shares as a principal security constraint on discretionary behaviour. This constraint is operated through a firm's profit level\(^{(22)}\); but it is not in managerial interests (as it is in shareholders'), 'first that the company should be made to earn the maximum profit compatible with a reasonable degree of risk; second, that as

\[\text{(22) It is a matter of controversy in the literature whether or not, in the absence of debt, equity market values are a function of corporate earnings independent of dividends. One group claims that equity values are independent of dividends: it includes, inter alia, Dean, 47; Durand, 58; Kuh, 145; F. and V. Lutz, 165; Modigliani and Miller, 187 and 188; Modigliani and Zeman, 189; Roberts, 212; Solomon, 236; Weston, 262. A second group claims that equities are valued at the present value of expected dividend streams, and includes, inter alia, Bierman et al., 16; Durand, 57 and 59; Gordon, 90, 92 and 94; Gordon and Shapiro, 95; Preinreich, 206; Tinbergen, 253; Walter, 260; Williams, 263. Modigliani and Miller state that, 'as long as management is presumed to be acting in the best interests of the stockholders, retained earnings can be regarded as equivalent to a fully subscribed, pre-emptive issue of common stock. Hence..., the division of the [earnings] stream between cash dividends and retained earnings is a mere detail' [187, p.266].}\]
large a proportion of these profits should be distributed as the best interests of the business permit,...' [Berle and Means, 14, p.121].

In this Section the results derived by Domar and Musgrave from application of their preference assumptions to the case of an increase in the rate of a no-loss-offset profits tax are examined and criticized. Their results are as follows:

Since, without loss offset, the yield is cut, while risk is unchanged, the compensation for risk-taking is reduced. Risk-taking has become less attractive, so that the investor will want to take less risk. But the reduction in yield also means a lower income from his investments. To restore his income, the investor will try to take more risk, since risky investments can be expected to have a higher yield. These two forces are operating in opposite directions. Theoretically the result is uncertain; practical evidence would indicate that the investor is likely to shift in the direction of less risk [52, p.390].

Several matters need to be mentioned before these results can be examined.

(1) As Domar and Musgrave observe [52, pp.391-2], a corporation is assured of offset for losses on individual projects provided these losses do not exceed profits from other projects. A no-loss-offset corporate tax thus applies to net operating profits and losses, and may differ from a personal no-loss-offset income tax on small financial investors. However, this difference is offset to the extent that a financial investor can diversify his holdings over a relatively greater number of investments (see 4 below). Also, it is presumed that financial investors are assessed to
personal tax only on their net gains, so that they too benefit from automatic loss offset.

(2) Domar and Musgrave assume that 'a given amount of investment funds is available to the investor' [52, p.393]; and are concerned only with 'the immediate effects of a tax on investment, without regard for secondary effects such as changes in wealth...' [52, p.402]. They admit that, when an investor's wealth changes, 'his general attitude towards risk-taking may become more or less favourable' [52, p.421].

(3) For reasons of space, analysis of the nature and effects of risk and uncertainty has not been included in this Chapter, although the general role of managerial security constraints has been explained. To the extent that a critique of the Domar-Musgrave results necessitates statements for which no proper foundation has been laid, full restitution will be made in Chapter 2.

(4) One obvious difference between real and financial investment is that, in the former case, a decision-maker

is confronted with fewer and more unique investment alternatives than is the financial investor, and is thus unable to achieve an equal degree of diversification. Certain considerations which might be of little importance for the financial investor, such as those related to maintaining competitive advantage, might be very significant for him [52, p.422].

The Domar-Musgrave claim, that 'the general conclusions here arrived at would also apply to the
case of real investment' [loc.cit.], was therefore made after taking account of these differences.

(5) Domar and Musgrave assume throughout that the investor will consider only those investments with the greatest expected yield for a given degree of risk. This assumption corresponds, of course, to the Berle and Means criterion for shareholder satisfaction, mentioned in the first paragraph of this Section. In addition, Domar and Musgrave presume that return is directly correlated with risk, in that the greater the return expected from an investment, the higher will be the risk taken. [52, p.390].

The two opposing forces, which Domar and Musgrave consider would result from an increase in the tax rate, are respectively its income and substitution effects. The income effect expresses an investor's desire to restore his pre-tax-increase income level, and results from their preference assumption of diminishing marginal utility of rising income. The substitution effect reflects his tendency to reduce risk-taking because unit compensation for risk has fallen: this effect incorporates their second preference assumption of increasing marginal disutility of risk-taking as the amount of risk borne increases.

Domar and Musgrave also found that an increase in the rate of a no-loss-offset tax tends to reduce unit compensation for risk relatively more the greater the total
risk and yield of a given 'asset combination'. This causes what they term a secondary substitution effect, which acts as a check to both upward and downward adjustments of risk-taking following the tax increase. [52, p.407]. The underlying reason for this so-called secondary effect is that, in the Domar-Musgrave analysis, a tax without loss offset reduces yield by a greater percentage than the nominal tax rate, 'because all gains are reduced by the rate of the tax, while all losses are left unchanged' [52, p.404].

(b) The Income Effect

For purposes of determining the validity of the Domar-Musgrave claim that an increase in the tax rate will produce an income effect on managerial behaviour, it is convenient to dissect the claim into its twin components. Firstly, they claim, management is motivated to seek to restore corporate profit following a tax increase. Secondly, management will be induced to take more risk in order to accomplish this. These aspects will be considered in turn, it being assumed that, in addition to no offset for net losses, there is no corporate borrowing, and only 'normal' depreciation is allowed for tax purposes.

An income effect arises because the tax increase raises the marginal utility of income to a Domar-Musgrave

(23) Defined as the (financial) investor's security portfolio plus any (assumedly riskless) cash not invested. [52, pp. 399-401].
investor. How does this correspond to the role of profit among managerial objectives? In the previous Section it was established that, except in conditions of effective competition, management is not motivated toward profit as such, but needs 'satisfactory' profit for several reasons. Firstly, profit is required to provide, through distributions, a return acceptable to the market, since the market value of a firm's shares acts as a principal security constraint on managerial behaviour. Secondly, profit is needed to assist in financing future growth, and will assume differential importance to different firms for this purpose, owing to variations in growth rates, access to external capital, liquidity, and the adequacy of corporate depreciation provisions and revenue reserves, etc. Thirdly, profit is needed to absorb management's typical expense preference for staff and emoluments.

As Colm states, it is useful in tax analysis to distinguish 'between the effect of tax changes (and the related changes in expenditures or other methods of financing) on the flow of funds and on demand and costs, on the one hand, and the effects on the intentions, motivations, and behavior of business managers..., on the other hand' [41, p.492]. From the latter point of view profit is important mainly for security purposes, to maintain an acceptable level of the market value of the firm's shares. An entrepreneurially-competent, ambitious management, it is recalled, rationally aims for the highest sustainable growth

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(24) See note 22 above.
rate consistent with acceptable levels of this and other security constraints, including liquidity.

Domar and Musgrave's third preference assumption (that 'the marginal utility of income...[is] independent of risk and vice versa' [52, p.402]) means that risk does not enter into the value which an investor places on successive increments of income; nor do income considerations affect his attitude to risk as such. This assumption is difficult to reconcile with their view that income is a compensation for risk-taking, so that 'if the return on risk-taking is close to zero - that is, if market prospects are extremely poor - the investor will take little risk, if any' [52, p.407]. Risk and income are in fact closely linked in the Domar-Musgrave analysis, as, for example, in their statement that 'the faster the slopes of the indifference curves fall as the rate of yield increases along any given horizontal line, that is, the more the investor's marginal rate of risk-taking is (inversely) affected by the size of his income, the sooner will the tax-asset curve begin to fall' [52, p.407; italics added].

The fact that, for corporate purposes, profits are required for security reasons means that a significant part of the utility attaching to profits from managements' point of view arises from profits' contribution to the reduction of uncertainty or insecurity. Thus, the marginal utility of profits is not, within certain limits, independent of managerial risk or uncertainty. Whatever its relevance for purposes of analyzing the response of a financial investor to tax changes, the third Domar-Musgrave preference
assumption is therefore inappropriate so far as management-controlled real investment is concerned. Moreover, the reasonableness of this assumption seems to have little connection with their further assumption of a fixed amount of wealth, despite their statement to the contrary. [52, p.402]. As argued below, this latter assumption is also inappropriate in the case of real investment.

Subject to the above comments, the first Domar-Musgrave preference assumption of diminishing marginal utility of rising income does broadly describe managements' attitude to profits. However, it cannot be inferred from this that a management will take deliberate action through investment policy to restore the profit level after a tax increase unless, probably as a special case, the firm is driven back onto its minimum profit constraint by the tax increase. Management would then strive to increase profit for its own security; but the Domar-Musgrave analysis could not explain this reaction, because they assume that the marginal utility of profit is independent of security considerations.

For several reasons the above situation represents a special case so far as ambitious, competent managements are concerned. The argument that managements are not motivated very positively towards profit beyond a minimum constraint does not at all imply that actual profit usually approximates this level. Quite the reverse would tend to apply in the case of aggressive managements operating under imperfect competition. Frequently the number of profitable
investment opportunities available will exceed that which an existing management team is able comfortably to handle. The firm will then 'operate most of the time well back into the intramarginal range of investments so far as profitability is concerned,...' [Lintner, 157, p.528]. This may also happen when a firm limits investment outlays as a matter of policy to funds generated internally by retentions and depreciation charges. Then:

If the supply of funds for investment is completely inelastic, both the elasticity of the demand schedule and the extent of its vertical displacement by tax changes will be irrelevant so long as the intersection of the supply and demand curves after the tax increase are still above the minimal cutoff rate of return management has in mind [Lintner, loc.cit.].(25)

Restriction of investment to internally-generated funds is a matter of necessity for young and unestablished firms without access to external capital. It is a matter of deliberate policy on the part of established, conservative managements, which prefer to emphasize security rather than growth. If such managements are able to operate in the 'intramarginal range of investments so far as profitability is concerned', they need have no more reason motivationally than growth-minded managements to initiate action to restore profit levels following a tax increase. A conservative management may be more likely than a thrusting management to wish to restore the profit level after a tax increase,

(25) Streeten argues similarly that limitations in supply of capital create an element of monopoly revenue as the result of uncertainty about the future. He then states that 'a tax which falls on this rent element can have no effect on the supply of uncertainty-bearing' [246, p.285]. That is, there will be neither an income nor a substitution effect.
but, given its financial constraint on investment, would be relatively less likely to do this through investment policy.

Assuming that a firm operated above its minimum profit constraint prior to a tax increase, whether the constraint becomes binding depends on several factors. These include the size of the tax increase, the margin by which actual profit exceeded the level of the constraint prior to the increase, the incidence of the tax, and the degree to which tax increases are capitalized in the market value of shares. Tax capitalization means that the effective profit rate on issued capital is unaffected by a tax increase: management therefore need not, at least for this reason, take profit action for security purposes. Similarly, to the extent that a tax increase is passed on, the reason for an income effect will also be reduced or removed.

Even apart from limiting factors, such as tax capitalization and incidence, an income effect on investment policy would be rather a special case in practice, even when conservative managements are taken into account. As stated above, the latter are more likely to be sensitive to reductions in profit, but less likely to use investment policy in response. Moreover, the income effect probably overstates considerably for imperfect competition the frequency with which tax increases find profit at its constrained level.

Lintner believes that the minimum profit constraint may indeed be less important for tax purposes than is often supposed.
Although many companies require at least given prospective rates of return after taxes on such investments [as are not justified on non-profit grounds], others state the returns required for favourable consideration as minimum rates of profit before taxes and make their investment decisions largely if not entirely on this basis...there is also evidence that the standards of minimum acceptable pre-tax return are adjusted sluggishly and incompletely, and sometimes not adjusted at all, to changes in tax rates. Moreover, we have observed cases where companies...which use a cut-off rate of return after taxes have formally or informally adjusted this rate downward as taxes increased. In both cases, the return required after taxes is not substantially unchanged as usually assumed in theory,... [157, p.522].

It is concluded that a tax increase alone will not normally induce managements of firms which usually operate above minimum profit constraints to take investment action to restore the profit level. Also, if, as a special case, a tax increase does induce action to restore profits, it will be for reasons not visualized by the Domar-Musgrave analysis.

Now consider the sort of firm whose minimum profit constraint is normally binding. It is recalled that this occurs when a firm is subject to effective competition in each of its actual and potential markets. The firm is then confined to the objective of short-run profit maximization. In these circumstances the firm does not respond at all to an increase in the rate of tax on its profits. [Cyert and March, 44, p.248; Williamson, 265, p.74]. It does not respond for the simple reason that, in these circumstances, it is unable to respond. There is then neither an income
Effective competition, together with factors that make competition effective for a firm (managerial competence, resources, etc.), therefore represent additional grounds for believing that the circumstances in which an income effect occurs are very limited.

Domar and Musgrave assert secondly that management will shift to a more risky combination of projects (investments) as the means of recouping the extra portion of profits taken in taxation. It is recalled that given resources are assumed available for investment, and that their analysis disregards effects on investment decisions of changes in wealth. 'Whenever an investor shifts to a more risky asset combination, he may do so by taking more risky investments or holding less cash or, most likely, by applying both methods at the same time' [52, p.407]. The notion that risk-taking must increase in order that expected income may rise is based on the Domar-Musgrave assumption that 'risky investments can be expected to have a higher yield' [52, p.390], and on their definition of risk as 'the probability

Domar and Musgrave allow for the absence of an income effect whenever the marginal utility of income is assumed constant. [52, p.408, n.5]. Profit maximization corresponds to this income assumption. However, they appear to rule out the case in which the marginal disutility of risk-taking is also constant by stating: 'If income utility is thus assumed constant, the second assumption (increasing disutility of risk-taking) must be applied, since the tax will produce no effects on risk-taking whatsoever, if both income utility and risk disutility are held constant' [52, p.403, n.9]. The resulting paradox is more apparent than real, since a firm subject to effective competition, and therefore, in Domar-Musgrave parlance, to constant marginal disutility of risk-taking, does not willingly suffer this state of affairs. It is merely unable to take steps to improve the situation.
of a loss [which is] a property of a known probability distribution' [52, p.396].

In view of the previous conclusion, that action designed to recover profit following a tax increase will be taken only if that increase activates the security constraint on profit, it seems prima facie unlikely that managements would be persuaded by Domar and Musgrave to increase risk borne. Also, it must again be stressed that the type of management which is relatively sensitive to security, and which tends to restrict investment to internal funds, would be unwilling to use investment policy in this situation. It might be more inclined to reduce the investment rate, since 'available' funds have been eroded by the higher tax rate.

However, the most serious objection to this aspect of the income effect concerns the assumptions under which it allegedly occurs. An income effect is incompatible with the assumption of fixed resources, because a firm can normally adjust its 'investment combination' only through additional investment in new product lines. Additional resources are needed for this purpose, since the firm would hardly be likely to disinvest from existing activities in order to finance the specified adjustment in risk-taking. Heavy capital losses would be incurred if it attempted to do so, which would not facilitate restoration of either profits or security. It need hardly be added that managerial prestige is involved in maintaining shares in existing markets. Firms do, of course, effect considerable changes in their product-market postures over time, by gradually
disinvesting from saturated existing lines in favour of fresh growth opportunities. However, significant fractions of investment will be devoted to maintaining a firm's stake in existing markets, even though these markets cannot necessarily be relied on to contribute significantly to profit expansion.

The income effect of taxation predicted by Domar and Musgrave is therefore inherently unlikely so far as corporate real investment is concerned. Firms are unable to emulate individual financial investors in the speed and facility with which 'portfolio' changes may be effected. Real investment policy cannot be studied under the assumption that corporate 'wealth' is fixed (which is, of course, a different matter from the assumption that investment resources are inelastic in supply). There are no 'immediate effects of a tax on [real] investment' [52, p.402] when effects of changes in corporate wealth are disregarded. (27) Although there may be scope for investment of idle cash resources, it would be difficult to establish a case on motivational grounds for supposing that tax increases have much effect in this direction. Liquidity is an important managerial security constraint. Management would therefore rationally avoid trading-off necessary liquidity against increased risk-taking, because such an

(27) Domar and Musgrave admit that, when an investor's wealth changes, their results may need to be modified. However, it is considered that even the grounds on which this admission is based are unsatisfactory for corporate investment behaviour; i.e. they merely observe that, when wealth changes, the investor's 'general attitude towards risk-taking may become more or less favourable' [52, p.421].
exercise would probably be self-defeating. Efficient firms do not normally carry liquid resources over and above amounts needed for security purposes and those earmarked for actual projects.

An efficient management would assess the causes of a profits crisis on their merits, and would take action appropriate to the circumstances. This may not involve investment policy as such, but may instead consist of cost reductions effected by reducing organizational slack.\(^{(28)}\)

Other criticisms of the Domar-Musgrave income effect depend on the distinction between risk and uncertainty, and on the nature of the corporate decision process. These matters are discussed in later Chapters. If their risk assumptions are replaced by those of uncertainty, direct correlation between expected profit from real investment and overall 'risk' may no longer be taken for granted, as did Domar and Musgrave. That is, under uncertainty, it is necessary to reformulate their assumption that 'risk-taking' must be increased in order to increase expected profit.

(c) The Substitution Effect

According to Domar and Musgrave, 'the tax will reduce the compensation per unit of risk \(y/r\), because \(y\) is reduced while \(r\) is left unchanged. The investor will therefore

\(^{(28)}\) Reder notes that, after a loss of about fifty million dollars in the first three quarters of 1946, the Ford Motor Company 'announced that it had found methods of reducing operating costs (on a given volume of output) by about twenty million dollars per year' [209, p.453, n.12].
tend to take less risk' [52, pp.405-6]. This view expresses the 'disincentive' effect of a no-loss-offset tax which has been widely identified in the literature. [E.g.s. Brown, 22; Cosciani, 43; Due, 55; Goode, 88; Kurihara, 147; Lintner, 157; Musgrave, 191]. In the Domar-Musgrave analysis, inter alia, the disincentive effect is directly related to the view that yield constitutes the compensation for risk-taking. So much is clear from the above passage, but the connection needs to be emphasized. In the opinion of Brown [22] and Streeten [246], however, 'the effects of taxation on uncertainty-bearing (used synonymously with "risk-bearing") must be distinguished from its effects on investment. Certain types of taxes discourage investment even under conditions of certainty' [246, p.271, n.1]. In Brown's study, to which Streeten was referring, the only investment 'incentive' envisaged was that of profitability.

Some authors have queried the strength of the disincentive effect on the grounds that it may be less if business aims to earn reasonable, as opposed to maximum, profit. [Colm, 41; Kimmel, 135; Lintner, 157; Sanders, 217]. Streeten notes that 'it is not at all clear that risk-taking is a real cost rather than a positive utility' [246, p.283], and that psychological attitudes may be unaffected by the tax. [246, p.284]. Colm feels that high corporate taxes will not necessarily discourage investment when firms are intent on expansion. [41, p.498].

(29) See also note 25.
Streeten supports this view on the grounds that, 'in corporations where management and often control are separated from ownership a reduction in dividend payments to shareholders need not affect the willingness of those responsible for decisions to take risks. Their main interest is the growth of the company' [246, p.282]. In Lepper's view (with reference to financial investment), whether there is a disincentive effect depends on the form of an investor's utility function, and particularly on the method by which risk is measured, and on whether investors would hold large proportions of their portfolios in risky assets in the absence of a tax. [153, p.40].

This study has taken the view that tax increases react on managerial motivation, as distinguished from the financing of investment, primarily from the security angle. Profitability will need to be improved for security reasons when a firm is driven back onto its minimum profit constraint by a tax increase. It has been suggested that this would represent a special case, and that profit action by management may take the form of cost reductions effected by cutting back organizational slack. Investment policy may thus be unaffected by a tax increase, remaining geared to management's main aims, subject to available opportunities and finance. It is further considered that the nature of managerial motivation precludes a tax disincentive effect (or, for that matter, an incentive effect) in the sense in which these terms are conventionally employed, and for the reasons usually advanced. That is, managerial investment policy is not dictated solely or even mainly by profit
considerations, and there appears to be little justification for the view that profit is regarded by management as the compensation for risk-taking. Managerial compensation for risk-taking comprises the pecuniary and other benefits which accrue from successful growth. Satisfactory profit is a necessary but subsidiary condition for this.

Various other specific criticisms of the Domar-Musgrave analysis, raised in connection with their income effect, apply also to the substitution effect result. These may be briefly summarized as follows:

1. The marginal utility of profit is not independent of risk or uncertainty.
2. Effects of changes in corporate resources on investment behaviour cannot be disregarded in determining the effect of a tax increase.
3. There is no automatic correlation between expected profit and the uncertainty of a firm's operating position.
4. Firms cannot disinvest from existing lines, as financial investors do, in order to adjust their 'risk-taking'. Adjustments normally occur through additional investment in new lines.
5. For reasons of prestige and investment strategy, maintenance of existing market shares is an important 'proximate' managerial objective.
6. As well as the market value of a firm's shares, corporate liquidity also acts as a managerial security constraint. Action to restore profit, following a tax increase, would be unlikely to proceed at the expense of the latter constraint.
(7) Corporate investment policy is subject to uncertainty or partial ignorance rather than to risk. Managements therefore do not know the probability of a given outcome of an investment decision when the decision is made.

When a tax increase causes a security constraint to become binding, the present analysis suggests that, if remedial action involves investment policy rather than cost reductions, the effect of the tax from the motivational viewpoint may be regarded superficially as a combination of income and substitution effects. That is, the firm would be concerned to boost its profit level in order to increase security and would accordingly revise the ranking of its proximate objectives, viz. future investment expenditure would be governed relatively more by considerations of profitability than in the past. Essentially, however, the tax has only one effect on motivation, which may be termed its security effect. (30) The success of managerial action in terms of the security effect depends, as already stated, on the calibre of search and evaluation procedures, while the extent of the 'substitution' between proximate objectives depends on available investible resources (liquidity), suitable investment opportunities, the profit 'gap', and the bargaining-learning process within the active

(30) As explained below, the impact of a tax increase on managerial expense preference may be regarded as one of facilitating an already active aspect of managerial motivation. By contrast, the tax security effect creates a situation, viz. a security problem which, by hypothesis, did not exist prior to the tax increase.
managerial group. As previously stated, a firm subject to effective competition is unable to respond in this fashion to a tax increase.

Williamson argues that the reaction to a tax increase, of a firm whose main objective is to maximize sales subject to a minimum profit constraint, will be to reduce both staff and output and move towards a profit-maximizing position independently of the condition of the competitive environment. His reason is that the firm's minimum profit constraint is assumed to be always binding. [265, pp.80-1]. It is debatable whether profit-constrained sales maximization, as advocated by Baumol [11, Ch.6], is really compatible with managerial self-interest, despite Baumol's claim that 'this hypothesis in no way conflicts with an assumption of rationality' [11, p.47].

in the sales maximizing firm, the managers have no greater preference for staff than for production. Additional laborers and additional staff are equally valued...The objective is merely to choose that composition of variable factors that most contributes to sales. Thus, instead of expanding the operations of the firm in a manner that favors expenditures on staff (as occurs in the managerial discretion models), the entire scale of the enterprise is expanded generally and without bias towards staff [Williamson, 265, p.80].

In normal circumstances an expense preference for staff is one dimension of managerial self-interest. Moreover, since a sales maximizer's profit constraint is, by assumption, always binding, Baumol's model seems to place management in a position similar to that of short-run profit maximization under effective competition. Actually, in advocating sales maximization, Baumol's main aim was to displace profit from its position as a firm's main objective, although a sales maximizer can pay no less attention to
profit than would a profit maximizer. The former would also be likely to allot a higher priority to maintenance of existing market shares than would a growth maximizer, who would be relatively more ready to diversify into new fields. Sales maximization is of interest here from the twin viewpoints of investment policy and the response of management to tax increases. However, because it appears to conflict with the exercise of (unfettered) managerial self-interest, this objective may be confined to particular market situations.

A firm whose security constraints are not activated by a tax increase will not take special investment action as a result of the increase. Its investment policy will continue along existing lines, subject as always to the rate of increase in available resources (including staff), and to available investment opportunities. In these circumstances, as Lintner explains:

considerations of profitability enter into investment decisions in a much broader context of other considerations and objectives than has been reflected in the theoretical models used to discuss the effects of taxes on investment...So long as profit positions are not unacceptably low and the necessary funds are available on acceptable terms, very substantial amounts of new investment are likely to be undertaken even where there is no good evidence that the individual investment moves will add enough to net profit to make them worth while on that ground alone...if an investment is primarily justifiable on grounds of profit and it is marginal on this basis or is made marginal in these terms by a tax increase, another investment directly justifiable on other grounds is likely to be made in its stead. Since investment policies serve a number of different management and company objectives, not just greater profits alone, the degree of reduction in the volume of investment attributable to taxes on incentives will be seriously overstated by considering simply the effects of taxes on profitability [157, pp.523-4].
Given managerial expense preference for staff and emoluments, unless a tax increase activates security constraints, there will be substitution between profit and preferred expenses. As Williamson states: 'when the "price" of taking satisfaction in the form of profit increases, the compensated tax adjustment always leads to a substitution of staff for profit...' [265, p.47]. This conclusion is supported by Cyert and March as follows:

With respect to an increase in the profit tax rate, our model predicts that the firm will shift out of profits and into staff and output as well as managerial superfluities as the penalty associated with reporting profits is increased. In the presence of an excess profits tax, for example, the behavioral firm will increase expenditures on advertising, customer services, public relations, and so forth and at the same time increase the proportion of management slack absorbed as cost [44, p.249].

Machlup also supports this view, and states that 'every change in tax rates changes the trade-off ratios...[between profit, managerial remuneration and] several other company expenses which add to the prestige, power, and self-esteem of the managers' [167, p.20]. He further points out that 'this is confined to situations where profits are high enough to stand encroachments by avoidable expenses - to situations, that is, where the firm is not hard-pressed by competition' [loc.cit.]. Although, as Machlup implies, the marginal substitution rate between profit and preferred expenses is zero when a firm is subject to effective competition, the extent to which these expenses may be safely preferred to profit is always limited. Thus, when the tax rate increases, profit trade-off is constrained by liquidity considerations, the threat of share market sanctions, and by demand for resources to finance future
growth. Various other institutional and legal considerations may also limit the exercise of expense preference.

Managerial expense preference for staff and emoluments is a normal feature of the modern corporate scene which will be exercised to varying extents whenever firms are not subject to adversity. Real investment is also a preferred expense, subject to managerial growth motivation. Since expense preference manifests managerial self-interest and would be exercised with or without a tax to some extent (circumstances permitting), a tax substitution effect between profit and staff only facilitates or enhances an essentially non-tax tendency. This view is consistent with the previous conclusion that the main effect of tax increases on managerial motivation is confined to cases in which one or more of a firm's security constraints becomes binding as a result of the tax increase.

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CHAPTER 2
THE NATURE AND EFFECTS OF RISK AND UNCERTAINTY

2.1 Introduction

In conventional tax theory investment is subject to risk, the quantifiable probability of loss. Despite the considerable information available to investors through their assumed ability to calculate probability distributions for outcomes of investment opportunities, risk is considered a strong deterrent to investment. This is especially so when the tax rate on yield or profit rises, since this reduces the reward for risk-taking.

It is therefore widely agreed that relief is necessary, to provide an investment incentive, or to restore that destroyed by the tax. Various measures have been canvassed for this task, including the expensing of investment. Following the Domar-Musgrave analysis, however, one very influential method of redress is provision of offset for losses. This measure has long commanded support in equity. However, Domar and Musgrave found in loss offsets for tax purposes a whole new dimension as an investment incentive, based on this provision's impact on investment yield and risk.

This Chapter examines the reasonableness of risk assumptions for corporate real investment, and identifies some consequences of the state of knowledge in which investment decisions are made. Incentive effects of tax loss offset provisions are then evaluated in relation to
results of the examination of risk assumptions, and to conclusions about how pursuit of managerial self-interest is affected by the state of knowledge.
2.2 The Domar-Musgrave Analysis

These authors followed Hart's view that it is 'reasonable to set up the assumption of quantified probability estimates as an idealization of actual business practice' [109, p.52]. They adopted the probability distribution 'in the absence of a better approach' and assumed that their investor would construct such a distribution for each available investment opportunity. [52, p.393]. Although their analysis is therefore couched entirely in terms of risk, Domar and Musgrave did not completely ignore uncertainty.

Investment decisions are made in spite of uncertainty with respect to the relevant data and their implications. No investor is sure that his estimated probability distribution is entirely correct, but the degree of uncertainty will vary with different investors and different investments. It will be a factor in the investment decision. Yet it is extremely difficult to express the degree of uncertainty involved in workable terms. For our purpose it is sufficient to say that the prevalence of uncertainty may induce the investor to require a somewhat higher return than would be required otherwise [52, pp.395-6].

Moreover, in their opinion,

if definitions for risk and yield were obtained on the basis of some different approach,...behavior under the impact of a tax would probably be very similar. If it is denied that numerical values can be obtained, no method for a precise analysis of the problem appears to be available [52, p.421].

Domar and Musgrave found that 'the probability of a loss...is the essence of risk' [52, p.396]. Specifically:

Since the investor is not only interested in the probability of a negative return, but also in the chances of suffering losses of various magnitudes, the coefficient of risk should be defined more precisely as a function of losses and their probabilities. This can be done most simply by defining risk as...r, i.e. the summation of all possible losses multiplied by their respective probabilities...[loc.cit.].
Risk is expressed symbolically in terms of mathematical expectation as

\[ r = - \sum_{i=1}^{k} q_i p_i \]

where \( q_1, q_2, \ldots, q_k, q_{k+1}, \ldots, q_n \) are expected rates of return such that \( q_i < q_{i+1} \) and \( q_k = 0 \), and where the probability of occurrence of \( q_i \) is \( p_i \), such that

\[ \sum_{i=1}^{n} p_i = 1 \]

Further comments by Domar and Musgrave, which are pertinent to their views on the nature of risk and uncertainty, are briefly listed below:

1. Investment constitutes creation of risk, whereas the holding of cash is riskless by assumption [52, p.391];

2. Risk includes the possibility that losses will not be covered by other income, but large corporations should be relatively well-placed in this respect [52, pp.391-2];

3. Greater dispersion of the probability distribution does not, *ceteris paribus*, constitute risk in the sense of commanding a market return, although it is a factor in investment decisions [52, p.397];

4. The speculative, precautionary and income elements of Keynesian liquidity preference represent aspects of the fear of loss, and are therefore taken into account in the probability distribution [52, p.398]; and

5. Opportunity costs are excluded, so that risk does
not include the possibility of missing opportunities [52, p.400].

In common with many other writers Domar and Musgrave conclude that a tax without loss offsets will lead to a reduction in investment, in terms of the quantity of risk borne. This is the net result of the negative risk or substitution effect and the positive income effect. However, when provision is made for losses to be fully offset against taxable income, their model shows that return per unit of risk is unchanged by the tax, and that the income effect, operating alone, causes total risk-taking to increase. Total risk includes that borne respectively by the taxpayer and by the government, which, under a tax with loss offset provisions, shares investment risk with the taxpayer. Total risk, after adjustment to increases in the tax rate, will be greater when full offset for losses is permitted the higher is the tax rate. Above some optimum tax rate, however, reduction in the level of private risk overcomes the multiplier income effect and total risk tends to fall.

According to Domar and Musgrave, therefore, the incentive or disincentive effects of the tax depend entirely upon whether or not provision is made for losses to be fully offset. As they observed, since corporate revenue losses are necessarily offset against available income in the same year, only net losses remain to be dealt with for tax loss-offset purposes. [52, p.391]. They suggest that losses should be carried forward and back against income of other periods to provide full offset, on the understanding
that the investor is assured of such income. Better still, the government should consider reimbursing taxpayers (at the tax rate) during the same period as losses are incurred. This, claim Domar and Musgrave will ensure that investment conditions are more favourable under a high tax rate than under a lower rate with less complete offset for losses.
2.3 Risk or Uncertainty?

A decision alternative, that is, a known possible course of action, is characterized by risk if the probabilities of each of its possible outcomes are known when the decision is made. [Ansoff, 7, p.120; Baumol, 12, Ch.19; Farrar, 76, pp.1-2; Knight, 139, p.233; Lintner, 156, p.254; F. and V. Lutz, 165, p.182]. Knowledge refers here to the requirement that there should exist a numerical probability distribution, either provided a priori to the decision-maker, or established statistically, or developed subjectively by experience. [Knight, 139, p.214; Luce and Raiffa, 163, Ch.13; Savage, 218, p.3; Tisdell, 254, pp.125-7]. In order to satisfy the above requirement a decision alternative must be capable of repetition over a very large number of homogeneous, individual instances, either by the decision-maker himself or by someone (such as an insurer) to whose knowledge the decision-maker has access. [Farrar, 76, p.2; Knight, 139, p.234; Shackle, 221, pp.4-5]. The frequency distribution, representing the knowledge gained by serial testing, must be available ex ante to the decision-maker.

A choice situation is one of risk when all available decision alternatives can be specified in advance and are capable of being treated as risk alternatives in the manner specified above.

The measurement of risk is usually associated with dispersion of possible outcomes around an average, although it may be recalled from 2.2 above that Domar and Musgrave
Various measures of dispersion are used as investment criteria, including:

(1) The range of the distribution around its mode (most probable value), in which case 'the greater the range, the less definite the expectation of the most probable price' [Lange, 149, p.29];

(2) The variance of the distribution from its mean. [Makower and Marschak, 168];

(3) The standard deviation of the distribution from its mean. [F. and V. Lutz, 165, p.180; Tobin, 255, p.72];

(4) The standard deviation as in (3), with correction for skewness of the distribution. [F. and V. Lutz, loc.cit.].

Correspondingly, a decision alternative is subject to uncertainty when, prior to the decision being made, it is either impossible to formulate its numerical probability

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1. Discussions of the effects of proportional taxes on individual investment behaviour, under various assumptions regarding which moments of probability distributions are relevant to investors, are found in Lepper [153] and Richter [211].

2. Lintner found, despite a general presumption among economists that relative risks are best measured by the standard deviation, that indifference functions are linear between expected rates of return and their variance, not their standard deviation, at least in cases when all covariances were considered invariant or zero. [160, p.14]. In Tobin's opinion 'the standard deviation is neither the sole measure of dispersion nor the obviously most relevant measure' [loc.cit.].

3. Skewness is defined as the difference between a distribution's mean and mode divided by its standard deviation: it is often argued that, if the mode is located to the right of the mean, the probability of values higher than the mode occurring is less than that of values smaller than the mode.
distribution [Baumol, 12, Ch.19; Farrar, 76, p.2; Hurwicz, 117, p.133; Knight, 139, p.233; Lintner, 156, p.254; Luce and Raiffa, 163, Ch.13; Tisdell, 254, p.125], or the distribution is considered unreliable. [Georgescu-Roegen, 86, p.25; Knight, 139, p.199; Modigliani and Cohen, 186, p.155; Penrose, 200, pp.56, 58; Shackle, 220, pp.115-6]. Hart has stated that uncertainty is present when the parameters of the probability distribution are not single-valued. [108, p.110]. Shackle has ascribed uncertainty to circumstances in which the decision-maker 'is a chooser among courses of action concerning the outcome of each of which he entertains several non-excludable hypotheses' [221, p.18].(4) His reasoning, well worth noting, is as follows:

The things amongst which a man is free to choose are not satisfactions themselves, but actions designed to secure for him some sort of satisfaction; and except when he acts as a mere spender of income on familiar things for immediate consumption, there is no knowing whether any given course of action that he embarks on will secure him the sort of satisfaction he looks to it for, either in kind or in quantity. This is most strikingly true in regions of economic theory lying outside the theory of value, narrowly interpreted; and in particular it is true in the theory of investment [loc.cit.].

Before taking the cue from Shackle's remarks, it remains to define the uncertainty of a choice situation. This occurs when the decision-maker is not aware ex ante of all the specific decision alternatives available to him [Ansoff, 7, p.15; McGuire, 180, p.33; Savage, 218, p.16; ...

(4)

In Shackle's terminology a non-excludable hypothesis is one which cannot be rejected 'absolutely as irrelevant and out of the question...' [loc.cit.].
Simon, 228, p.53], and is moreover unable to formulate numerical probability distributions for those alternatives of which he is aware.

Most managerial real investment decisions are taken in conditions of uncertainty in this latter sense. Despite this, the majority of theoretical discussions of investment (including those of corporate tax theorists) assume conditions of risk. Specifically, it is usually assumed either that the choice situation is fully one of risk (Domar and Musgrave, for example), or, as a concession to reality, that the decision-maker cannot fully enumerate his investment opportunities, but is able to handle known alternatives in terms of risk. As Georgescu-Roegen observes:

Most social scientists and decision theorists reason on the assumption that such an uncertainty can be represented by some kind of numerical profitability. Warnings issued from time to time against the futility, nay the danger, of treating all decisions as if they referred to "a gamble on a known mathematical chance" [Knight, 139, Ch. 7] have had little effect..., most students have preferred to advance on the less thorny passage of measurable uncertainty - a passage more fertile in analytical results - rather than to face the delicate complexity of expectation and be content with making smaller, yet more relevant, strides [86, p.11].(5)

(5) The available options are perhaps less bleak than Georgescu-Roegen suggests. It may be possible to predict the direction of real investment behaviour under uncertainty on the basis of assumptions about motivation, competence and available resources, without having to ascertain the manner in which an investor forms his detailed expectations about the future. Georgescu-Roegen in fact concludes that 'the concept [of good judgment] seems to resist any attempt at an objective definition that also would be operational ex ante' [86, p.29]. Also, as Simon points out, 'expectations play a narrower role in actual business behavior than they do in classical models of rational choice. The devices employed in programmed decision-making to reduce dependence on explicit forecasts are numerous' [228, p.57].
A prime example of the practices to which Georgescu-Roegen refers is the facile assumption (made by Domar and Musgrave; refer 2.2 supra) that risk may satisfactorily substitute for uncertainty subject to the investor demanding that his return should include a premium to cover the latter.

Many issues are affected by the choice between risk and uncertainty assumptions, including the maximization controversy, definition of rationality, and the nature of expectations, etc. For present purposes, however, the necessity for basing discussion on the assumption that uncertainty prevails reduces to two considerations: firstly, that business is in fact faced with uncertainty; and, secondly, that behaviour under uncertainty differs substantially from that under risk. It may be recalled that Domar and Musgrave did not dispute the first consideration, but they rejected the second one explicitly [52, pp.395, n.6, 421, 422], on the grounds that 'it is sufficient to say that the prevalence of uncertainty may induce the investor to require a somewhat higher return than would be required otherwise' [52, pp.395-6].

It is judged self-evident that corporate managements cannot be aware ex ante of all possible available

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Specifically, Domar and Musgrave defined uncertainty as doubt with regard to the correctness of probability distributions. By referring to 'a probability distribution which the investor will construct for each available investment opportunity' [52, p.393], it is clear that they assumed a choice situation of risk, as defined above. That is, they acknowledged uncertainty, but not in the sense recognized here, and they assumed that the investor can specify all available decision alternatives in advance.
in investment opportunities. The uncertainty which attaches to the outcomes of known opportunities arises from the uniqueness of most individual investment decisions. This uniqueness means that it is impossible to form the very large group of like instances necessary to construct a probability distribution. The problem is beyond the scope of insurance for the same reason. [Knight, 139, pp.233-4; Latané, 151, p.149; Shackle, 220, Ch.7; 221, Ch.1]. Even if a hypothetical ex ante distribution was constructed, no ex post distribution would ever become available whereby the former could be proved correct. These obstacles extend to the case in which results from a considerable number of similar past instances are available, since failure to distinguish aspects of a current decision alternative which differ from those of past instances may have very unfortunate consequences. [Fellner, 79, p.197]. Moreover, as Knight has pointed out: 'Where the connection [between present and past decisions] is occasional, demonstration of a dependable connection is vastly more difficult, and there is the added problem of ascertaining the precise proportion of cases in which the connection occurs' [139, p.214].

Probability distributions are a doubtful guide for individual cases, apart from the problems of uniqueness and establishment of dependable connections between cases.

It is clear then that the probability coefficient can be uniquely defined as a frequency ratio only in the entire phase-space. A sequence of observations, be it infinite, represents but a mere sample of this space. This does not mean that we can dispense with it...But can we trust the intermediary link, knowing that a sequence of observations may lead to any frequency limit or even to none? [Georgescu-Roegen, 86, p.16].
The answer is that 'we cannot affirm that in the long run an event will occur with a frequency proportionate to its probability; but we can affirm that it is more likely to occur with this than with any other precise degree of frequency' [Boole, 20, p.422]. Therefore, a probability distribution provides knowledge for prediction 'not of the outcome of any one future trial, but only of the average outcomes of a long series of future trials, all identical to those conducted in the past' [Angell, 6, p.4].

Mathematical expectation on its own has long since ceased to be advocated as the criterion for decision-making, because Bernoulli [15] demonstrated, in terms of the St Petersbourg Paradox and other examples, that this principle is contravened in practice. Instead it was supposed that decision-makers seek to maximize the product of objective probabilities of outcomes and the utilities of those outcomes, known as expected utility maximization. In 1944, the year in which the Domar-Musgrave analysis was published, the criterion received tremendous impetus from publication of von Neumann and Morgenstern's famous work 'Theory of Games and Economic Behavior' [194]. They demonstrated that risky propositions can be ordered in desirability, and thereby endowed expected utility with behavioural meaning.

Nevertheless, dissatisfaction with objective probability, for reasons already explained, soon led to development of an alternative approach based on subjective probability. The subjective approach arose from the work of de Finetti [80], Ramsey [208], and Savage [218], of which
the latter is most influential. Whereas, in the case of objective probability,

- evidence for the quality of agreement between the behavior of the repetitive event and the mathematical concept, and for the magnitude of the probability that applies, is to be obtained by observation of some repetitions of the event, and from no other source whatsoever... [subjective or personal probability] measures the confidence that a particular individual has in the truth of a particular proposition... [on the understanding that] two reasonable individuals faced with the same evidence may have different degrees of confidence in the truth of the same proposition [Savage, 218, p.3].

In contrast to objective probability, subjective probability is regarded as 'a code of consistency for the person applying it, not a system of predictions about the world around him' [Savage, 218, p.59]. Internal consistency of beliefs is achieved by a rationality stipulation to the effect that a person's beliefs should reduce to addition of probabilities of mutually exclusive events and to multiplication of those of independent events. [Cf. Keynes, 134, p.120]. Learning by experience through changes in subjective probability is governed by Bayes' Theorem. Thus, although subjective probabilities have the same mathematical properties as objective probabilities, an individual is free to choose any subjective probabilities he likes prior to the first occurrence of an event, even ones unsupported by compelling argument. [Savage, 218, p.65].

Although subjective expected utility maximization must rate as an advance on its objective predecessor, it is no more competent than the latter to cope with decision-making under uncertainty. Objections to the subjective theory involve both its probability and utility aspects.
According to the personalistic view, the role of the mathematical theory of probability is to enable the person using it to detect inconsistencies in his own real or envisaged behavior. It is also understood that, having detected an inconsistency, he will remove it. An inconsistency is typically removable in many different ways, among which the theory gives no guidance for choosing. Silence on this point does not seem altogether appropriate, so there may be room to improve the theory here [Savage, 218, p.57].

That is, subjective numerical probability is something less than a practical guide to action. It can warn the decision-maker that he is in error, but it cannot advise him how to correct the situation. This weakness arises from the subjectivist view that probability is not concerned with predicting the outside world. [Georgescu-Roegen, 86, p.29; Savage, 218, p.59].

The postulates of personal probability imply that I can determine, to any degree of accuracy whatsoever, the probability (for me) that the next president will be a Democrat. Now it is manifest that I cannot really determine that number with great accuracy, but only roughly [Savage, loc.cit.].

The apparent accuracy of numerical probability is spurious and unattainable in conditions of uncertainty. A subjectivist is no more able to determine the outcome of an election than is an objectivist able to state that 'on the basis of the available evidence it is very improbable, though not impossible, that France will become a monarchy within the next decade' [Savage, 218, pp.61-2]. Yet elections or successions would normally be subject to a lower order of uncertainty than many business investment decisions.

Given that probabilities which do not add to unity are not proper measures [Edwards, 64, p.72], subjective probabilities may be regarded as being bounded at 0 and 1 in the same way as objective probabilities. The addition
theorem specifies boundedness to achieve internal consistency of beliefs. Therefore, subjective and objective probability scales are identical and 'the formalization of weights as subjective probability measures must then be either abandoned altogether, or the measures arrived at originally must be adjusted upwards (or downwards) so as to make them conform to the rule that the weight of a tautology is equal to unity' [Ożga, 195, p.91; Edwards, 65, p.37; Fellner, 78]. Experimental evidence indicates that people simply do not possess the necessary degree of rationality to conform to the addition theorem. [Cf. Edwards, 64, p.74]. Instead, as Shackle has explained, an increase in the number of unexcludable hypotheses about the result of a decision does not reduce the degree of acceptance accorded those hypotheses already held. [220, pp.113-4; 221, pp.26-9].

Just as Bernoulli demonstrated that people do not conform to the principle of mathematical expectation on its own, Pareto [198] has shown that the probability-less idea of utility (which refers to the consequences of acts, rather than to acts themselves) is untenable. Therefore, if numerical probability, whether subjective or objective) is discredited for conditions of uncertainty, utility maximization must also be rejected. However, certain

(7) 'Utility as a function of wealth can have any shape whatsoever in the probability-less context, provided only that the function in question is increasing with increasing wealth, the provision following from the casual observation that almost nobody throws money away' [Savage, 218, p.96].
objections which apply to the utility aspect of subjective expected utility maximization are worth noting, because they must be reckoned with in connection with managerial real-investment decision-making. Two main assumptions underlying utility maximization are that all acts can be rank ordered and that the sure-thing principle applies. (8)

In practice it is likely that decision-making is affected by inconsistencies and intransitivities that are difficult to deal with conventionally, even by means of stochastic choice models (e.g. Luce [162]). (9) Inconsistencies occur as a result of elementary mistakes in logic or because, although people often follow precedent, they have faulty memories for it, particularly when similar sets of circumstances are separated at all widely in time. (10)

Alternatively, man's learning faculty may cause him to perpetrate deliberate inconsistencies over time, if he

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(8) This principle is as follows: if a person would not prefer act f to act g, knowing either that event B will occur, or that event not B will occur, then he does not prefer f to g. Also, provided event B is not regarded as virtually impossible, if the person definitely prefers g to f, knowing that B will occur, and, if he would not prefer f to g, knowing that B will not occur, then he definitely prefers g to f. [Savage, 218, pp.21-2].

(9) Inconsistency occurs when a decision-maker fails to repeat a previous choice from the same set of decision alternatives and under the same conditions. Intransitivity occurs when a decision-maker prefers A to B, B to C, and C to A.

(10) Cf. Knight's observation: 'Where the connection [between homogeneous cases] is occasional, demonstration of a dependable connection is vastly more difficult, and there is the added problem of ascertaining the precise proportion of cases in which the connection occurs' [139, p.214].
remembers that previous instances of a current choice situation turned out badly for him.

The above utility assumptions may therefore be unrealistically stringent in their requirements of logic and knowledge on the part of decision-makers: indeed, they strongly suggest the 'look before you leap' principle.

Carried to its logical extreme, the "Look before leap" principle demands that one envisage every conceivable policy for the government of his whole life (at least from now on) in its most minute details, in the light of the vast number of unknown states of the world, and decide here and now on one policy. This is utterly ridiculous, not - as some might think - because there might later be cause for regret, if things did not turn out as had been anticipated, but because the task implied in making such a decision is not even remotely resembled by human possibility. It is even utterly beyond our power to plan a picnic or to play a game of chess in accordance with the principle, even when the world of states and the set of available acts to be envisaged are artificially reduced to the narrowest reasonable limits [Savage, 218, p.16].(11)

Intransitivities in choice are especially serious for utility maximization because they strike at the foundation of the theory's rationality assumptions. Luce and Raiffa suggest that intransitivities 'often occur when a subject forces choices between inherently incomparable alternatives. The idea is that each alternative invokes "responses" on several different "attribute" scales and that, although each scale itself may be transitive, their amalgamation need not be' [163, p.25]. May [178] suggests that

(11) Savage nevertheless feels that this principle 'is the proper subject of our further discussion, because to cross one's bridges when one comes to them means to attack relatively simple problems of decision by artificially confining attention to so small a world that the "Look before you leap" principle can be applied there' [loc.cit.].
intransitive choices may be expected to occur whenever more than one dimension exists in the stimuli along which decision-makers may order their preferences. This description seems to fit very well the multi-motivated corporation manager of Chapter 1. (12) However, underlying both inconsistencies and intransitivities are the effects of uncertainty, especially as regards the boundedness of rationality.

No matter how intransitivities arise, we must recognize that they exist, and we can take only little comfort in the thought that they are an anathema to most of what constitutes theory in the behavioral sciences today. We may say that we are only concerned with behavior which is transitive, adding hopefully that we believe this need not always be a vacuous study. Or we may contend that the transitive description is often a 'close' approximation to reality. Or we may limit our interest to 'normative' or 'idealized' behavior in the hope that such studies will have a metatheoretic impact on more realistic studies [Luce and Raiffa, loc.cit.].

(12) Strict intransitivity has nothing to do with changes in tastes that can occur during sequential choice procedure. Experimental studies have established that intransitivities and inconsistencies are empirical facts of life, and the main problem appears to consist of establishing the frequencies with which they occur. Other references include Edwards, 64, 65; Davidson and Marschak, 46; Luce, 162; Papandreou, 196, and Tversky, 258.
2.4 Some Effects of Uncertainty

Two main conclusions can be drawn from the foregoing discussion. Firstly, investment decisions are made in conditions of uncertainty, not risk. Secondly, and as a direct result of uncertainty (as here defined), it is unlikely that decision-makers can maximize their investment objectives. Theories based on risk and maximization assumptions, whether they deal with expected profit or utility, are suspect for positive micro-economic purposes, because the circumstances which they envisage bear little resemblance to the real world. That is, action based on the fantastic degrees of knowledge and logic with which maximizing risk-takers are endowed is of quite a different order to that of even the most competent and enterprising management. The nature of the decision process, its problems and emphases, must differ markedly between the two cases, because of the great disparity in knowledge and rationality. It is necessary to discard risk and maximization assumptions for purposes of studying real investment behaviour and business reactions to corporate tax changes, in favour of a more realistic approach based on sub-optimizing under uncertainty. (13)

The Domar-Musgrave analysis is an excellent early example of the subjective expected utility maximization

(13) In discussion on a paper by Simon [226] Lintner states: 'descriptively behavior as observed often differs markedly (and in relatively systematic ways for substantial periods) from optimizing behavior and...these observed patterns, not the implications of presumed optimizing behavior, are what is relevant in judging, for instance, the effect of a change in tax rates on real investment,...' [226, p.25].
approach to the problem of predicting investment reactions to income tax changes. They defined uncertainty as a quality of doubt about the correctness of probability distributions, as opposed to complete inability to construct such distributions. Consequently, they were able to defend their risk assumptions vigorously. Their assumptions are no more idealized than those of many other contributions. Nevertheless, their conclusions about effects of income tax changes on investment depend on these assumptions, and are therefore suspect. It would be impossible in practice for a firm to formulate the smooth, continuous optimum-asset curve 'which describes the investor's evaluation of the market situation and which is the principal tool for our analysis' [52, p.402].

Shackle, a subjectivist who rejects the probability distribution approach, comments on the Domar-Musgrave version of uncertainty in the following terms: 'It is not quite clear whether the uncertainty...arises from the fact that the distribution is a distribution and not a unique value looked on as certain, or from the investor's doubt as to whether the distribution is the right shape, whatever "right" can mean here' [220, p.115]. Shackle points out that the distribution is bogus in these circumstances, and really expresses, 'not actuarial risk which is a form of knowledge, but uncertainty which is another name for ignorance' [220, p.115-6]. He concludes that the distribution fails to describe an investor's uncertainty in exact terms, because the distribution itself is possibly incorrect, and known to be so. [220, p.116].

Consider, for example, the following statement from Goode's study of the corporate income tax: 'The importance of the deterrent effect of risk is all-pervasive and can be stated with fewer qualifications than the positive attraction of profit' [88, p.119]. Domar and Musgrave share this view in the absence of perfect loss offsets.

This is due not only to uncertainty but also, as Domar and Musgrave pointed out, to the fact that 'the manager of a corporation...is confronted with fewer and more unique investment alternatives than is the financial investor, and is thus unable to achieve an equal degree of diversification' [52, p.422]. The Domar-Musgrave optimum-asset curve is discussed in the Appendix.
could management plot any part of such a curve prior to investment decisions. These conclusions follow directly from this study's definition of uncertainty. On the one hand, management is not aware of all available investment alternatives, and, on the other hand, it is unable to construct numerical probability distributions for known opportunities.

The Domar-Musgrave analysis also drastically over-simplifies the number of variables which must be considered in making investment decisions. These variables are elaborated in later Chapters. The relevant point here is that their approach would need several dimensions beyond the two that were considered in order to bear much resemblance to the real investment decision process, even if their risk assumptions were accepted.

The preference assumptions underlying the indifference curves used by Domar and Musgrave in conjunction with their optimum-asset curve were considered in Chapter 1. It may be mentioned in passing that their indifference curves actually have nothing to do with indifference in the sense in which this term is employed for purposes of risk theory. Their curves are constant-utility curves of the Edgeworth variety, as used in the theory of riskless choice. A Domar-Musgrave investor exercizes choice between different combinations of risk and yield in much the same way as a consumer apportions his budget between different goods. The main distinction between the two cases is that the investor is selecting a preferred combination consisting partly of a positive 'good' (yield) and partly of a negative
'good' (risk). Risk or uncertainty indifference, on the other hand, refers to comparisons of knowledge or of ignorance. Keynes defined it strictly as follows:

There must be no relevant evidence relating to one alternative, unless there is corresponding evidence relating to the other; our relevant evidence, that is to say, must be symmetrical with regard to the alternatives, and must be applicable to each in the same manner [134, pp.55-6].

Richter examined the Domar-Musgrave conclusions under the assumptions that the investor maximizes expected utility and is concerned only with the first moment of probability distributions (as they assumed). He demonstrated that the investor's preference (indifference) curves between yield and risk are parallel straight lines and that they are 'incapable of generating the movement toward higher "risk taking" suggested by Domar and Musgrave. Under neither proportional income tax nor lump sum tax shifts would there be any change in the portfolio' [211, p.157]. In his opinion the same conclusion obtains when an investor maximizes the expected utility of a Bernoulli logarithmic function under a truly proportional tax. [211, p.161].

Richter then examined the Domar-Musgrave conclusions from the viewpoint of an investor who considers the first two moments (i.e. mean and variance) of probability distributions. This investor exhibits a quadratic utility function. In this case an increase in the proportional

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(17) In Savage's estimation: 'To this day, no other function has been suggested as a better prototype for Everyman's utility function'[218, p.94]. However, he cites Cramer's view that the logarithmic function is subject to refutation in terms of the St Petersburg Paradox and concludes that this function 'cannot be taken seriously over extreme ranges' [218, p.95].
element of a linear tax 'leads to a shift away from the asset type with lower mean, toward the asset type with higher mean' [loc.cit.]. Risk-taking 'increases in the sense that the larger portfolio pre-tax income can only be obtained at the "cost" of a higher portfolio variance' [211, p.160].

Domar and Musgrave therefore receive some oblique support from 'a model based explicitly on the von Neumann-Morgenstern axioms' [211, p.155]. However, this support was not forthcoming on Domar and Musgrave's own terms, and is itself open to objections, as in 2.3 above.(18)

Other features of their analysis which attract comment at this stage may be briefly mentioned. Firstly, their statement, that 'the prevalence of uncertainty may induce the investor to require a somewhat higher return than would be required otherwise' [52, p.396], is in apparent conflict with the definition of uncertainty adopted in the present study. The statement rests on the Domar-Musgrave view that uncertainty is nothing more than a degree of doubt about the correctness of numerical probability distributions, and on their definition of yield as a compensation for risk-taking. Under the present definition of uncertainty an investor would be unable to compute the premium for uncertainty envisaged by Domar and Musgrave. That is, he cannot ascertain the return to be expected under conditions of risk. As Shackle points out, 'it does not make sense to say that a

(18) Edwards notes that it is 'especially easy' to construct examples of behaviour that violate the von Neumann-Morgenstern axioms 'when the amounts of money involved are very large' [65, p.32].
man feels uncertain how uncertain, or ignorant, he is...'
[220, p.122]. It is also misleading to regard
investment as risk-taking. This view is based on
quantification of the probabilities of loss, which is
impossible in practice. Much investment is made for the
purpose, inter alia, of reducing overall uncertainty.

Domar and Musgrave's statement, that 'opportunity costs,
that is, income not received because investment opportunities
were missed, do not enter our analysis' [52, p.400], is
misleading. On no account would a Domar-Musgrave investor
have the slightest excuse for overlooking the opportunity
costs of his investment decisions, owing to the great
knowledge at his disposal. He is able to construct
probability distributions for all available investment
opportunities, and can therefore choose or vary his
portfolio to include exactly that desired proportion of cash
indicated by opportunity cost calculations. Exclusion of
opportunity costs is also inconsistent with the
Domar-Musgrave claim that 'the three elements of the
[Keynesian] liquidity preference represent nothing but the
fear of loss, and are therefore accounted for in our
probability distribution and in the values of y and r'
[52, p.398]. Liquidity preference, especially for the
speculative motive, clearly implies opportunity cost
calculations. It must therefore be concluded that Domar
and Musgrave were mistaken on this issue, and that
opportunity costs do play an important part in their
investor's calculations.
Effects of income tax changes on investment under uncertainty are considered in the final Section of this Chapter, in the light of the above discussion of definitions and assumptions which underly the Domar-Musgrave results. At this stage it is concluded that their assumptions about the role of yield or profit and the quality and quantity of data available to investors in conditions of risk are inappropriate for purposes of studying corporate investment decisions under uncertainty. The full extent of the huge disparity between the respective decision-making environments of a Domar-Musgrave investor and corporate managements will become evident during later Chapters. (19)

Sub-optimality of decision-making is a direct consequence of uncertainty. Potential investment opportunities must usually be unearthed by laborious and costly search activity, with no guarantee that effort and cost will eventually be repaid. Evaluation of known opportunities is complicated by the fact that they cannot always be considered in neat order of suitability. Vital opportunity cost calculations, which should precede decisions, are hampered by acquisition costs of information, and by the fact that, under uncertainty, there is always an inevitable and irreducible residue of ignorance about the

(19) There is little formal similarity between the real investment decision process and that envisaged by the Domar-Musgrave analysis. For instance, search activity has no place in the latter, and the proximate objectives in terms of which managerial aspirations are pursued bear only slight resemblance to those employed by Domar and Musgrave. Perhaps a better comparison with their decision process is Georgescu-Roegen's 'self-guiding section of the enterprise - the Probability-Relation Bureau - which will automatically make the "right" decisions, including that of what funds should be allocated to its proper budget' [86, p.18].
outcomes of decisions. (20) A further complication is that decisions must often be subjected to time limitation, to avoid losing opportunities to competitors. To these difficulties add the problem of acquiring, and sparing from existing activities, managerial resources capable of innovative decision-making. [Penrose, 200, p.64].

The imperfect nature of managerial rationality under uncertainty is an important determinant of the investment decision process. The problem is one of perception, and manifests itself in various ways. These include the difficulties of recognizing both problems and opportunities at the correct time, of giving correct emphasis to different aspects of decisions and of considering these in the most appropriate order, and the fact that, as a rule, perception depends on incomplete and sometimes inaccurate information. (21) Contributions to managerial decision-making which recognize its essential sub-optimality under uncertainty have therefore tended to emphasize the limitations of rationality, its adaptive nature, and its dependence on ex post 'feedback' correction of decisions as data become available. [Cyert and March, 44, p.99; Simon, 222, 225]. This view of rationality contrasts with that of the omnisciently-rational firm in the classical theory of the firm.

(20) Cf. Modigliani and Cohen, who 'conveniently assume that any aspect of the future can be known with certainty provided the agent incurs a finite - though possibly very large - cost to obtain the information' [186, p.156].
(21) Many of the critical problems of British industry have been attributed to failures in perception. See, for example, Drucker [54] and P.E.P. [204]. Levitt [154] discusses comparable American experience.
In this study a slightly different definition of rationality has been proposed to the effect that rational behaviour is the pursuit of perceived self-interest. This definition, which really reduces to the statement that behaviour is rational, period, accepts and includes the views of the contributors mentioned above. In addition, however, practical rationality is conditioned predominantly by personality factors, motivation, and competence, especially (so far as real investment decision-making is concerned) that particular type of competence known as entrepreneurial competence. These factors determine the nature of self-interest under uncertainty, the quality or extent of perception, and the manner in which self-interest is pursued. In particular, high premiums are placed on individuals who possess the peculiar facility, in conditions of uncertainty, of making correct decisions more often than not, and of timing these decisions correctly. This is so because 'there seems to be no other recommendation for dealing with Knightian uncertainty than the common advice: "get all the facts and use good judgment"' [Georgescu-Roegen, 86, p.29]. The function of managements is therefore precisely that of exercising the proven good judgment for which they are supposedly selected, in order

(22) It appears reasonable to assume that entrepreneurial competence does not usually lack the necessary support from ambitious motivation, and is moreover associated with general business efficiency. On the other hand, many are ambitiously motivated while lacking in various degrees the entrepreneurial competence necessary to cope successfully with innovative decision-making under uncertainty.
to make 'best' decisions on the available facts.\(^{(23)}\)

Managerial rationality, particularly in connection with entrepreneurial competence and motivation, varies markedly between different firms, if only because of supply factors. For this reason the real investment behaviour of different firms may be expected to show wide divergences. As Penrose observes, the assumption of competence 'merely provides us with a class of firms which are capable of growing' \([200, p.33]\). Both the capacity and the desire of managements to pursue an active real investment policy are involved in these inter-firm differences, as implied in the above definition of managerial rationality. The common reaction of all managements to uncertainty is, simply, 'reduce it'. This reaction arises from the basic personal motive of self-preservation. But, whereas competent and ambitious managements tackle uncertainty reduction actively through the real investment decision process, less-competent and conservative managements tend to constrain their investment behaviour according to restrictive financial criteria. Conservative managements, that is, tend to behave according to the principle of increasing risk, which states that, as investment increases the risk of loss becomes increasingly serious. \([\text{Kalecki}, 126; \text{Penrose}, 200, \text{pp.57-8}; \text{Steindl}, 239, 240]\). These firms are passive 'risk-bearers' to the extent of their existing activities, and aim to limit

\(^{(23)}\)The phenomenon of managerial discretion then arises naturally from the necessary association of responsibility with control. That is, just as the corporate form of organization has been correctly attributed largely to uncertainty and its consequences \([\text{Coase}, 38; \text{Knight}, 139, \text{Ch.8}; \text{Malmgren}, 169, p.401]\), so may the special position of managements be traced to the same underlying cause.
'risk-taking' by abstention from commitment. Their failure to develop long-run investment strategies corresponds to the Cyert and March view of business reaction to uncertainty. That is, firms avoid the requirement that they correctly anticipate events in the distant future by using decision rules emphasizing short-run reaction to short-run feedback rather than anticipation of long-run uncertain events. They solve pressing problems rather than develop long-run strategies [44, p.119].

However, this does not adequately explain the behaviour of more competent and ambitious managements. The contrast between action and reaction under uncertainty is an important factor among inter-firm differences in investment behaviour. Although uncertainty as such does not constitute a deterrent to 'thrusting' managements, they may be subject to periodic 'confusion in choice' caused by instability in external conditions. This is explained by Simon as follows:

In order for the decision maker to be able to cope with the problems of choice, it is essential to him that this environment be relatively stable and predictable. Economic instability, whether it stems from business cycles, monetary inflation, or "excessively" vigorous competition in an industry, paralyzes rational action because it destroys most of the customary bases for forming accurate expectations. I would argue that a large part of the discomfort that is felt in the face of instability can be traced to distraction and confusion in choice, rather than to any careful calculation of economic loss [228, p.57].

(24) The terms 'thrusting' and 'sleeping' are employed by P.E.P. [204] to denote behaviour characteristic of ambitious, efficient managements and conservative managements respectively.

(25) On the other hand, Henry prefers 'to stress the possibility that a complex state of manageable uncertainties is more characteristic of the real situation, and the possibility that many individuals may receive positive reward and personal satisfaction from the constant need to cope with a changing environment' [113, p.87].
If an otherwise ambitious and competent management experiences these special difficulties in perceiving its self-interest in the external environment, its investment behaviour may be adversely affected. These difficulties also produce errors in investment strategy.

Normally, however, the chief constraints on investment rates of thrusting managements comprise availability of financial and managerial resources and, perhaps, suitable opportunities. These firms are prone to managerial 'indigestion' caused by attempted excessive absorption of new projects. Given the necessary financial resources and reasonable stability, uncertainty therefore effectively limits expansion only to the extent that management is restricted in its physical capacity to search for and evaluate potential opportunities to the stage at which judgment may be exercised with reasonable confidence. [Cf. Penrose, 200, p.64].

Conservative or 'sleeping' firms, on the other hand, exhibit low rates of investment, mainly because they do not initiate search and evaluation activity designed to produce new openings. These firms moreover neither attract, nor especially seek, the type of managerial recruit who would demonstrate more thrusting characteristics. (26) Apart from innate competence, many factors contribute to the attitudes and behaviour of such firms, but the overall effect may be summed up as a general environmental or social lack of interest in growth, and lack of awareness of its benefits.

(26) P.E.P. [204] found that firm attitudes toward managerial recruitment, education and development constitute important sources of difference between thrusting and sleeping firms.
To the extent that its impact on real investment depends upon the personal qualities and capacities of managements, uncertainty may be regarded as lacking separate significance as a determinant of corporate investment. As Farrar observes: 'Uncertainty is present in greater or lesser degree, in virtually any investment decision. It is seldom, however, the only (or even the predominant) aspect of that decision' [76, p.34]. It would therefore be difficult in any case to disentangle the influence of uncertainty from that of other factors. The above analysis implies that it may also be theoretically improper to attempt to do so.

Before proceeding further it will be useful to outline briefly the satisficing approach to decision-making under uncertainty, in order to establish the areas of similarity and difference between this approach and the one adopted in the above discussion. Since 'the essence of satisficing is human reaction to having to take decisions in ignorance of their probable outcomes' [Marris, 173, p.272], it is apparent that satisficing is concerned with behaviour under much the same conditions envisaged in this study.

Satisficing theory asserts that decision-making under uncertainty concentrates on short-period, sequential problem-solving (as in the passage quoted from Cyert and March supra). These authors also state that 'choice takes place in response to a problem, uses standard operating rules, and involves identifying an alternative that is acceptable from the point of view of evoked goals' [44, p.116]. Not only is search activity problemistic, but
solutions are sought and, if possible, accepted in the immediate vicinity of the problem. The area of search is widened only if neighbourhood solutions are not forthcoming, and search activity ceases once an acceptable result is found. [Cyert and March, 44, pp.120-2; 45, p.154; March and Simon, 171, p.178; Simon, 228 and 229]. As already indicated, a satisficing firm seeks to avoid uncertainty by deliberately failing to develop long-run strategies.

Underlying these views is the notion that behaviour is governed by goal aspiration levels which adjust in accordance with experience and to what is considered attainable. Once an aspiration level is attained action ceases, because search activity is not concerned with finding the best alternative, but only one that is good enough (cf. note 27). However, if actual performances exceed aspiration levels, the latter may tend over time to be revised upwards. Correspondingly, if realized performances fall short of aspirations, search activity is initiated while, at the same time, aspiration levels may be revised downwards. Aspirations are believed highly sensitive to success or failure, and to those levels of goal realization considered attainable. [Simon, 228, p.55].

Aspirations are expectations - adjusted in the long run to realities - of the result that can reasonably be attained. They are not formed on the basis of detailed evaluation of alternative courses of action. Indeed, their principal usefulness lies in the fact that they remove the necessity for such evaluations until the failures of existing programs indicate the

(27) Thus, if a man is searching for the sharpest needle amongst many in a haystack, satisficing theory envisages that he would stop searching once he finds a needle sharp enough for his immediate purpose. [March and Simon, 171, p.141].
need for innovation. The innovative process then requires the discovery and elaboration of new programs that can be regarded as satisfactory - that is, as compatible with aspirations [Simon, 228, p.57].

The manner in which a satisficer evaluates known alternatives, given his objective of finding an acceptable solution, involves the equation of aspiration level with opportunity cost. That is, assuming alternative A is under consideration,

what the decision maker wishes to do is to attach a utility to "not doing A" that he can then compare with the utility of "doing A". Equally important, he wishes to assess the former utility without examining in detail all the alternatives that are subsumed under not A. It is this utility - the utility of not A - that economists denote by the phrase "opportunity cost of A" and psychologists by the phrase "aspiration level".

If the result the decision maker expects from A exceeds or equals his aspiration level, he will presumably choose A; if not, he will choose not A. But what does choosing not A involve? It involves a search for a new concrete alternative to replace A. Hence, the aspiration level mechanism determines whether a course of action will be chosen from among those presently available..., or whether a new alternative will be sought that has not previously been part of the repertory [Simon, 228, p.55].

Reduced to its basic essentials, the satisficing approach to decision-making under uncertainty rests on 'the general proposition that necessity - in the form of the pressure of applications - really is the mother of invention' [Simon, 228, p.56]. Adversity, in the form of problems caused by failure to attain aspiration levels, is the chief source of this necessity, and therefore the main determinant of business investment activity.

Simon claims that the aspiration-level mechanism provides 'a plausible psychological basis for such concepts as "reasonable profit"'...[and that] failure to earn a
reasonable profit will lead to a search for new alternatives, will stimulate the innovative processes' [228, p.55]. This applies also to other organizational goals, for each of which there will be one or more values that are 'critical' from the viewpoint of evoking search activity. These critical values depend on goal levels in the previous period, the extent to which those goals were realized, and performances of comparable organizations in relation to their goal levels in the previous period. [Cyert and March, 44, p.123].

Satisficing theory distinguishes implicitly between firms on the basis of different aspiration levels, but does not make the fundamental distinction between thrusting and sleeping managements on the basis of motivation and competence, as in this study. For instance:

Rational man is a satisficing rather than an optimizing animal. He is the former, if for no other reason, because he does not have the wits to be the latter. This is almost certainly true...of the way in which he decides whether to search for new alternatives. It is also true of the way in which he selects new alternatives when he is in an innovative mood [Simon, 228, p.56].

Consequently, differences between satisficing theory and this study are relatively greater so far as thrusting firms are concerned.

Whereas satisficing theory regards search activity as being initiated mainly by failure to achieve goal aspiration levels, a thrusting management would conduct search activity as a matter of regular policy - in fact, as a part of long-term growth strategy. 'Necessity...really is the mother of invention' [228, p.56]. However, what constitutes 'necessity' for a thrusting management depends not only or
particularly on the occurrence of periodic problems or crises, but also and chiefly on its own driving ambition - on its compulsion to grow.\(^{(28)}\)

The failure of such a management to reach its minimum performance level for a proximate goal - profits, for example - would, as specified by satisficing theory, cause search activity to be initiated, and this would be problemistic. But this type of search activity would not necessarily involve the firm's investment policy, and would not usually constitute a high proportion of the firm's total search effort. Attention might well be drawn to the quality and direction of the firm's strategic (as opposed to its problemistic) search, in order to re-direct search effort towards opportunities of potentially greater profitability. Satisficing therefore helps to explain the reaction of a thrusting management when a security constraint becomes operative.

There are apparent difficulties about the notion of goal aspiration levels as an explanation of investment behaviour. Security considerations, as well as ambition, dictate that realized performance levels, of proximate goals such as profit, should not fall short of certain minima. It is reasonable to suppose that realized performances in recent past periods have considerable influence in determining these\(^{(28)}\)

Simon recognizes this to the extent that 'an aspiration can become attached to the rate of change of a variable just as well as it can to the level of the variable...When such an escalator is built into the aspiration-level mechanism, a need for innovation will be generated even in the absence of adverse environmental changes' [228, p.56]. He cites labour contracts with inbuilt productivity-based increases as an example of 'escalators' that can cause this behaviour. This qualification does not really amount to acceptance of the thrusting behaviour that is emphasized here.
minimum performance standards. Proponents of satisficing theory accept this, and also claim that the setting of minimum standards of behaviour is consistent with satisficing. [E.g. Cyert and March, 45, p.45]. However, goal aspiration levels only have operational meaning if they are identified with these minimum standards of behaviour. Employed in the role of expected levels of attainment, as in satisficing theory, these aspiration levels are indeterminate and would not have the effect (of causing search activity to be initiated) that is claimed for them. Attainable performance levels are not known in advance under uncertainty, especially where new projects are involved. The only determinate basis for instituting special search activity consists of required minimum standards of behaviour, in which case options other than search for new opportunities must also be considered, as explained above. Also, basic managerial aspirations, such as power and prestige, are not easily expressed in terms of levels: it may also be especially difficult to predict the extent to which they are attainable.

A related objection to the role of goal aspiration levels concerns their identification with opportunity costs. The latter are conventionally defined as the greatest benefit given up by selecting alternative A rather than not A. Satisficing theory asserts that, if the result expected from A (which may be understood in this case to refer to all known opportunities) is less than aspiration level, the decision-maker will select the opportunity cost of A, or not A. That is, he will reject known alternatives in favour of search for new ones. Given uncertainty, this
really means that he is supposed to gamble on the likelihood that as-yet-unknown opportunities will show more promise than those about which judgment may be currently exercised. This is unrealistic. The exercise acquires meaning only if minimum acceptable performance levels are substituted for aspiration levels. In the latter case, if management concludes, on the information available and to the best of its ability, that no known decision alternative will meet even minimum requirements, then clearly rejection of known alternatives in favour of search for new ones is a rational act. It is considerably easier, under uncertainty, to judge whether an investment project is capable of meeting minimum performance standards than to establish ex ante what its final result will be (viz. in relation to some desired attainment level). (29)

Aspiration levels are a well-established phenomenon in psychology, for whose purposes they are defined as individuals' 'expectations of accomplishment or...the demands which they make upon themselves' [Munn, 190, p.179]. Individuals differ widely in their levels of aspiration, which are modified over time as the result of success or failure in achieving personal goals. These considerations have been taken into account here, particularly in the fundamental division of managements into thrusters and

(29) The above remarks are not inconsistent with the possibility that a thrusting management may, as a matter of long-term investment strategy, 'keep its options open' by maintaining sufficient flexibility to permit it to exploit opportunities as they become available.
sleepers, and emphasis on the necessary association between motivation and competence. However, personal aspirations cannot be used directly as investment criteria in complex managerial decision-making as advocated by satisficing theorists, if only because uncertainty and the number of relevant variables prevent an \textit{ex ante} process of relating expected results of investment decisions to desired end results.

Management is also in rather a different (or at least more complex) position to that of an individual with regard to raising and lowering aspiration levels, for security reasons. If a staggering loss is suffered in one period, management must aim to restore profit to its previous level, or risk sanctions from the investing and consuming public. Correspondingly, management must aim to avoid dazzling but unsustainable performances. These considerations are, of course, elements of the long-run investment strategy that a thrusting management will rationally attempt to develop under uncertainty, contrary to the views of satisficing theorists.

There is somewhat less dissimilarity between the predictions of satisficing theory and the typical behaviour of a sleeping management. The latter would not develop long-run growth strategies and would not search for new opportunities on a regular basis. Its search activity would tend to be strictly problemistic or \textit{ad hoc}, in conformity with satisficing predictions. However, search would probably not be directed towards discovering new investment opportunities, at least initially. Problems
would tend to be identified with and solved in the immediate neighbourhood of the firm's existing activities, using means other than investment policy. According to P.E.P. [204], inactivity and lack of awareness of both problems and opportunities are characteristic of such firms. This applies, inter alia, to management recruitment and development, assessment of the firm's absolute and comparative performance, long-range planning, operational control, marketing and sales, research and development, and general problem-solving. In general a sleeping management will be relatively slow to recognize both problems and opportunities, and will also lag in taking positive action regarding them.

Satisficing theory therefore respectively understates and overstates the extent to which thrusting and sleeping managements will engage in search activity for purposes of real investment. This is due not only to a failure to specify the factors which determine aspiration levels [Tisdell, 254, p.135], but also to a lack of emphasis on the role of entrepreneurial competence in managerial investment decision-making under uncertainty.
2.5 Incentive Effects of Tax Loss Offsets Under Uncertainty

Direct comparison of managerial behaviour with that in the Domar-Musgrave and other risk models is rather difficult, owing to the latter's extreme artificiality. Not only are firms subject to uncertainty (defined as partial ignorance about the future) rather than risk, but profit and real investment policy occupy different positions in the corporate environment from yield and risk-taking in a Domar-Musgrave world. It is inappropriate to identify real investment with increases in risk-taking, or profit with managerial reward for risk- or uncertainty-bearing. As explained in Chapter 1, profit plays a surrogate role in managerial motivation, and the chief objectives of decision-making are managerial security and either growth or a quiet life. These objectives are pursued in terms of factors, such as sales, market shares, pricing and investment policies, etc., which determine profit residually, rather than in terms of profit as such. This is a consequence of uncertainty about profit outcomes, and of non-profit aspects of managerial motivation.

Uncertainties which confront management in real investment and other decisions therefore relate not only or even mainly to the possibility of net operating losses, but also and predominantly to the variety of 'proximate' factors which, as stated above, also determine the eventual profit outcome. Profit as such tends to be emphasized only when it has fallen, or is expected to fall, below the minimum level needed for security and financing purposes.
This means that profit uncertainty may cause managerial concern even when actual net losses are not incurred or expected. If losses are incurred or expected, the relevant 'risk' for decision-making purposes is that felt by management. It relates to reactions on the part of the investing, consuming and supplying public, and to the adequacy of available finance for future growth.

Offsets for losses are normally allowed against the taxable profits of periods earlier or later than those in which net losses are sustained. If the taxpayer is allowed to carry back losses to earlier periods, he is assured of the maximum prescribed relief provided that sufficient taxable income arose in respect of those periods. However, if it is provided that losses are to be carried forward to later periods, offset is subject to uncertainty about the adequacy of future profits. Thus, even in terms of risk a full loss offset tax may not reduce both yield and risk in the proportion of the tax rate, because the probability that future income will not suffice for offset purposes must be taken into account. Domar and Musgrave assumed that their investor is assured of sufficient income to achieve full offset for losses [52, p.409], which really begs the question of the efficacy of offset provisions in achieving results claimed for them. Firms are less able to predict events the further into the future that they may occur.

If net losses are incurred or expected, or if profit falls below the minimum required, appropriate action depends on which factors cause the loss. The solution would not necessarily involve the firm's investment policy, except,
perhaps, for purposes of cost reduction. The reaction of a Domar-Musgrave investor under a full-loss-offset tax, however, would depend on his marginal utility of income. If this increases with falling income, he would presumably increase risk-taking through investment in order to restore the level of income. In any case, the only type of reaction available to him involves investment policy.

Real investment policies are determined respectively by the adequacy of existing capacity to meet expected product demand, by replacement needs, and by non-productive welfare and other commitments. Loss offset provisions, or the lack of them, have little relevance to amounts that managements feel should be invested under these headings in existing lines. Investment in additional productive capacity, beyond that believed appropriate to expected future demand, would contribute to future losses. Reduction of planned investment below this appropriate amount would mean loss of sales, market shares and profits. Replacement policy, as will be demonstrated in Chapter 3, is properly directed towards reduction of unit costs and, therefore, competitive uncertainty. It would be incorrect to argue that a loss-induced response through replacement policy constitutes an increase in risk-taking.

Although investment may be adjusted in response to losses, or even in the absence of losses, when management considers this appropriate, various other categories of expenditure may also be retrenched in order to improve profitability, and without affecting output. Reduction of organizational slack increases profitability, and, by
improving operating efficiency, also reduces managerial uncertainty. Given the choice, and this depends entirely upon particular circumstances, an ambitious management would disturb real investment policy as little as possible, because it is geared to sales and market share aspirations.

These conclusions apply a fortiori to the more general case in which net losses are possible, but are not actually incurred or expected. In these circumstances a Domar-Musgrave investor will, given an increase in the tax rate, respectively increase or decrease risk-taking, depending upon whether there is provision for offset of losses or not. In reality, either response would expand the uncertainty of a firm's competitive position, without correspondingly increasing expected profits. Loss offset provisions do not assist management to cope with uncertainties about proximate variables, in terms of which investment decisions are made, and through which managerial objectives are realized. That is, loss offset provisions are no help in ascertaining whether given sales or market share targets can be achieved or maintained, how competitors will react to the firm's market initiatives, whether customers will respond favourably to certain product innovations, etc. Nor, in the case of a net loss, can these provisions alleviate managerial uncertainty about the effect on the firm's image with the investing, consuming and supplying public.

See Chapter 1, footnote 28.
These provisions merely state that, should a net loss result from the many decisions taken under uncertainty, then relief will be provided at the tax rate on these losses, if sufficient taxable income becomes available in prescribed periods. The possibility, or even certainty, of such relief is irrelevant from the incentive point of view to the manner in which investment and related decisions are made under uncertainty in relation to managerial objectives. That is, whether or not offset for losses is allowed, management must still make its best decisions under uncertainty, by the same proximate criteria, on the basis of the same best available data about these criteria, with a view to achieving the same objectives. Alterations in the tax rate do not directly affect a firm's profit efficiency, which is the pre-tax return on resources employed; nor, subject to tax capitalization and other aspects of incidence, need these alterations affect the amount of profit required for purposes of managerial security.

Tax-induced adjustments of a Domar-Musgrave investor's portfolio involve physical switches between investments of different yields and risks, that is, diversification. The above remarks refer more particularly to investment in existing lines, so that one may enquire whether managements experience any direct incentive to diversify as the result of introduction of full loss offset provisions. Diversification into new lines usually extends managerial uncertainty to some extent, because of initial unfamiliarity with their technical, organizational and marketing implications. This is the price to be paid for the hope of
avoiding growth and profit limitations of existing lines. Decisions to diversify, together with decisions to establish the research and other search processes which laboriously unearth potential opportunities, depend directly upon managerial interpretation of its own self-interest in conditions of considerable ignorance about the eventual outcomes of these decisions.

In the absence of loss-offset provisions a Domar-Musgrave investor would not diversify after a tax increase, since he would wish to reduce risk. Enterprising managements, on the other hand, would diversify in the absence of loss offsets, since the latter make no practical difference to the quality of data at their disposal for decision-making purposes, or to their need to exercise entrepreneurial competence in order to achieve success. In any case diversification to reduce uncertainty, at least in the shorter term, is not always possible within the scope of real investment. Financial investment in, say, blue chip stocks is quite another matter, outside the scope of this study.

Extension of uncertainty through diversification into new lines does in fact bear a formal resemblance to the Domar-Musgrave income effect of an increase in the rate of a tax with full offset for losses. For reasons already stated, however, the tax does not generally provide an investment incentive which would directly induce diversification. That is, managements are not motivated either to recoup profit taken in tax, or to extend uncertainty for this purpose. Diversification occurs,
subject to opportunities, when managements seek growth (and associated profits) beyond limitations of existing lines. Loss offset provisions do not really reduce the uncertainties involved, which encompass far more than the eventual profit outcome. Also, managements presumably do not undertake ventures with a view to the need to rely upon loss provisions at later stages. In Chapter 3 it will be explained how managements attempt to ensure that losses on unsuccessful projects are kept to a minimum. An additional factor is that, for reasons connected with financing, competitive power, and availability of managerial resources, etc., a firm's new ventures are not normally very large in relation to its own size.

Sleepy managements are even less likely than thrusters to diversify in response to increases in the rate of a full-loss-offset tax. They are insufficiently motivated and entrepreneurially-efficient to institute the search and evaluation procedures which disclose potential opportunities. [Cf. P.E.P., 204, p.208]. However, there may be an intermediate type of conservative management, not very growth-minded, nor very entrepreneurially-efficient, which is yet sufficiently active to consider occasional ventures, subject to rigorous conditions of financial prudence. For this type of management, the element of insurance offered by loss offset provisions may well have some attraction. These firms lack the inherent drive of thrusting managements, and are more likely than the latter to be impressed by profit uncertainties. They are also less well-equipped organizationally and by experience to undertake an efficient
process of data collection and evaluation upon which diversification strategy must be based under uncertainty.

Tax loss-offset provisions are based upon the equitable principle that, if a taxpayer is levied at a proportional rate on his periodic trading surpluses, he should be allowed credit at the same proportional rate on periodic trading losses. This provides that the tax burden over a number of consecutive periods shall not exceed tax at the given proportional rate upon the average surplus for those periods. Various writers concerned with the economic effects of taxation regard this equitable provision as a powerful instrument for influencing real investment incentives through the tax system.

The foregoing detailed discussion of the nature and consequences of managerial motivation and competence, the corporate environment in which investment decisions are made, and business uncertainty, has found little theoretical justification for conclusions of received theory about effects of a proportional profits tax, with or without full loss offset provisions, on real investment incentives of corporate managements. Instead, it is concluded at this stage that neither increases in the tax rate nor loss offset provisions have much discernible effect on managerial desires to invest.

Conclusions of the Domar-Musgrave analysis and other contributions depend upon a variety of assumptions that are inappropriate to this context. These assumptions refer to managerial motivation and objectives, especially in relation to profit, and the degree of information available to
managements when investment decisions are made. In this latter respect the gulf between a Domar-Musgrave world and the corporate environment is so wide that any resemblance between the respective decision processes is purely nominal.

At this point, therefore, the Domar-Musgrave analysis is discarded. On the foundation laid by the previous discussion of managerial motivation and business uncertainty, etc., the two subsequent Chapters examine corporate investment decision processes and their relation to profit. This analysis, of the various ways in which managerial self-interest is pursued through investment under uncertainty, allows the above preliminary conclusions about effects of corporate income tax changes to be further tested in the final Chapter.

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CHAPTER 3

CORPORATE REAL INVESTMENT DECISIONS

3.1 Introduction

Analysis in the two previous Chapters has attempted to reach satisfactory conclusions in two of the main areas underlying the predictions of conventional corporate tax theory. These areas included motivation and objectives, and the risk-uncertainty controversy. Conclusions in these areas have generally not supported the predictions of conventional theory.

However, these conclusions are not yet conclusive, because there is a third area, real investment decision-making, in relation to which both the conventional theory and the above conclusions must be discussed. Given motivation and objectives under uncertainty, that is, decision processes describe how self-interest is pursued.

This may reinforce conclusions about effects of corporate tax changes arrived at from the viewpoints of objectives and the state of uncertainty. Alternatively, it may prove necessary to modify these conclusions in various respects. This Chapter therefore aims to lay part of the foundation for answering that question. In the absence of positive theory about real investment decision-making, and associated theory about the role of profit in these decisions, analyses of effects of tax changes may predict behaviour which, in reality, would put a firm out of business or damage its competitive position.

- 120 -
Discussion of real investment decisions falls conveniently into those concerned with diversification into new fields, on the one hand, and those which involve expansion of existing lines and replacement investment, on the other hand. This distinction is significant from the viewpoints of both managerial motivation and uncertainty.
3.2 Diversification Strategy

In Chapter 1 it was observed that the firm of traditional theory has small scope for achieving sustained growth through internal policy decisions. The number of variables susceptible to influence by policy is few: they include price, advertising, and quality variation. Sustainable increases in the volume of demand are mainly exogenous events. Given that the theory of the firm is concerned with production of existing lines, its assumptions are by no means entirely unrealistic. Industries typically pass through a demand and investment life cycle whose stages comprise adolescence, maturity, and senility. [Kmenta and Williamson, 138]. In the latter stages, when market shares have become established and the main reservoir of demand has been tapped, the extent to which a firm can achieve further growth in a market, other than by waiting upon secular increases in demand, may be quite limited. Subject to market competition, growth in existing markets may also be prohibitively expensive.

If a growth-minded management is to achieve its objectives without seeking new outlets, it must therefore accomplish the difficult task of increasing its market shares for existing products, and must repeat this feat over several such markets if growth is to be sustained. This requires some increase in relative threat strength vis à vis competitors, through cost reductions and/or improvements in consumer appeal. Scope for such increases is clearly limited. [Marris, 173, p.200; Williamson, 264, p.4]. Diversification therefore 'represents the search for a new
business structure which will provide a means of survival for the corporation beyond the life cycle of a single industry,...' [Miller, 185, p.136]. It also represents the means by which an ambitious management may regain and maintain the initiative for directing growth of the firm through internal policy. A thrusting management will seek to diversify whenever its growth objectives can no longer be met within the scope of its existing activities. [Ansoff, 7, p.129; Penrose, 200, p.144]. For many firms this implies continuous diversification.

According to the well-documented principle of financial investment, portfolio diversification contributes greatly towards the security of investment. [Domar and Musgrave, 52; Hall, 101; Lepper, 153; Markowitz, 172]. This is equally true of real investment. Management can never entirely depend on existing activities for the future healthy existence of the firm. The best long-run protection against direct and indirect competition in existing markets consists of active preparation to anticipate or match threatening innovations in technology, production and marketing. [Penrose, 200, p.113; Schumpeter, 219, pp.84-5].(1) The more widely diversified are a firm's activities (subject to important considerations mentioned below) the less vulnerable is the firm to reverses in any particular area of its operations.

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(1) In a survey of 110 corporations rated as excellently-managed, about 90 per cent of respondents to a questionnaire were of the opinion that 'staying abreast or out ahead in the innovative race is more important to their long-range business success than a "defensive" policy of basing prices closely on costs' [Earley, 61, p.59].
Although a firm may not depend on existing activities for future sustained growth, the rate, type and direction of its diversification must usually depend both qualitatively and quantitatively on the amounts and growth rates of the productive services, resources, and knowledge which are employed in, and which derive from, existing activities. These factors affect, for example, the extent to which a firm will resort to acquisition as the means of diversification, rather than internal development.

Firstly, the existence of spare or under-utilized resources, whether managerial or plant, provides both a strong impetus to expand in new directions and a potential source of competitive advantage for this purpose. It is particularly likely that existing activities will fail to utilize fully a firm's economic potential as this grows over time during normal operation and expansion. Many resources tend to be both indivisible and capable of alternative uses. This means, on the one hand, that management cannot trim resources strictly according to ebbs and flows of existing operations, and, on the other hand, that pressures may develop for fuller utilization of those resources, on grounds of efficiency and sectional self-interest. Resources, included in a firm's economic potential, to which these remarks apply, consist not only of physical productive assets, but also of various kinds of knowledge and technical, organizational and entrepreneurial
Indivisibility and flexibility together imply that the logical scale of total operations is the least common multiple of the full range of resources. In many firms a large number and variety of indivisible resources are used. None of these need be very large, but if each is capable of rendering not only different amounts, but also different kinds of services, a combination that achieves the full utilization of all of them may perforce call for an output much larger and more varied than can be organized by a firm in any given period of time [Penrose, 200, p.69].

Clearly, the greater the degree of functional specialization, the higher the least common multiple, and the less likely that existing activities will fully utilize available resources. If these activities cannot be appropriately expanded, there is an inbuilt impetus to diversify. Specialization at points of common costs is an attribute of size, and is therefore one benefit of successful previous diversification. It is a means of reducing unit costs of both existing and future products and, as such, a source of competitive strength.

The second principal connection between a firm's existing activities and its diversification strategy concerns the fact that scope for expansion depends importantly on the types and qualities, as well as amounts, of productive services, knowledge and techniques used in

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(2) In his study of Du Pont's 'venture management' approach to diversification Peterson observes that the entrepreneurial function is continuous...By contrast, the small businessman gets his new venture started and then retreats into a conventional operating role...he typically remains engrossed in daily operations and does not use again the specific talents he developed in pioneering his enterprise [201. p.73].
connection with, and developed from, existing activities. Conglomerate diversification, that is, into new areas having no connection with existing activities, probably constitutes only a small proportion of total diversification. [Penrose, 200, p.131; Miller, 185, p.122]. Long-run growth depends on a firm's ability to establish one or more strong and comprehensive technological bases from which operations can be diversified into new products and markets. [Ansoff, 7, Ch.6; Miller, loc.cit.; Penrose, 200, p.137].

The main components of long-run growth strategy derive from the necessary dependence of a firm's scope for diversification on its present activities, resources and knowledge. In crude terms this means that what a firm can do depends on what it (the firm) is. This important relation is underlined by the fact that, under uncertainty, cash flow projections of potential new investments are at best unreliable. Management needs tangible factors on which to concentrate for purposes of evaluating the suitability of new projects. The components of strategy meet this need. They include product-market scope, growth vector, competitive advantage, and synergy. In combination they provide the common thread between existing and future activities that is essential for long-run growth.

The profitability and even survival of a firm which fails to concentrate on the intensive development of any of its existing fields, and instead jumps from one type of production to another in response to changes in external conditions, depends entirely on the ability of its entrepreneurs to make shrewd financial deals, to judge correctly market changes, and to move rapidly from one product to another in response thereto...no enduring industrial organization is ever maintained by this type of adaptation or growth...Sooner or later such "firms" either break up or settle down to the exploitation of selected fields. The force responsible is that of competition [Penrose, 200, p.131].
Product-market scope specifies the industries to which the firm confines its activities, or the overall technological area within the firm's competence. This is often too broad to enable a common thread to be ascertained. Scope may widen over time as the result of technological advances by the firm. Growth vector indicates the directions, both inter- and intra-industry, in which the firm is tending to move within its overall scope. Individual diversification entries may tend to change these directions, and management will wish to assess the implications of such changes. The directions of movement take account of current and potential market penetrations, and development of both markets and products. Competitive advantage 'seeks to identify particular properties of individual product markets which will give the firm a strong competitive position' [Ansoff, 7, p.110]; it depends on the firm's absolute and comparative strength in research and development, production, marketing, and organization. The fourth component, synergy, is concerned with the desired characteristics of fit between existing activities and potential product entries. [Ansoff, 7, p.75]. Synergy, or joint effects, may arise in connection with development, production, investment, marketing, and management. If the firm enters products which are synergistically strong, and which also conform to the other components of strategy, it can expect to gain significant growth and other benefits from diversification moves, subject to the usual ceteris paribus proviso.
One of the most important joint effects of diversifying into related areas, especially under uncertainty, is that established knowledge and experience may be utilized. Most of a manager's value lies in his ability to 'relate each business problem to a particular context in which the manager increases his chances of a correct decision because he understands the parameters of that industry' [Miller, 185, pp.125-6]. Initial costs of diversification partly depend on this understanding, and on the degree to which the firm's other skills and resources are compatible with the requirements of new ventures. These costs include learning and making mistakes in new environments, acquiring new skills, and establishing new rules and procedures. Competitive and other benefits may be lost if unfamiliarity delays establishment in exploding markets. [Ansoff, 7, pp.83-4]. Also, since the cost of acquiring knowledge must be taken into account, concentric diversification (into related areas) has the advantage that the incremental cost of adding new data to an existing stock of knowledge is probably much lower when that stock is already large. [Malagren, 169, p.414]. Existing knowledge is also often capable of repeated use for new purposes without corresponding repeated costs being incurred.

If a firm diversifies in markets in which it has monopolistic or oligopolistic advantages, it may obtain market synergy from fresh exploitation of goodwill established by previous products. Its appropriability is probably also greatest in these markets. Aggressive innovation by one or more members of an oligopolistic
industry may induce or stimulate matching responses by competitors, leading to a climate of growth in the industry. [Villard, 259, p.493; Williamson, 266, pp.67-8]. The notions that rewards of innovation increase with market control [Kaysen and Turner, 133; Schumpeter, 219; Villard, 259], and that innovation varies with the degree of monopoly power, are not generally accepted. It is alleged that monopoly power allows large firms to neglect innovation or to restrain it in the interests of stable inter-firm relations; and that differential advantages of innovation are greatest when competitive conditions prevail. [Kaysen and Turner, 133, p.85; Williamson, 266, p.68]. These questions partly depend on motivation, which is not at issue here. The essential point is that use of established marketing organization and knowledge is a source of considerable advantage in diversification, and that this advantage may importantly influence the directions in which a firm will expand.

Some benefits from diversification derive from the size of the firm in question, or from its increased size following successful expansion. Other benefits relate to the diversification process itself. This distinction reflects the fact that 'growth is a process; size is a state' [Penrose, 200, p.88].

Economies of size are present when a larger firm, because of its size alone, can not only produce and sell goods and services more efficiently than smaller firms but also can introduce larger quantities or new products more efficiently [Penrose, 200, p.89]. (4)

(4) The term 'benefits' refers here to the desirable results of diversification (growth, prestige, profitability, efficiency, etc.). 'Economies', on the other hand, are one of the factors by means of which the benefits of diversification are achieved.
Benefits attributable to size alone clearly introduce an element of differential advantage into the diversification activities of different firms. A large firm has an absolute advantage over a small firm in most fields that the two may enter, and some fields are effectively barred to firms below a certain size. Size yields benefits in the areas of technology, marketing, finance, and research. Although these benefits are partly derived from the three basic 'principles' of bulk transactions, massed reserves, and multiples which together form the economies of large-scale operation [Sargent Florence, 81, pp.50-1], the advantages of size are more comprehensive than this. They also include financial security, command of a wider range of opportunities than that available to small firms, and, especially, the capacity to enter big markets, in which they may often enjoy relatively greater growth and profitability, free from the competition of the many. Whilst it is understood that size is a relative concept, varying according to the circumstances of different industries, diversification by large firms constitutes the exercise of their established advantages in this respect. Above a certain (industry-dependent) size, that is, large firms probably do not expect to gain incremental advantages of size from further diversification. Smaller firms, on the other hand, often expand through diversification in order to attain that minimum size at which their competitive position and command over a range of opportunities are transformed. Meanwhile, they are at a disadvantage relative to large firms and must rely on superior entrepreneurial ability,
particularly with regard to selection of suitable opportunities from those available.\(^{(5)}\)

Economies of growth are the internal economies available to an individual firm which make expansion profitable in particular directions. They are derived from the unique collection of productive services available to it, and create for that firm a differential advantage over other firms in putting on the market new products or increased quantities of old products. At any time the availability of such economies is the result of the process...by which unused productive services are continually created within the firm [Penrose, 200, p.99].

Growth benefits arise from the process of diversification itself (or from expansion of existing lines): they are not available in the absence of growth. Therefore, they are available to large and small firms alike, although in greater degree to the former, since 'all the economies of size...also provide economies of growth for any firm that can take advantage of them' [Penrose, 200, p.100; also Robinson, 213, p.67]. Dependence of these benefits upon a firm's particular resources is a principal determinant of growth strategy, as discussed above. Correspondingly, strategic efficiency enables a firm to fully exploit its opportunities for obtaining growth benefits, because this efficiency includes careful selection of opportunities for expansion on the basis of their compatibility with the firm's existing resources and advantages. Ability to obtain

\(^{(5)}\)

According to Hall and Weiss, 'there is considerable evidence that average growth rates (though not the variances of growth rates) are in fact independent of size' [102, p.323]. This evidence includes, inter alia, Collins and Preston, 40; Hymer and Pashigian, 119; Mansfield, 170; and Simon, 223. For purposes of their study Hall and Weiss accepted Baumol's definition of firm size as the 'amount of owned and borrowed money capital' [11, p.38]. See also Chapter 4, footnote 13.
growth benefits also depends on types and qualities of productive services, and, as stated by Penrose, on the extent to which they can be spared from existing activities.

The existence of unused productive services is the first prerequisite for obtaining growth benefits, as it is of the growth process itself. These benefits include all the favourable effects of putting to work currently-idle or under-utilized potential. Irrespective of firm size, if this potential is already fully taxed, there is no room for further growth, and, therefore, no scope to obtain its benefits, until such time as this potential can be either enlarged or otherwise released from present uses. Needless to say, this underlines the importance of entrepreneurial strategic efficiency with regard both to selection of projects, and to abandonment decisions. Resource deployment decisions that are efficient and (given partial ignorance about future opportunities) lucky enable management to eke out the scope for growth with limited resources. Firm size, on the other hand, is a constant source of advantage in a large firm's existing markets. However, it is growth through diversification which really exploits size, since the latter is a valuable property which shares a common characteristic with some types of knowledge, that of being capable of repeated use without depletion.

A further determinant of benefits from diversification consists of the direction of growth and the method employed for this purpose. These are bound up with the efficient selection of opportunities in particular cases, having
regard to the nature of the resources available. Methods and directions of growth both tend to be differentiated according to particular requirements. Marris [173, Ch. 4], for instance, distinguishes diversification on the basis of whether it is imitative or differentiated with respect to existing products. Penrose [200, Ch. 7] classifies entries between changes in one or more of market, product, and production (technological) base. Thus, for example, a firm may attack new markets with new products from an existing production base, or it may seek to expand in existing markets with new products from a newly-developed base. Penrose also distinguishes entries according to their purpose: that is, a firm may diversify to stabilize production against temporary or seasonal fluctuations, to counter permanent, adverse changes in demand for existing products, or simply because its present growth rate is too low. Ansoff [7, Ch. 7] distinguishes diversification in two ways: firstly, whether it is horizontal or vertical; secondly, whether it is concentric or conglomerate (that is, related to existing activities, or not). Miller [185] analyzes problems connected with the following types of diversification: combination of new ventures with existing activities for the purpose of sharing existing facilities; break-through moves, in which particular existing resources are applied to a new venture in order to create an initial entry advantage; and establishment of product clusters, in each of which the constituents have enough common or complementary business characteristics to be administered as a group. Most of the above types of diversification also
often involve the further distinction of the method of
growth; viz. internal development of products or
acquisition of other firms. This distinction, as well as
the foregoing, affects the particular question of the role
of real investment in diversification, in addition to the
benefits of growth.

A Penrose-type classification provides perhaps the
best illustration of the different types of diversification
moves. These are shown in Figure 3.2-1, which suggests
that product-market scope depends considerably on
technological strength. A firm that is unable to develop,
or acquire, new production bases is confined to moves I,
II, III, and VIII, of which the latter is merely
acquisition of close competitors in existing markets, while
the first constitutes market diversification of existing
products. There is probably limited scope for growth by
means of I and VIII, neither of which depends on scientific
research. Moves II and III, however, do necessitate
research and development, and, in the case of III, the
ability to conduct imitative or differentiated
diversification in exploding markets. A type III move into
a market which is already established, although new to the
firm, may be a particularly difficult venture, unless the
firm possesses a strong competitive advantage not shared by
firms already in the market. The production base from which
the firm is attacking could provide this advantage if it is
superior to those of other firms. Move II is known as
full-line diversification, whereby a firm exploits both
technological and marketing synergy to serve a wider variety
Figure 3.2-1
Scope for diversification

(Diversification paths between 'production base' and 'market' are traced by twin pairs of numerals - e.g. VI-VI)
of the needs of its existing customers. A firm which initiates II gains considerably in short-term competitive advantage and forces competitors to follow suit. This variant is especially important in oligopolistic industries, notably in those producing consumer durables. [Penrose, 200, pp.134-6].

In each of II and III the firm may diversify either as initiator or as imitator. Growth benefits may depend considerably on which of these is the case. An initiator can enjoy the benefits of quasi-monopoly during at least part of that phase of a product's life when price elasticity of demand is believed to be lowest; namely, when demand is exploding. [Kaplan et al., 129, pp.59-60; Marris, 173, pp.143-4]. Various production and marketing advantages may also arise from being first in the field. On the other hand, product innovation is expensive and uncertain. The market may fail to explode, or imitators may succeed in capturing a large share of the market. An imitator is subject to less uncertainty when he enters an already-exploding market; and he may be spared a part of initial costs of research and development. [Marris, 173, p.187]. Owing to uncertainty the total market size of a new product may not be known in the early stages. The initiator therefore knows his own sales, but not the behaviour of his market share. This complicates the problem of devising tactics against encroachment, especially if absolute sales and profits figures continue to rise satisfactorily. Other things equal, the more technologically-sophisticated a firm's market entries of types II and III, the greater the
lag before imitators appear, and, therefore, the higher the proportion of the exploding phase of product demand will the initiator be able to exploit unchallenged.

If a firm possesses sufficient resources and technical competence to develop new production bases, its scope for growth through diversification widens to include moves IV - VII, subject to relations between the respective uses of the new and existing bases. Move IV, for instance, is a variant of II (full-line diversification) and may gain for the firm a considerable competitive advantage in its existing markets. New production methods or materials, which are relevant to existing markets by way of new products, may also be used to transform the physical characteristics, quality and marketability of existing products in existing markets (move VI), and/or to attack markets new to the firm where this was not previously feasible (move VII). Markets new to the firm for purposes of VII may either be initially developed by the firm or already established prior to diversification. Again, the firm may diversify either as initiator or as imitator. The extent of competitive advantages and growth benefits to be gained from these moves depends materially on these considerations. Moreover, it should not be overlooked that the above moves, or rather the new techniques underlying these moves, may conflict with the firm's investment in existing methods. In that case, if the firm has initiated the technical advance, diversification may be deferred until the old investment can be liquidated. If another firm initiates the new methods, the firm may be forced to cut its losses on previous
investment and to adopt the new methods to save its competitive position. Much depends on the specificity of previous investment.

Move V represents diversification into new markets with new products developed from a new production base. This move may simply constitute a market extension of IV, as, for example, when technically-new products, which are relevant to a firm's existing markets, can also be exported. Market synergy and competitive advantage in existing markets will then assist efforts to sell the same new products in new markets. In the absence of market synergy, growth benefits of move V depend on other types of synergy (if any), on managerial efficiency, whether the firm is first in the new field, and on the degree and timing of competition from other firms. A complete lack of synergy in move V would entail great reliance on technical and managerial resource, and on financial strength, if diversification is to succeed. Ability to diversify conglomerately is a prerogative of size coupled with efficiency, and, perhaps, of entrepreneurial and organizational flair of managements of smaller firms. Success in all types of diversification depends on technical and market strength backed by research and development effort, and by managerial enterprise and efficiency. All directions of opportunity for a firm are also potential lines of attack by other firms. An efficient and growth-minded firm prepares itself through research, etc. to respond swiftly to both threats and opportunities.
The main constraints on diversification by internal development, apart from financial resources, are managerial and technical. This refers to the quantity and quality of managerial and technical staff available to plan and execute diversification moves. If these resources are over-extended, costly errors are likely to ensue, because speed and accuracy of judgment are more critical when operations are new and unestablished. This applies especially to decisions to divert resources from projects that have failed to gain market momentum, or to provide extra support necessary to make marginal projects succeed.

The more products there are to watch, relatively to the number of efficient managers, the less efficiently, beyond a certain point, will each be controlled, and the more capital will be wasted, locked up in products which have failed to explode, or be lost irrevocably through tardy diversion [Harris, 173, p.233]. Failures in this respect particularly affect fixed capital and other overheads. To the extent that fixed capital has alternative uses, the importance of quick managerial reaction is greater, because opportunity costs of reallocation are then considerable. Mistakes will be reflected in a tendency for the overall capital-output ratio to rise. The more complex a new venture in relation to its size, and the larger this absolute size, the more managerial resources will be needed to supervise it, and to solve problems of co-ordination with existing activities. [Penrose, 200, pp.207-8; Robinson, 213, p.56]. Managerial problems are multiplied when a firm diversifies into unfamiliar fields. In these cases, 'some kind of reliable, experienced business judgment is needed just at the time when the old judgment standards no longer apply' [Miller,
185, p.128]. Even fields which appear to be technically similar to existing activities may give rise to problems not foreseen when expansion was undertaken. (6)

Technological complexities tend to lower the most efficient growth rate that can be attained. However, the simpler the technology applied in a firm's existing production bases, the less likely it is that abilities will be developed which enable the firm to move into new areas. On balance, the attainable diversification rate will be lower the weaker a firm is technologically. The same applies to marketing strength. [Penrose, 200, pp.118-20]. Miller reached similar conclusions in his empirical studies of diversification.

Many of them [diversifying firms] overestimated the importance of the production function as a whole, and underestimated the product development and marketing problems of their diversification moves. This generally resulted in excessive facilities cost, inadequate product pricing, and premature high-volume production for new ventures that simply were not ready for full-scale operation. They needed a means of adjusting themselves to the real requirements of the new venture [185, pp.121-2].

Miller also identified a further constraint, which he termed proliferation of commitments. For instance, a new line may

(6) One diversification move examined by Miller [185, pp.25-31] involved production by an automobile manufacturer, Briggs, of drawn steel bathtubs. The attraction of this move lay in application of automotive steel stamping techniques, which were expected to yield advantages of light weight and low cost that existing manufacturers of cast-iron bathtubs could not provide. It was discovered, however, that automobile presses ran too fast and that the steel tore during stamping. Special presses and different steel had to be developed. The project succeeded admirably, but only because management realized in time that this move could not be regarded merely as a means of achieving fuller utilization of automobile presses, and that substantial separate supervision and support were needed for the new project to succeed.
be combined with existing facilities simply to spread overheads and to achieve fuller plant utilization, with no intention that the venture will exert its own claims on resources. Miller found, however, that in some cases, 'as soon as unit production costs became an important consideration, the new venture began to generate its own requirements, and the flexibility of existing resources became a critical factor' [185, pp.118-9]. In this way a non-growth venture may inhibit future diversification by diverting attention and resources.

Competition, both actual and potential, exerts a constraining influence on the directions in which most firms can diversify.

In a competitive and technologically progressive industry a firm specializing in given products can maintain its position with respect to these products only if it is able to develop an expertise in technology and marketing sufficient to enable it to keep up with and to participate in the introduction of innovations affecting its products. If this proposition is valid for firms specializing in given products, then it is equally valid regardless of the number of products a firm produces. Thus if a firm chooses to produce a large number of products not closely related in technology and marketing, it must be in a position to devote sufficient resources to the development of each type of product to maintain its competitive position in the market for that type of product [Penrose, 200, p.132].

The force of this constraint clearly depends partly on firm size, since this governs the amount of resources available for product development. Large firms are able to service wider ranges of products than small firms; and the broader the technological bases from which the former diversify, the more varied the content of their market postures. A firm's scope within the competitive constraint also depends on circumstance; for example, on the amount of resources needed to
sustain each venture. This often cannot be known initially, owing to partial ignorance about a venture's likelihood of success and the eventual size of the firm's market share. Inability to service a range of products is often the result of weaknesses in strategy, as when management neglects to appraise the technical, managerial and marketing connections between new and existing activities. Other possible reasons are that a firm's capabilities are too specialized, shallow, or obsolete to generate opportunities in areas related to existing activities. Management may then easily overreach itself, because it is unfamiliar with the requirements of new fields. [Cf. Ansoff, 7, pp.135-6].

Diversification by acquisition of other firms is a possible alternative to internal development in all the cases previously considered. When available, this method of growth often allows a firm to alleviate, though not to remove, some constraints on growth by internal development. To this extent acquisition may raise the attainable, efficient growth rate, but it does not exempt a firm from the necessity of possessing the same technical expertise that would enable it to enter a given field through internal development. If the firm does not understand the parameters which affect the business of its acquisitions, it will experience great difficulty in integrating them with existing activities. Acquisition may, however, enable the firm to effect considerable savings in development effort, and to gain valuable technical skills previously lacking.

A firm may also acquire close competitors in existing markets, viz. move VIII in Figure 3.2-1 above.
Managerial problems of co-ordination and control may be even greater in connection with acquisition than in internal development, and the efficient absorption rate is no less constrained by limitations of managerial resources than is growth by internal means.

Firms therefore mostly do not acquire businesses simply because they are on offer at apparently favourable terms. As Penrose has observed, like a family with a new baby, a corporate acquisition changes all existing relationships. [200, p.128]. An efficient management will attempt to observe the strategic requirement that acquisitions constitute logical additions to the firm's existing activities, in the manner previously discussed.

The potential advantages of acquisition are considerable. Often with little or no direct cash outlay a firm can acquire established managerial and technical teams and market positions, whilst at the same time eliminating actual or potential competitive pressures. On the debit side, as Miller's study shows, firms often experience great difficulty in making acquisitions according to plan. Firstly, the causes and timing that determine a firm's availability for acquisition may not coincide with such plans. Secondly, during the absorption process it is often necessary to proliferate commitments to an unforeseen extent in order to make an acquisition succeed. This can happen despite the fact that the original acquisition was a logical addition to the firm's activities.
Much of what we call management judgment is actually experience in a particular business context. Diversification to a new business context necessarily tends to upset that judgment. It places upon management the burden of major decisions that cannot easily be delegated or postponed and that depend heavily upon just such judgment [Miller, 185, pp.126-7].

Thirdly, both a firm's digestive capacity and the availability of suitable victims are limited in any given period, owing to restrictions on managerial capacity, the need to evaluate candidates carefully, and to a simple scarcity of acquisition possibilities. The size of the acquiring firm is also a factor, both with regard to the ease with which other firms may be integrated, and to its scope for acquisition. However, the larger the firm, the less likely is it that acquisitions can be relied upon to raise or even maintain the overall growth rate. It may therefore be expected that acquisitions will be proportionately less significant in the expansion programmes of very large firms than in those of medium-sized firms. [Butters et al., 30, Ch.9; Penrose, 200, p.212].

Finally, it would not be strategically prudent for a firm to rely exclusively for its growth upon acquisition. Technological and, therefore, competitive strength usually necessitates an active programme of internal research and development as well. [Cf. Simon, 228].

(8) In the field sample of 12 manufacturers of automobile components studied by Miller, however, the preferred means [of diversification] was acquisition rather than internal development. No company relied on internal development alone, though one-third of them relied on acquisition alone...the typical effort was to support a development by subsequent acquisition and to support the acquisition by subsequent internal development [185, p.11].

Manufacture on licence is an alternative to both internal development and acquisition.
The particular role of real investment in diversification is a very subjective one. This role is also affected by a certain amount of controversy concerning the definition of real, as opposed to financial, investment. Real investment is conventionally regarded as 'capital expenditure on physical productive assets, e.g. machinery, factory buildings, roads, bridges, houses and so on' [Gilpin, 87, p.110; also Hanson, 105, p.362]. If, however, investment is defined more generously as 'an outlay on resources which is expected to give rise to income in the future, usually over a number of years' [Barna, 9, p.21], then many items outside the range of physical productive assets will qualify for inclusion. Some non-physical assets, such as purchased goodwill and patents, are usually capitalized in the manner of fixed assets. Other items, including research and advertising expenditures, which are also intended to produce benefits in future periods, and which serve to increase the firm's capacity, are treated as current outlays for both business and tax purposes. For purposes of this study it is expedient to adopt a fairly broad concept of real investment at this stage. Most expenditure in connection with diversification, whether on fixed assets or otherwise, represents a strategic disposition of scarce resources for the purpose of securing future growth benefits. Moreover, as stated above, it is very difficult to generalize about the role of real investment (narrowly defined) in diversification moves.

Real investment in productive assets for diversification purposes will be greater,
(1) the higher is the diversification rate, since the proportion of exploding products and the growth rate of required capacity should then both be greater;

(2) the bigger the saturated size of markets at which diversification is aimed, and the faster the rates at which demand explodes in those markets, given the appropriate efficient capital-output ratio in each case;

(3) the more technologically-advanced the industries in which diversification occurs and, therefore, the higher the appropriate efficient capital-labour ratios;

(4) the more specific are the uses of existing capacity and/or the higher the utilization rate of this capacity;

(5) if there is conflict of technical standards between new and existing activities (see footnote 6);

(6) the higher the proportion of diversification moves undertaken by means of internal development rather than by acquisition; and

(7) the less technically-efficient is diversification, since the capital-output ratio then rises, and the capacity needed to produce a given output increases.

There are considerable inter- and intra-industry variations in fixed-asset capitalization, due to technical factors. Corresponding variations are found between successive stages of individual production processes within
firms.\(^9\) The type and direction of diversification play a large part in determining associated capital investment. For instance, combination of new lines with existing activities often aims simply at fuller capacity utilization, and does not involve fresh investment. The same may be true of market diversification of existing products. In any case, however, the relation between any given diversification move and associated capital expenditure is by no means determined entirely by technical factors. The scope of internal policy for influencing this relation is of great interest, both for the study of capital accumulation, and for the impact of corporate tax policy on growth decisions. Thus, managerial decisions to purchase or to rent plant, to purchase new or second-hand assets, and to undertake individual processes internally or to subcontract them, etc., materially affect the growth rate of productive capacity even when the rate, types and directions of diversification are given.

\(^9\) 'In the making of television sets, for instance, assembly is lightly capitalized but the manufacture of some components is heavily capitalized' [Barna, 9, p.23].
3.3 Investment in Existing Lines

(a) Net New Investment

Investment decisions under this heading may be classified into expansion of existing productive capacity, cost-reducing investment, and 'non-productive' investment in offices, welfare projects, etc. Any such classification is open to objections [cf. Barna, 9, pp.30-1], but this one is adequate for present purposes. Net new investment for purposes of cost reduction is subject to the same criteria as replacement, and these will be discussed in the following Section. This Section is devoted to the first category.

The acceleration principle purports to explain net induced investment by existing firms in existing lines, as follows:

\[ I_t = K_t - K_{t-1} = \alpha (0_t - 0_{t-1}) \]

where \( I_t \) denotes investment, \( K_t \), capital stock, \( 0_t \), output, \( t \), the time period, and \( \alpha \), the acceleration coefficient (traditionally assumed constant). This simple version states that net induced investment depends entirely on the growth rate of output, and it is fundamental to the principle that firms maintain some optimum relationship between capital stock and output, both measured in real terms. It is immediately possible to improve on (1), because investment cannot usually respond to current movements in output unless \( t \) is quite long. This gives rise to a lagged formulation, as follows:

\[ I_t = \alpha (0_{t-n} - 0_{t-n-1}) \]
In more complex lag formulations the adjustment process is spread over several periods, so that investment in any period depends on output changes of several previous consecutive periods. [Chenery, 35, p.12; Eisner, 68, p.177; Kuh, 144, p.216]. This is the distributed lag formulation, whereby

\[ I_t = \alpha_1 t_{n-0} - t_{n-1} + \alpha_2 t_{n-1} - t_{n-2} + \ldots + \alpha_m t_{n-m+1} - t_{n-m} \] (3)

If net investment is strictly a function of the growth rate of output, as the acceleration principle states, investment should not be 'lumpy' and there should be no economies of scale. [Chenery, 35, p.2; Ekaus, 62, p.215; Hicks, 114, p.58; Knox, 140, p.280]. Also, operation of the principle is generally regarded as asymmetrical between upward and downward changes in output, since, when output falls, gross investment cannot be negative. [Knox, op.cit.; Smyth, 234; Tinbergen, 252]. (10)

These considerations, together with the assumption of a constant acceleration coefficient, reflect adversely upon the ability of the principle to explain investment. However, the main objection against the principle is its neglect of the influence of existing capital stock in investment decisions, or specifically, of the rate at which this stock is utilized when additional capacity is under consideration. Other things equal, a firm is unlikely to invest in additional productive capacity if the utilization rate of

(10) An adequate supply of funds is generally regarded as a prerequisite of the principle. [E.g.s. Duesenberry, 56, p.42; Meyer and Kuh, 183, pp.218, 229].
its existing capacity is below normal when output increases. On the other hand, pressure of demand on existing capacity is likely to stimulate further investment. When capacity is fully utilized the causation specified by the acceleration principle becomes impossible; i.e. further output increases, whereby investment is induced, cannot occur. Instead, it is additional investment which 'causes' output to increase. [Hicks, 114, p.99n.; Neisser, 193, pp.253, 257, 259; Somers, 237, p.82].

Criticism of output as a determinant of investment applies also to sales, which is linked to output through limitations on inventory adjustments. However, the extent of these limitations differs between industries, along with the possibility of utilizing capacity more intensively than normal. [Eckaus, 62, pp.221-2; Hicks, 114, p.39; Kuh, 144, p.22, n.24]. (11) This criticism has led to capacity formulations of the principle, as follows:

\[ \frac{I_t}{K_{t-1}} = bk \frac{t-n}{K_{t-1}} - b, \]

where \( k \) is the desirable long-run output capital ratio, and \( b \) is the (constant) proportion of capital stock deficiency \( \{k_{t-n} - K_{t-1}\} \) that firms choose to make good in each period. It is therefore assumed that firms desire to maintain a stable output-capital ratio in the long run, but that full adjustment to demand changes is not usually effected within one unit period. If either or both of the desired

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(11) Output and sales formulations of the accelerator have been widely blamed in the literature for the principle's poor empirical performance. [Eisner, 68, p.173; Meyer and Kuh, 184, pp.16,134; Smyth, 234, p.193; Tinbergen, 252,p.176].
output-capital ratio or the reaction coefficient (b) changes over time, (4) would need to be modified by a trend term. [Smyth, 234, p.186].

Output changes therefore affect investment via pressure on capacity as the output-capital ratio reaches and passes the value considered desirable: however, output level (in relation to capacity) is emphasized in capacity formulations. Investment in any period does not necessarily correspond to the output change in any particular previous period. If, as a limiting case, full adjustment is made within one period to the higher output level of one previous period, then (4) becomes

\[
\frac{I_t}{K_{t-1}} = \frac{O_{t-n}}{O_{t-n-1}} - 1, \tag{5}
\]

which resembles (1) above.

In capacity formulations of the acceleration principle\(^{(12)}\) the investment rate depends on feedback from successive incremental divergences of desired from actual capital stock, although the relationship is not necessarily smooth.

for the individual firm, whatever the causal variable, activity may be expected to develop in jumps. The rate of sales may increase over a number of years until finally the decision is reached to launch that major expansion or build that new factory. In each firm, at any time, there may be some quantitative rate of increase of sales, or some length of time for which sales have been higher, or some expectation of future sales in relation to the past and present that will be just sufficient to bring the firm over the decision-making threshold and lead it to plan or incur the capital expenditure [Eisner, 68, pp.165-6].

\(^{(12)}\) Variants of the capacity formulation include, inter alia, Chenery, 35; Goodwin, 89; Kaldor, 124 and 125; Kalecki, 127; and Klein, 136 and 137.
The hypothesis, that firms attempt to stabilize the output-capital ratio through investment over the long period, has been successfully tested empirically. (13) This seems reasonable in view of technological considerations which usually link quantities of output and capital. Having stated this, however, it still appears likely that marked differences will exist between the investment policies of thrusting and sleeping firms, on the basis of motivation, competence, and industry circumstances, etc. Long-term stability of the capital coefficient implies very different behaviour in the two cases.

Output or sales changes in recent past periods can provide two types of information for managerial investment decisions. Firstly, these changes directly determine present capacity utilization rates, which represent a known fact. If these rates are high, capacity is under pressure and may need to be augmented. Secondly, management may base projections of future capacity requirements upon these changes, thereby using them for predictive purposes. If current utilization rates are high, but a downward trend is discernible, additional capacity may be deferred. Correspondingly, management may wish to act before capacity comes under intense pressure.

However, output and sales levels and changes in past periods may not be a reliable basis on which to predict the future. They represent that which was achieved, not (13) See, for example, Eisner, 68, pp.177, 187-8; 69, p.238; Evans, 75, p.158; Hicks, 114, p.39; Jorgenson and Stephenson, 122, p.17; Kuh, 146, p.266; Meyer and Glauber, 182, p.13; Meyer and Kuh, 184, p.132.
necessarily what could have been achieved; also they may have been subject to a host of demand and supply factors peculiar to those periods. Some measure of effective product demand in each period is probably the best single guide for predictive purposes, provided that special periodic influences are taken into account. [Duesenberry, 56, p.44; Eisner, 71, p.386; Hart, 107; Hicks, 114, p.99,n.; Kuh, 144, p.50; Meyer and Glauber, 182, p.17; Neisser, 193; Smyth, 234, p.191; Tsiang, 256].

One good measure of effective demand for an individual firm is net orders outstanding, in which case investment will be influenced by the ratio of net orders to capacity. Hart, who has generated an index of this ratio, ORCA, defines it as 'the ratio of production to capacity, multiplied by a ratio of new orders to output' [op.cit., p.135, n.]. ORCA focuses attention on the present and the future, whereas the output-capital ratio alone reveals little about whether extra capacity will continue to be needed in future periods.

Current output in a sense represents obsolete information - relevant chiefly as a basis for estimating future output. While even the orders arriving in the current quarter will probably be largely worked through in most industries before facilities for which appropriations have been made in the current quarter can be brought into use, current orders are information several months closer to the cutting edge than current output. Hence, if a ratio of output to capacity is useful, a ratio of orders to capacity should be more so [Hart, op.cit., p.126].

Also, the influence of past periods on current investment decisions is believed to decline at a rate approximating

(14) In some industries, e.g. capital-producing industries, managements may be able to look even further ahead by taking account of interested enquiries, of which a certain proportion, perhaps estimatable on the basis of experience, will become orders.
the exponential. [Cf. Evans, 75, p.151; Hart, op.cit., p.125; Koyck, 142, Ch.2; Meyer and Glauber, 182, p.23].

Managements must try to determine whether demand in periods \((t + n), (t + n + 1), \) etc. justifies appropriations in period \(t\), subject to a delivery and installation lag of \(n\) periods. Investment decisions frequently create excess capacity deliberately, to provide for future economies of scale or to deter potential entrants to an industry. As a general rule, however, investment will not be induced unless and until management believes that existing capacity is permanently inadequate, in the sense that expected future demand will employ the proposed additional capacity during the latter's expected working life. [Bissell, 17; Eisner, 68, pp.176, 183, 185; 71, p.386; Kmenta and Williamson, 138, p.175; Meyer and Kuh, 183, p.229; Smyth, 234, p.199; Tsiang, 256, pp.327-8].

Product demand is determined at national, industry, and firm levels. Managements formulate their beliefs about the future on the basis of information and impressions derived from each of these levels. On the other hand, their ability to mould future demand is confined to the firm and (to some extent) industry levels. For instance, the degree of maturity of product demand is a determinant at industry

\((15)\) This lag depends on fixed investment lead times, which in turn are governed by circumstances in the capital-producing industries, and by the size and complexity of capacity ordered. Lead times are a principal determinant of lags between demand increases and net investment, on the one hand, and between investment plans and realizations, on the other hand. [Eckaus, 62, p.218; Eisner, 69, p.246 and 70, p.190; Evans, 75, p.151; Jorgenson and Stephenson, 122; Mayer and Sonenblum, 179; Meyer and Glauber, 182, p.27; Smyth, 234, pp.191, 194].
level, and there may be very little that an individual firm can do about this if demand is already saturated and market shares are firmly established. [Cf. Kmenta and Williamson, 138]. Similarly, the general level of economic development, and changes therein, are parameters at national level for individual firms. [Cf. Frankel, 82]. To some extent, therefore, managerial expectations regarding future investment requirements may be based on factors beyond the reach of corporate policy-making. Some writers also believe that managements can more easily form views about general economic trends and other 'large' matters than about events closer to their firms, and therefore more within the ambit of firm policies. If so, expectations of the former type may be held more confidently than those of the latter type, and would be likely to exert more influence over investment. [E.g. Eisner, 68, p.168; Katona, 130, pp.64-5].

Under imperfect competition there is considerable scope for managerial policy-making for product demand. However, action within this scope, including formation of expectations, depends directly upon the motivation and competence of management. Expectations do not form themselves: they have to be worked out on the basis of relevant data collected for this purpose. Data collection requires managerial initiative to establish the necessary machinery for delivering pertinent facts in timely fashion, subject to constraints on costs of collection. As Katona has observed, 'in the absence of definite expectations... business is often conducted in a habitual way, according to prevailing rules of thumb; the firm continues to do what it
has always done' [130, p.64]. Managerial initiative in this respect is therefore a principal source of difference between thrusting and sleeping firms, especially with regard to investment behaviour. Upon the quality of managerial expectations and the confidence with which they are held depend the precision with which increases in demand are anticipated, both as to quantities of investment and its timing.

Sleeping managements, by definition, usually fail to anticipate demand developments and also tend to be inactive with regard to stimulation of demand by policy initiatives. Of these firms it is likely to be true, given lags between decisions and expenditures, and between expenditures and installation of capacity, that typically the new facilities become fully available just as output is slacking off, and that the need for new facilities created by an upswing in sales typically becomes visible just as the slacking off in capital installations set off by the last recession is fully effective [Hart, 107, p.133].

A vicious circle or chain of causation is involved, in that managerial competence is initially responsible for guiding the firm into markets where the scope for profitable growth is greatest. Once involved in these markets (in which, by definition, demand is determined relatively more by variables within managerial jurisdiction, and relatively less by parameters outside its control), managerial competence again ensures that maximum advantage will be taken of the scope for satisfying and developing demand through investment, marketing and other policies. Correspondingly, when demand has become saturated, a competent management will reallocate investment towards new markets.

Managerial deficiencies which directly or indirectly hinder expansion include: reluctance to admit existence of problems; failure to achieve a proper degree of specialization; readiness to treat variables as parameters; refusal to cater for the wants of customers; skepticism regarding the necessity for large-scale production; resentment of technological change; lack of cost consciousness; tolerance of divisional failures; and neglect of managerial training. [P.E.P. 204, Ch.10].
Such failures of market intelligence would doubtless be rationalized as precipitate investment action, and the resulting 'prudence' would cause future growth opportunities to be missed even more. Investment decisions depend on the confidence with which expectations are held, which, under uncertainty, depends in turn upon opinion as to the reliability of data on which expectations are based, and upon decision-makers' past records of success or failure.

The acceleration and capacity principles have been criticized for implying that business 'behaves like a thermostat towards capital' [Meyer and Kuh, 184, p.14]. This criticism is justified on the above grounds that the response of investment to demand is conditioned by motivation, competence and business confidence. Large firms possess an advantage over small firms to the extent that confidence must be purchased by allocation of skilled resources and money to the tasks of data collection and evaluation.

Expansion of capacity in particular lines in response to increases in demand depends also on competing claims for limited resources, which often arise concurrently. The top-management function of resource allocation, subject to corporate goals and constraints, often demands entrepreneurial competence and organization of a high order. The volume, composition and timing of investment are affected by these goals, particularly by their priorities and the methods by which they are pursued. Current investment decisions also depend upon past allocations of
resources, since these determine existing markets, capacity and competitive position. Thus, just as diversification investment depends significantly upon existing lines, so investment in the latter is also a function of previous, current and projected diversification decisions. Other things equal, the higher the rate of successful diversification in the past, the greater will be current investment requirements. Schemes are often deliberately planned to allow for supplementary investment at later stages for purposes of product differentiation and improvement, etc. Correspondingly, the higher are current and projected rates of diversification, the smaller will be the amounts of managerial time and investible resources that can be allocated to expansion of existing lines. It may be equally true of existing lines, as of new projects, that the more complicated a proposed expansion the longer it will take to work out, and the more likely it then is to be affected by inelasticities in the supply of managerial planning and executive resources.

These factors affect the total volume of investment, because projects differ in managerial requirements (which determine the length of time before decisions are made), and in capital requirements, including the scope for gaining future economies of large-scale production. Also, the total amount which may be invested in a particular period is not necessarily fixed independently of capital requirements. Finance available internally may be supplemented by borrowing.
To a large extent corporate production functions are technologically determined, so that quantities of various types of capacity needed to produce a given output are fixed and known in advance. Consequently, equivalent percentage or absolute increases in demand, given current rates of capacity utilization, impose differing requirements for additional capacity on different industries. Induced investment is affected by output elasticity of existing capacity, the scope for gaining economies of large-scale production, and the associated principle of multiples. These were discussed in connection with diversification. On the one hand, increases in demand over considerable periods may not induce investment in additional capacity because these increases were anticipated in previous investment decisions. As Chenery has observed, 'an industry with a good reason for maintaining excess capacity also has a good reason to react slowly to changes in demand' [35, p.15]. On the other hand, when additions to capacity are eventually made, they may be very large both in relation to currently unsatisfied demand, and absolutely. These decisions are probably very flexible as to timing and will not be made until long-term expectations are favourable and confidently-held.

However, technological factors by no means entirely determine the productive capacity which is provided to produce a given output. Capital coefficients often lie significantly within the jurisdiction of corporate policy, thereby causing intra-industry variations in investment rates. This jurisdiction includes purchase or leasing of
capacity, purchasing new or second-hand assets, and arranging own production or sub-contracting various stages. Firms are also often able to choose between machines of varying capacities and costs to perform a particular function. Investments associated with research and development are largely subject to managerial policy. These activities may be entirely neglected, or firms may acquire technical knowledge through licensing arrangements.

Effects of these policy choices on investment rates depend partly on managerial motivation and competence, including adequacy of pay-back period or other criteria by which these decisions are made, and partly on specific circumstances. [Barna, 9, pp.23-4]. The durability of capital assets is an important factor in investment decisions, owing to the risk of premature obsolescence and/or insufficient growth of demand. Some managements may be reluctant to invest in long-lived assets, or ones of high functional specificity. [Eisner, 68, p.177; Knox, 140, p.283; Tinbergen, 252, p.165; Tsiang, 256, p.335]. If demand tends to fluctuate, production techniques may need to be kept flexible. Firms will be less able to gain economies of scale through investment and the average proportion of reserve capacity permissible may also be reduced. [Chenery, 35, p.11].

(18) However, this depends on whether demand is rising or falling on trend, i.e. on whether the industry is growing or declining. Some disturbances must be expected and should not affect investment much provided their amplitude is small. The amplitude of investment-determining variables is a basis of distinction between induced and autonomous investment. The latter type 'is only expected to pay for itself over a long period' [Hicks, 114, p.59], and 'is based on a very broad permissible range of fluctuation...' [Kuh, 144, p.57].
The conclusions of this Sub-section are (i) that induced investment is heavily affected by managerial motivation and entrepreneurial competence, and that (ii) after due allowance has been made for these qualities, investment for expansion depends on the strength of demand, and on the ability of managements to be reasonably confident that demand will not weaken for reasons beyond their control. This is especially important for small and growing firms, which are relatively susceptible to recessions. [Eisner, 70, p.195; Friend and Bronfonbrenner, 83; Meyer and Glauber, 182, p.136; Meyer and Kuh, 184, pp.166-7]. While large firms often appear to react less quickly through investment policy than small firms to increases in demand, 'there is some evidence that large firms respond [more] quickly when a downward adjustment is involved' [Eisner, 68, pp.175-6; also pp.179, 182]. (19)

This is due to the greater output elasticity of large firms' capital stocks, and to their generally superior forecasting ability. (20)

(19)
A conference experience recounted by Hart is illuminating in this respect.
I still remember with a shiver a comment made by an economist from a large corporation at the Conference on Stabilization of Business Investment a few years ago. I had protested in the discussion what seemed to me an excessive emphasis on forecasting mere dates of turning-points, as against forecasting the strength of the forces at work and the amplitude to be expected in the absence of shifts in policy. "But," said this commentator - "but it is enough to forecast turning-point dates. As soon as we spot a downturn, we can't go wrong in suspending our investment programs" [107, p.133, n.17].

(20)
Viz. 'Discrepancies between anticipated and actual investment, measured as ratios of fixed assets, were found to be a decreasing function of size of firm' [Eisner, 68, p.187].
Replacement of Fixed Assets

Modern replacement theory derives from the work of Taylor [247], Hotelling [116], Preinreich [205], F. and V. Lutz [165], and Terborgh [249]. With the exception of the latter, these writers were concerned with criteria for replacement under the assumption of no technological progress or obsolescence. Taylor provided a formula for determining the length of a machine's life such that the unit cost of its output is minimized. Hotelling sought to bring replacement under the aegis of profit maximization with his hypothesis that a firm will seek to maximize the present value of a machine's output less its operating costs. He surmised that 'considerations of profit [may] lead him to scrap the machine at some different time from that which makes unit cost...a minimum' [116, p.341].

Preinreich's important contribution was to show that the economic life of a single machine cannot be determined without regard to the lives of all machines in a chain of future replacements extending to the firm's profit horizon. He then argued that the firm should maximize the present value of the 'aggregate goodwill' of all replacements, comprising the present value of the earnings of future replacements, less the present value of the costs of those replacements.

The most significant advance was made by Terborgh, who extended the theory to account for obsolescence. He agreed with Preinreich that replacement cannot be determined with regard only to the economic life of a single machine. He then proceeded to show that replacement
is eventually induced by the 'inferiority gradient' of existing plant, caused partly by obsolescence - the amount by which the earning rate of the most modern new plant exceeds that of existing capacity when the latter was new - and partly by physical deterioration of existing plant - the amount by which the latter's earning capacity has declined since it was new. The timing of replacement is then determined by comparison of the performance of existing plant with that of the latest available. Existing plant should be discarded as soon as its discounted annual cost - capital cost plus 'operating inferiority', which includes both revenue and cost factors - exceeds that of all future replacements, where the latter are assumed to occur optimally. Terborgh has also provided formulae for computation of the economic lives of future contenders for replacement ('challengers') and their corresponding discounted annual costs, based upon time averages of the various components of plant cost.

As Smith has observed, it is 'somewhat puzzling to find such tenacious adherence to a profit maximization formulation of the model [in the pre-Terborghian literature], since, in the absence of technological changes in equipment, the replacement decision cannot possibly affect either price or output' [233, p.131]. If obsolescence occurs under the influence of steady, as opposed to major and discrete, technological advances, then replacement decisions are concerned, not with the firm's revenue goal, but with minimizing the overall net plant cost of producing a given output, provided only that price and output decisions are
independent of replacement decisions. That is, if price and output policies are dominated by product demand and market competition rather than by cost considerations, replacement decisions are directed towards productive efficiency rather than towards expected profits. [Barna, 9, p.31; Neild, 192, p.32; Smith, 233, p.161].

In this connection it is necessary to distinguish replacement from induced investment for expansion. The latter does contribute to cost reduction because it represents technologically more advanced capacity than existing plant. However, its revenue-increasing role is more dominant. The well-known practical difficulties of isolating the pure replacement content of reinvestment may be disregarded for present purposes, if it is assumed that replacement is piecemeal, so that the expansion effect is gradual and insignificant.

The proposition, that replacement is concerned with cost minimization, implies that effects of aging and obsolescence are felt in terms of rising costs of a given normal output, and not, as frequently assumed, in terms of diminishing plant earning capacities. Old and obsolescent plant retains its original capacity for work (short of actual breakdown), but this capacity can only be achieved at higher operating costs.

In replacement decisions a firm must weigh the balance of cost advantage between replacing now or later. Given steady technological progress, operating expenses of existing plant will be higher the longer that replacement is postponed, whereas those of the eventual replacement
will be lower, because delay allows more advanced plant to be installed. Allowances should be made for the utilization rates of existing and new plant, and for reduction over time in the former's scrap value. If the current replacement is deferred, the (optimal) dates of all future replacements are correspondingly put back. The cost of postponing replacement now is therefore reduced by the discounted gains which accrue from the fact that all future replacements will be more efficient. Calculation should include interest on both the present value of these future savings and reduction in scrap value caused by delays in replacement.

An optimal replacement policy is therefore 'one that minimizes...the constant outlay stream that has the same present value as all the operating cost and net investment cost outlays associated with a unit of equipment in an infinite chain of equipment replacements' [Smith, 233, p.137]. However, if technological progress causes shifts in the production function or alters the production coefficients, replacement policy then becomes concerned with minimizing overall total unit cost, not just the flow cost of plant alone, with respect to plant life. It is by way of replacements that new techniques are introduced, although firms also make net investments (not merely the net investment content of replacements) specifically for cost reduction purposes. (21)

(21) As previously explained, the fact that demand-induced investment also reduces unit costs is incidental to its main purpose.
There has been controversy in the literature regarding which of output level (capacity utilization rate) or age of plant is more important in replacement decisions. In terms of the foregoing normative analysis this controversy is misguided, because replacement is concerned with minimizing the cost of a given (normal) output, while age of plant affects decisions through comparison of the flow costs of existing and new plant, given the rate of technological progress. The age of plant must indeed be expressed as a function of the components of the inferiority gradient of existing plant, namely, physical deterioration and obsolescence. In the absence of the latter, the only relevant measure of plant age is machine hours worked (i.e. output level). Once a rate of obsolescence is introduced, however, actual machine hours worked must give way to normal utilization for purposes of calculation.

It has proven difficult to test hypotheses about replacement, because of problems of isolating the replacement content of gross investment, and of measuring plant age. Meyer and Kuh, for instance, attempted to test the 'echo effect' theory, which states that replacement

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(22) Proponents of output level include Clark, 36; Frisch, 84; and Kuznets, 148; whereas Boulding, 21; Einarsen, 66; and Haberler, 100; have stressed the importance of plant age. (23) In Smith's opinion, equipment operating cost depends most directly upon cumulative use, and perhaps also upon the current utilization rate. Equipment age is an indirect determinant of equipment operating cost due to the relation between cumulative use and age. Therefore, operating costs ought to be expressed as a function of both the utilization rate and equipment age [233, p.135, n.11].
demand is greater the older is existing capital stock. They found low and consistently negative simple and partial correlations of their age variable (depreciation provisions) with gross investment, which they tested as a proxy for replacement. [184, Ch.6]. This result does not support the theory, suggesting that the 'senility effect' theory may better describe actual behaviour. The latter theory states that, if two established firms have capital stocks of different average ages at a given point in time, then (i) firm A with the younger capital stock will tend to invest at a higher rate than firm B; and (ii) the average age of B's capital stock will tend gradually to rise, owing to the low investment rate. Meyer and Kuh observed that the typical firm which entered the postwar period with relatively old plant subsequently invested at a lower rate than a firm which commenced this period with newer plant. They attributed the senility effect to lack of trade position motivation. [184, p.96; also Campagna, 31, p.210; Meyer, 181, pp.304-5; Meyer and Glauber, 182, p.11].

Depreciation charges and provisions are not good measures of plant age, especially for purposes of inter-firm comparison. Annual charges are calculated arbitrarily owing to uncertainty, and asset depreciability varies considerably both within and between firms and industries. [Cf. Campagna, 31, p.210; Eisner, 69, p.243; Knox, 140; P.E.P., 204, pp.125-6]. A more reliable measure of average physical age of capacity might be the ratio of plant maintenance expenditure to gross fixed assets. Grunfeld includes this category of expenditure in gross investment,
'because of the large degree to which these expenditures can (and apparently do) substitute for purchases of new plant and machines' [99, p.212].

Despite these problems, however, empirical work has established fairly conclusively that wide inter-firm variations exist in replacement behaviour, and that many firms' policies fall woefully short of the goal of cost minimization. Available evidence, some of which is cited here, unmistakably identifies deficiencies in managerial motivation and competence as the basic cause of these shortcomings. Before this evidence is examined, it is necessary to discuss briefly the extent to which best-practice replacement policies in the real world may be expected to fall short of, or diverge from, the normative optimum described above.

Most lapses in this area are associated with uncertainty. Some writers believe that 'a replacement decision is a simpler decision surrounded by fewer uncertainties than a major expansion, or a venture into a new market' [Neild, 192, p.32]. This may be true, although it is unsafe to rely on arguments involving the quantification and comparison of uncertainties. (Cf. Chapter 2). Nevertheless, replacement is subject to uncertainty, mainly about future rates of capacity utilization, obsolescence, relative factor prices, and the behaviour of competitors.

The first two aspects, utilization rates and obsolescence, mean that managements are unable to estimate in advance the expected lives of proposed replacements. Contrary to normative assumptions, future rates of
technological progress cannot be predicted in advance, and it is usually out of the question for managements to calculate the correct timing of even the next-but-one replacement, still less the timing of each of an infinite chain of such decisions. Uncertainty about future output levels means that the rate of physical deterioration (which depends on utilization) cannot be known for sure. Managements may also not know the extent to which given rates of utilization will cause physical deterioration; that is, how capacity will stand up under stress. Moreover, since replacements often incorporate an inseparable element of increased capacity over that of existing plant, and since there is also often a range of machines of differing capacities with which existing plant may be replaced, uncertainty about future output levels poses real problems in selecting successors. On the one hand, managements prefer to replace with larger capacity, if that is more economical. On the other hand, however, expensive capacity may be underworked.

Uncertainty about relative factor prices can affect replacement decisions in at least two ways. Firstly, managements do not know the extent to which future wage increases will increase the operating inferiority of existing capacity (which probably needs more labour for operating and maintenance purposes) compared to new plant. Moreover, since the latter will also need upkeep, if managements are uncertain about both the rate of physical deterioration of new plant (i.e. the rate at which it will attract labour for maintenance purposes) and about future
labour costs, it may be difficult to establish the operating advantage of new plant over existing capacity. Secondly, since relative factor prices partly determine the degree of capitalization, or labour-capital ratio, uncertainty in this respect complicates managerial decisions about the (capacity) level at which replacement should occur, assuming a choice in the matter.

Finally, uncertainty about the behaviour of competitors affects replacement policy in the sense that management cannot afford to let its costs get out of line with the rest of the industry. Although, under imperfect competition, management may be content merely to keep abreast of other firms in this respect, if a decisive discrepancy is allowed to develop, it may well be turned to good account against the firm in its markets.

It is concluded that managements are clearly unable to optimize replacement policies in the normative sense owing to uncertainty. However, replacement may still be efficient in the more restricted sense that decisions are directed towards cost reduction in the light of known technological improvements, and are not merely initiated by physical breakdown of existing capacity. (24)

Available evidence indicates that managements recognize replacement needs in terms of physical deterioration as often as in terms of expected cost savings. [E.g. Istvan, (24)]

However, as explained in the next Chapter, worthwhile replacement projects may be deferred by an efficient management in favour of expansion projects, in order to increase long-term benefits from overall resource allocation.
120, p.57; Neild, 192; P.E.P., 204]. This is especially well-illustrated by managerial statements quoted in the latter, the P.E.P. 'Report on Attitudes in British Management'. For instance, the works director of a very large earthmoving equipment firm stated:

We very rarely chuck out a machine tool because there is something better available. We would normally go to the normal length of that machine too, which is, say, ten years, and we will then replace it willynilly. If we find something better to replace it with, obviously we will, but if there isn't anything better then we will replace it with the same again [204, p.118].

Likewise the works manager of a domestic appliance firm:

Even if the machine was performing well and had been depreciated, there wouldn't be a case for replacement, would there?...It's earned its keep at work...There's no case if it is producing effectively to say, "Well, look it's been a faithful servant. We've had it many years. We must get rid of it". I should say, "No. If it is a good performer, we'll keep it" [204, p.117].

On the other hand, the works manager of a large electronics firm stated:

You must have someone who's looking and saying, "How can we do better? Is there any automatic lathe that will do this? Is there any automatic way of welding these things or an automatic way of pressing these things out?" [204, p.119].

Empirical enquiries have also concluded that a high proportion of firms do not maintain records which enable them to assess the cost behaviour of existing capacity for replacement purposes. Similarly, many firms neither compile written evidence supporting replacement decisions, nor make

(25)

This may be less true of American than British industry, in view of the greater emphasis on these problems in the academic, professional and technical literatures of the former country. [Hutton, 118, p.85; Neild, 192, p.35].
full financial assessment prior to decision. Where cost estimates are made, most firms employ the payoff period or cash-throwback method for decision-making. Other criteria, including percentage of annual cost savings to capital outlay, MAPI [Terborgh, 248 and 249], and DCF, are used by only a small minority of firms, mostly of large size.\(^{(26)}\) Large firms also predominate among those making written estimates. Not surprisingly, firms attaching importance to obsolescence for replacement purposes, as opposed to physical deterioration, tend to be more active in making written estimates of expected cost savings from replacement proposals. [Barna, 9, p.33; Istvan, 120, pp.58-60; Neild, 192, pp.35-43; P.E.P., 204, pp.116-7, 120-1].

The efficacy of calculations, employed by firms which make written estimates for replacement purposes, is impaired by the fact that the majority of these firms adopt the payoff period method for the purpose.\(^{(27)}\) This method is a rule of thumb which, because 'estimating the expected life of a piece of plant is an intractable problem' [P.E.P., 204,\(^{(26)}\)]

\(^{(26)}\) Istvan's study of 48 U.S. corporations, each among the largest in its industry, concludes that there has not been extensive adoption among the firms studied of the theoretically superior techniques of capital-expenditure analysis. This is especially true in the area of economic evaluation. The second [conclusion] is that this investigation has failed to disclose any basic agreement among the managements of the companies regarding the degree of concern and effort that should be expended on the development and implementation of a capital-expenditure decision-making process. There is not even any general agreement among the member firms of a given industry [120, p.97].

\(^{(27)}\) E.g.67 per cent. of the firms considered by Neild [192, p.40]. See also Phelps Brown, 203, p.246.
p.125], reduces to a mere subjective judgment. This conclusion is evidenced by Neild's discovery of a strong tendency on the part of firms to use a limited number of lengths of life, specifically three, five and ten years respectively. In his view, this 'can be explained only by the choice of fashionable numbers' [192, p.35]. (28)

The payoff period approach is a crude method of counteracting the uncertainties which attach to replacement. Its use is necessarily subjective, and must therefore depend on managerial motivation and competence. A conservative firm will be tempted to demand very rapid rates of cash throwback from replacement proposals (relative to actual rates of obsolescence and deterioration). Proposals will then be difficult to justify, and many will not obtain approval. The rate of replacement will be low in consequence, and the average age of the firm's capacity will steadily increase. However, the main objection to the payoff period method is that it is a liquidity measure, and not, as needed for replacement purposes, a measure of contribution to cost reduction. If this method is used as the sole criterion, emphasis in replacement decisions will therefore be directed away from their proper goal, and replacement will tend to be dominated by physical deterioration alone.

(28) A classic instance in depreciation policy also illustrates this point. 'The company secretary of a medium-sized domestic appliance firm' stated that most plant was written-off over ten years. 'Asked why he chose ten years, he replied: "It's just the accountancy training I suppose. Plant and machinery ten per cent - that seems to be customary in this area"' [P.E.P., 204, p.125].
Another common defect in managerial replacement decisions involves undepreciated balances of the original cost of existing capacity. Many firms incorrectly treat these balances as a cost in determining operating advantage of new plant, to which they are actually irrelevant. If replacement is currently justified on the grounds of operating advantage, undepreciated costs merely mean that depreciation charges in previous periods were inadequate. Owing to difficulties of fixing correct depreciation rates in advance, such *ex post* adjustments are to be expected and should not deter replacement.

Indications are, however, that they do in many cases, which again suggests that factors other than cost efficiency often influence replacement decisions. [Istvan, 120, p.60; P.E.P.; 204, p.125; Skinner, 230]. Neild's observation [192, p.43], that low selling prices of old plant tend to perpetuate their usage and thus delay replacement, coupled with Istvan's finding that 'over two-thirds of the firms indicated that salvage recovery was usually a negative figure because the costs of removal exceeded revenue from sale' [120, p.57, n.3], also suggest that replacement is often delayed far too long from the cost-efficiency viewpoint.

Durability of assets partly explains these delays, and may also account for ill-founded objections to replacement, on the grounds that existing assets are incompletely depreciated. The following statement was made by the 'works manager of a domestic appliance firm' to the P.E.P. research staff.
Well, we usually find that it's worn out, that it doesn't do its job properly. That doesn't happen very often you know because British machines, which mainly we've bought, are wonderfully robust and, if they are kept well, they seem to last for ever, these darn things! What we seem to mainly do is to buy new machines for additional work and then we do eventually scrap some of the older ones. We never run a machine until it's worn out and then buy a new one. We usually are in advance of that. We buy in advance of everything going out and then we decide later on, "Oh well, we'd better get rid of this thing". [204, p.118].

This firm apparently does not conduct a replacement policy in the usual sense, because its investment is entirely demand-induced. Existing capacity is counted present and correct so long as it can be propped up by maintenance expenditure, except that, when demand conditions permit, the most marginal capacity may be discarded. The relative operating inferiority of this firm's capital stock must continually increase, because existing assets are insulated from cost-reducing technological improvements until ultimate decrepitude, except to the extent that demand-induced additions are made. Moreover, these additions, which will eventually 'replace' the most marginal capacity, are made well in advance of the latter being discarded: they must therefore be technologically less-efficient than the latest new capacity at the time of such discard, assuming some positive rate of technological progress. (29)

(29) 'A survey of obsolescence of machine tools in 1960 showed that in the ten years since 1950 new machine tools had become about 40 per cent more productive' [P.E.P., 204, p.126]. The survey in question was 'The First Census of Machine Tools in Britain', Metalworking Production Research Dept., 1961, p.31.
In conditions of uncertainty an enterprising firm compares results of at least larger replacement decisions with their originating proposals. This exercise, known as the postaudit, enables firms to learn from their mistakes. For present purposes postaudits are of interest only as evidence that firms pursue efficient replacement policies. Results indicate that only a minority of firms conduct postaudits on a systematic basis. For instance, Barna found that 'one firm in four had some inquiry into the success of projects though not as a regular exercise; there may be an occasional personal inquest by the managing director, an inquiry into a major failure, or an assessment of the results of a cost-saving scheme' [9, p.34]. Neild [192, p.42] found that 23 per cent. of firms in his sample conducted postaudits of replacements in all cases; 58 per cent. did so 'in some cases', and 19 per cent. did not do so at all. Istvan found that, out of 48 firms interviewed (all among the largest in their industries), '19 make a postaudit of all implemented projects; one does it for expansion projects; one for replacement projects; and one for projects over a minimum dollar amount; two firms simply take a random sample' [120, pp.38-9].

Some firms consider replacements too numerous and too small relative to expansion projects to justify postaudits. Replacements may also be considered more predictable and therefore more accurate than investment for expansion. However, postaudits may be more justified for replacement than for expansion projects, because results of the former are more accurately measurable than those of the latter.
In practice some degree of selectivity in postauditing is justified by staff shortages, and by costs involved in relation to benefits gained. [Cf. Istvan, 120, p.39].

To the extent that replacement policies, and other investment decisions primarily directed towards cost reduction, are less obviously involved than demand-induced investment with sales pressures, the onus on managerial motivation and competence is correspondingly greater. 'The economic reflection of managerial attitudes is in costs of production...Cost-consciousness is a state of mind which either permeates a firm or not' [Barna, 9, p.55]. Over considerable periods, therefore, opportunities and pressures to invest for cost-reduction, whether on account of technological progress, rising operating costs, or mass production and marketing, are only effective if the firm is willing and able to respond appropriately to them.

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(30) During the 'lotus-eating years of the 1950s', one engineering firm developed a wider and wider range of products. We were, I maintain, industrial spivs in those days in the sense that we made all kinds of things that were completely uneconomic. Here we were, a small company [with about 1,200 employess] making some machines in half-dozens against people turning them out in hundreds with huge factories equipped solely for making them. That was in the days when the waiting list was two years. There was no incentive to improve efficiency, lower costs, buy new equipment or anything of that sort [P.E.P., 204, p.107].

This behaviour evidences Denison's finding [32, pp.274-8] of the lower 'residual efficiency' of British industry compared to that in America and Europe.
4.1 Introduction

In the Introduction to Chapter 3 it was stated that conclusions about effects of corporate tax changes arrived at from the viewpoints of objectives and the state of uncertainty are not conclusive. Real investment decision-making, which describes how objectives are pursued under uncertainty, must also be taken into account.

This Chapter continues the analysis of decision-making by examining the role of profit in decision processes, including its relation to managerial objectives and uncertainty. Preliminary attention has been given to these latter aspects in earlier Chapters. It is again convenient and meaningful to arrange the discussion in order of diversification decisions and those relating to investment in existing lines.
4.2 Profit in Relation to Diversification Strategy

Managements are interested in making profits for their own security and to finance future growth of their firms. The long-run scope of existing activities to satisfy managerial profit requirements may well be limited, just as these activities provide limited scope for future growth. Once an industry has settled down into established market shares and demand has matured, profitability can only be extended by cost reductions, price increases, winning bigger market shares, or through secular increases in demand. A firm's ability to increase profitability by these means is limited. Price increases, for instance, tend to upset the firm's accumulated experience of demand at a given price. They may also adversely affect demand if price elasticity rises as demand matures, or if they initiate price competition in the industry. Neither price competition nor any other form of internecine warfare for market shares is a particularly enticing method of achieving profitable growth.

Diversification into new products and areas creates new prospects for growth and profits, and frees a part of the firm's activities from restrictions of saturated markets. No entrepreneurially-competent management would willingly delay diversification until such restrictions became really serious. The importance of profits in a firm's growth strategy therefore depends partly upon the relation between the trend of its present profits and the level of its minimum profit constraint. Profits will bulk larger among
the objectives of managerial plans for diversification if profitability of existing operations is unsatisfactory, than if it exceeds the minimum constraint.

It should be noted, however, that the profit constraint has two aspects. Firstly, the absolute profits of each period should appear in favourable and stable relation to those of either one or more recent past periods, or of an average of profits of past periods. Secondly, since the amount of productive resources is not fixed, but changes over time, the rate of return on resources employed should also be favourably and stably related to those of past periods. The latter is perhaps the more important of these two aspects. Diversification must therefore not only contribute to total profits but must also maintain and, perhaps, increase the firm's overall rate of return on capital. The ease with which new ventures can meet the latter requirement depends on the merits of these ventures and on the level of profitability which the market has been accustomed to expect from the firm in the past. The task of management with regard to profitability is not facilitated by the consideration that, if rates of return on some projects are very high, the market may be led to expect standards which cannot be maintained. Management is also concerned to ensure that profitability requirements do
not hamper the firm's growth rate to a greater than necessary extent. (1)

Under uncertainty as defined in this study, management does not know, at the time resources are committed for diversification purposes, the degree of profitability that will result from its decisions. Nor does management know whether the 'best' opportunities have been selected from those available for profit purposes. Uncertainty therefore means that ventures cannot be evaluated and selected on the basis only of their profitability; the techniques of capital budgeting are insufficiently reliable on their own to provide a solid basis for decision-making. [Cf. Ansoff, 7, p.76]. (2) Other objectives, particularly that of growth, (1) However, profits are needed to assist in financing future growth, so that management will wish to earn that rate of profit which is consistent with safe and sustainable growth. [Cyert and March, 44, p.42; Marris, 173, p.241; Penrose, 200, p.30; Simon, 228, p.55]. From the financing viewpoint this is the rate which, after provision of necessary dividends on capital, provides, together with depreciation allowances, such total retentions as will enable the firm to maintain its desired physical growth rate, having regard to the possibility and desirability of raising a proportion of capital requirements externally. Baumol states:

In practice, the determination of a minimum acceptable profit level probably comes down to no more than a rough attempt,...partly by rule of thumb, to provide competitively acceptable earnings to stockholders while leaving enough over for investment in future output expansion at the maximum rate which management considers to be reasonably safely marketable [11, p.53].

(2) In a recent book devoted to 'the computational treatment of the corporation, income and capital gains taxes and investment incentives in long term company financial planning' [152, p.vi], Lawson and Windle state:

In a world characterised by risk and uncertainty the accuracy of [capital budgeting] estimates is inevitably in doubt. Thus, impressive-looking though mathematically correct DCF investment criteria may be, they cannot of themselves improve the quality of estimates. Hence the use of DCF methods can only be regarded as a way of making correct comparisons, or of undertaking correct analysis, of assumptions in the form of estimates [152, p.149].
normally ensure that ventures will not be evaluated and
selected only according to profitability.

The tangible factors, to which managements resort
under uncertainty for purposes of selecting new projects,
comprise the components of strategy, which were discussed
in Chapter 3. The profitability of diversification depends
on the efficiency of this strategy, subject to
opportunities for investment which can be uncovered by
search activity, and to the amounts and quality of
productive services at the firm's disposal. Profitability,
that is, is determined by the same strategic advantages and
disadvantages of technological skills and other resources,
product-market scope, degree of competitiveness, and
entrepreneurial efficiency, etc. to which the firm is
subject for growth purposes. Owing to uncertainty,
profitability is a conceptual, as well as an accounting,
residual, because the big decisions which ultimately
determine it are made on the basis of other factors.

A prime example of these 'other factors' consists of
amounts outlayed on marketing new products, and on
associated research and development. Management
realistically expects that a certain proportion of new
market entries will fail. Some products are deliberately
curtailed when it becomes apparent that initial hopes will
not be realized. This action is designed to enable
satisfactory growth rates to be achieved without always
incurring full costs of development and marketing. It is
an important device, under uncertainty, for offsetting the
consequences of an inevitable time-gap between a
diversification decision and knowledge of its outcome. With regard to individual projects, however, it is often very difficult to assess whether and when failure has occurred. Management may be persuaded that further determined marketing effort will tip the scales between success and failure, as is often the case. Personal reputations become involved in particular projects, thus creating 'political' obstacles to abandonment. Above all, there is the problem of perceiving the best course of action in an uncertain situation.

Profitability depends on entrepreneurial decisions of the above types, and large sums must often be committed in advance of reliable intelligence about product demand and market shares, etc. Other things equal, the desire to push projects to success, and to achieve a high overall success ratio, operates to reduce the overall rate of return if pressed beyond a certain point. Delays in abandonment decisions have the same effect, as do delays in responding to feedback in successful projects. Profitability is therefore affected by managerial efficiency and speed of reaction, which in turn are partly determined by whether managerial resources are available to deal with problems as they arise.

The total outlay on particular projects is often subject to tactical decisions regarding the method to be

(3) For this reason a firm's diversification rate may exceed its resultant growth rate. [Marris, 173, p.185]. The success ratio, a policy variable, is found by dividing the latter rate by the former.
adopted to determine success or failure. Management may, for instance, decide to push a product by sustained and costly effort over a limited period, after which, if take-off has not occurred, the product will be withdrawn. Alternatively, development and marketing outlays may be more limited, but spread over a longer gestation period. The approach adopted in each particular case depends on market and product characteristics, strength of financial and other resources, and on other commitments. The approach should, of course, be flexible in response to feedback. Both the profitability of individual projects and the time profiles of such profitability depend on which approach is selected in each case.

Pricing policy affects the profitability of diversification through price elasticity of demand for new products, the overall success ratio, the degree of competition, development and marketing policies, and market synergy, etc. Some writers believe that price elasticity of demand is relatively low during initial stages of a product's life cycle, when the growth rate of demand is usually highest. [Kaplan et al., 129, pp.59-60; Marris, 173, p.143; Penrose, 200, p.105]. If so, prices of new products may be pitched at profitable levels without damaging sales. The strength of this effect on overall profitability varies according to the product of the diversification rate and the overall success ratio.

However, the success ratio itself depends partly on efficiency of pricing policy, having regard to the degree of competition in each market, and to whether or not the
firm is first in the field in each case. The stronger is
competition in a given market the more serious the
consequences of errors in pricing policy. On the other
hand, if there is competition and the firm diversifies by
imitation, prices may be determined externally for the
firm. It is necessary to distinguish between tactically-low
and inadequate product pricing. In the former case,
management uses pricing policy to increase either or both
of total size of market and the size of its own share of
that market. A product's chances of success may be greater
if its price is lower. (4) Inadequate product pricing, on
the other hand, results from ignorance about, or
misjudgment of, costs and market parameters. [Marris, 173,
pp.228-9; Miller, 185, p.122].

Considerable uncertainty may attend pricing policy in
a product's early stages, when both demand and costs are
not fully known. Marketing synergy between a firm's new and
existing activities would then enable management to draw on
previous experience for purposes of pricing new products.
This is, incidentally, an example of the tangible factors to
which managements have recourse for strategic purposes in
conditions of uncertainty.

Both profitability and profit of diversification
depend on the size of markets into which a firm moves.
Market size is a function of many factors, including product

(4) However, a product may fail because a low price
generates consumer suspicion of its quality. Moreover, if, as
already suggested, price elasticity of demand is low during
a product's initial stages, market leverage exerted by low
pricing may be quite insignificant.
characteristics, price, general living standards, size of national population, etc. Profitability also depends on the firm's share in each market, which mainly depends on competitive strength. Large firms have both absolute and comparative advantages over smaller firms for entry into big markets, and for establishing and maintaining in those markets shares of profitable proportions. As Penrose observes:

"There is good reason to believe that the amount of resources administered by a firm has in itself a significant influence on the opportunities for expansion open to the firm, that is, that smaller firms as a group are in a different position vis-à-vis the external world from that of large firms as a group [200, p.217]."

The advantage of large firms lies in their capacity for making the great initial outlays necessary to develop big markets; that is, entry into these markets is subject to a capital requirements barrier. [Bain, 8, p.156; Baumol, 11, p.33; Hall and Weiss, 102; Penrose, 200, p.227]. Large firms also often have advantages of organizational strength and research capacity that smaller firms are unable to match. The comparative advantage of large firms in big markets causes them to concentrate on those markets, in which they compete as oligopolists against firms of similar size. Subject to other opportunities, large firms tend to avoid small markets (except as extensions of big markets) because they do not provide opportunities for reaching high-level production from big investments which large firms need in order to exercise the advantages of size.

Although there is evidence to support the view that average growth rates of firms are independent of their
size, some observers believe both that the profitability of large firms is relatively greater, and that the variance of their profit rates is relatively less, than is the case for smaller firms. [Baumol, op. cit.; Hall and Weiss, op. cit.; Williamson, 264]. Then, 'if large firms grow no faster than small ones, there is little danger that high profits are the cause of size rather than size being the cause of high profits' [Hall and Weiss, 102, p.323]. This follows, as explained, from the superior ability of large firms to enter big markets.

If development costs are thought of as an overhead to be recovered from the profits of ultimate sales, then a firm whose process of diversification

(5) See Chapter 3, footnote 5. The greater absolute growth of large firms is offset for percentage purposes by their bigger size. Penrose, however, believes that 'we should expect the rate of growth of the medium-sized and moderately large firms to be higher than that of the very new and very small firms, and higher also than that of the very large firms' [200, pp.212-3]. With regard to the latter Penrose states:

For the larger firms in competition with each other...it seems that all of the factors which tend to increase the managerial services required per dollar of expansion are present in an increasing degree; the only significant offsetting factor in the very large firm arises from the possibility of increasing the capital intensity of expansion [200, p.212].

If this view is correct, it would appear to follow that the profitability of large firms will gradually decline. Other factors should also be considered, however, including: (i) the great size of individual expansions typically undertaken by these firms (including large minimum sizes of plant; (ii) their relatively greater scope for acquiring other firms; (iii) their greater strength in both purchasing and selling; (iv) their superior ability to diversify over much wider ranges of markets than can smaller firms; and (v) their greater capacity to retain managerial and technical talent and to undertake research and development activities.

(6) A study by Barna, however, yielded the conclusion that 'averages [of profit rates] calculated for groups of firms classified according to size do not show significant differences and it does not appear that size is a factor which can explain differences between individual firms' [9, p.11].
4.2 consists in attacking a succession of large markets will, other things equal, experience a higher long-run rate of return than a firm which only attacks small markets [Marris, 173, p.170].

The greater profitability of big markets derives mainly from those economies of size which can be achieved in high-volume production. For purposes of diversification economies of size support profitability as economies of growth. Small firms' profitability can also benefit from economies of growth, but to a lesser extent. Through successful diversification some small firms eventually attain a size at which they can tackle bigger, more profitable operations. (7) Research activity is an important source of future opportunities, but such activity cannot be sustained by many small firms. It is profitable for large firms to make considerable investment in research because these costs will be spread over great volumes of output. Plant and other technical discontinuities, because of which diversification into big markets often involves investment increments of large minimum size, are at once a source of economies of size which cause the greater profitability of large firms, and an obstacle to the entry of small firms into big markets. [Cf. Penrose, 200, Ch.6; Sargant Florence, 81].

Given that small firms are at a relative disadvantage with respect to available opportunities for diversification, the profitability of their growth depends heavily on

(7) Progression through market operations of increasing size is often by no means smooth. At various stages in its growth a firm is likely to be confronted with scale requirements considerably larger than those of its existing activities.
efficiency, especially of their strategy. Since 'both in terms of growth and in terms of profits it always pays to be efficient' [Marris, 173, p.249], small firms must exploit fully economies of growth that are available. These economies derive, as previously explained, from the productive services available to each firm. Profitability benefits from more intensive and efficient utilization of free productive services in new ventures, except that, beyond a certain point, managerial services are insufficient for planning and supervision of growth. Apart from utilization of productive services, profitability depends on the choice of projects in which these services will be used. If these projects are closely related to the firm's existing activities, initial costs can be reduced. Much depends on the state of competition in markets available to a small firm, whose product-market scope is determined by entrepreneurial, technological and marketing strengths. A small firm which is weak in one or more of these areas is likely to experience effective competition in all available markets, and to achieve little in the way of either growth or profitability.

The growth of a small firm should be accompanied by increasing prospects of profitability, as a consequence of the growth process itself. Greater quantities and variety of productive services enable the firm to contemplate bigger ventures, from which economies of size may be derived which affect existing activities as well. Increasing size also permits greater functional specialization, including the entrepreneurial and planning functions. Research and
development capacity can be instituted which increases the firm's competitive advantage and broadens its product-market scope. Growth from small size therefore benefits profitability through both costs and revenue, as the nature of a firm's comparative advantage gradually alters. However, it appears that the markets which constitute this developing advantage impose their own requirements on profitability.

For any given product larger firms probably do require a larger margin over direct cost for profitable operations, not because of a larger administrative overhead as is sometimes alleged, but because of the kind of oligopolistic competition in which they become engaged [Penrose, 200, p.226].

Growth of the firm therefore not only increases a firm's ability to earn profits; it may also stimulate a competitively-oriented requirement for greater profitability. The latter is due to the fact that profitability is, inter alia, a function of the state of competition in a firm's markets. As the firm grows it eventually becomes able to enter big, oligopolistic markets, whose cost structures and profitability differ from those of smaller, less-organized markets. Large firms are geared to compete in big markets and need to earn the higher rates of return appropriate to these markets if they are to survive. The growth process may therefore be accompanied by changes in the type of market into which a firm will diversify, with important consequences for profitability.

It has been stated that, in principle, there is no long-run conflict between managerial objectives of growth and security, on the one hand, and profitability of diversification, on the other hand. In practice, however,
it is no easy matter to ensure that this relation is correctly maintained, or even to ascertain what it should be.\(^{(8)}\) Given that firms are unable to rank diversification opportunities neatly according to expected profitability, there are four principal ways in which growth may proceed at the expense of profitability, at least in the short run. Firstly, the rate of diversification may be higher than that which can be efficiently supervised by available managerial resources. This leads to costly delays and mistakes. Secondly, management may fail to make timely abandonment decisions for projects which have not succeeded within a reasonable time, thereby favouring the success ratio at the expense of profitability. Thirdly, management may, by way of pricing or marketing policy, seek to achieve a higher share of a new market than is warranted on profit grounds. This action is as likely to result from uncertainty about market parameters and costs as from deliberate policy decisions. Finally, the firm may be induced by actions of competitors or suppliers to make diversification decisions whose results contribute less to profitability (and, perhaps, to growth as well) than would alternative uses of the same productive resources. Examples include backward integration for security or prestige reasons [cf. Penrose, 200, p.146] and full-line diversification necessitated by competitive considerations.

In conclusion, the factors which principally determine the profitability of diversification will be briefly restated. These factors exercize a deciding influence on

\(^{(8)}\) See Baumol's comment, footnote 1.
the nature and extent of any impact of corporate income tax changes on managerial diversification. Owing to uncertainty, whereby costs and revenues are not initially known, new projects cannot be selected on the basis of their respective profitabilities. Instead, managements select projects on the basis of ascertainable strategic considerations, which include the firm's comparative market advantage, previous experience in similar areas, and technical and other relations between new projects, on the one hand, and existing activities and available productive services on the other. These factors, the components of growth strategy, enable management to guide the firm's development in directions most appropriate to its particular resources and productive advantages, which change over time as a result of the growth process. To the extent that this objective is achieved the firm will, subject to certain provisos, attain the most efficient and profitable growth rate possible in the circumstances.

Assuming that the most appropriate strategy is adopted in each case, profitability of diversification is likely to be considerably affected by firm size and by the nature and quality of productive resources: these factors govern product-market scope and competitive advantage. Apart from availability of suitable opportunities, ability to diversify at any time depends on the existence of spare productive services, especially management. This affects profitability through the attainable diversification rate and the success ratio.
Apart from firm size and competitive advantage the most important determinant of profitability is the efficiency with which diversification is carried out. Overall efficiency includes strategy (entrepreneurial competence in selection of projects and in correctly-timed abandonment decisions where necessary), as well as technology, marketing, and general operation and organization. All aspects of efficiency are affected by the tempo of a firm's activities, beneficially up to a point, adversely thereafter. Efficiency, and therefore the cost of growth, is especially susceptible to mistakes and delays which occur when managerial capacity is overtaxed. In conditions of uncertainty, profitability, growth, and even survival depend on speed and accuracy of reaction to data which become available to management as feedback after initial investment decisions have been made.
4.3 Profit and Investment in Existing Lines

(a) Demand

Given costs and prices, the relation between profit and current sales is simple and direct. When sales change, profit changes proportionately in the same direction. Various writers have observed that this structural relation implies that 'the expectational hypothesis for profits cannot, and perhaps should not, be distinguished from the sales level or capacity accelerator hypothesis' [Kuh, 144, p.208]. Short-term deviations of output from sales are absorbed by inventory adjustments and do not affect this relation. Orders or future sales should similarly be a good predictor of future profits. [Hart, 107, p.131].

If actual orders or expected demand outstrip existing capacity, sales, and therefore profit, cannot increase unless there is either new investment or a part of production is subcontracted. Satisfaction of demand by running down inventories is only a short-term expedient. Thus, when full capacity utilization is reached (which depends on output elasticities of productive processes), effective causation extends from demand, through new investment, to incremental sales and profit. Owing to the structural relation involved, it makes no difference at this juncture whether management invests for growth (sales) or profit.

(9) See also Eisner, 70, pp.191, 201; Evans, 74, pp.356, 363; Jorgenson and Siebert, 121, p.705; Kuh, 146, p.262; Meyer, 181, p.315; Meyer and Glauber, 182, p.21; Meyer and Kuh, 184, p.131; Williamson, 264, p.5.
The relationship between demand, sales, investment and profit acquires meaning only in relation to managerial behaviour in the environment provided (or created) by various important market considerations. These include the state of competition, total size of markets, a firm's shares of those markets, and degrees of maturity of market demand.

Managerial behaviour, which reflects motivation and competence, determines sales and profit both through the original decisions to enter its present markets and through its sales efforts within those markets. Behavioural differences between thrusting and sleeping managements, relating to data-gathering, formation of expectations, anticipation of investment needs, and efforts to increase sales and market shares, have already been discussed. It is evident that qualitative factors exercise a profound influence on profit from the sales point of view, and also, therefore, on the volume of demand-induced investment which is required to supplement existing capacity.

The state of competition in a firm's markets is an important determinant of profit, although it is difficult to isolate its effects on the sales side from those which involve production costs and pricing policy. This applies also to the total size of markets, a firm's share of each of its markets, and maturity of demand. The degree of competition is intimately associated with the size and growth of firms in terms of both sales and assets. As a firm grows in size its comparative advantage lies in increasingly large markets, in which, by virtue of size, there tend to be fewer competitors. It cannot be stated
from the viewpoint of sales alone that large, oligopolistic markets will be relatively more profitable, in terms of rate of return on resources employed, than smaller, more competitive markets. However, the structural relation between sales and profit means that, at a given price, profit will be greater in larger markets. Also, owing to differences in relative ease of entry by new competitors, increased sales in one period in a large, oligopolistic market are less likely to precipitate new competition than in a market where barriers to entry are lower. Evans found that lagged sales have a strong negative influence on the profits of competitive industries, 'since high sales in one year lead to new entrants next year and a resulting loss of profits' [74, pp. 362-3]. Competitive firms are unable to plan new investment to meet expected increases in industry demand on the basis that they, or even their existing competitors, will reap the lion's share of such increases. This inhibition adversely affects the growth of these firms' sales and profits.

Oligopolists, on the other hand, are widely believed, following the work of Baumol and others, to be sales- and market-share-oriented. Since this tendency alone should benefit profit, any explanation of the well-known allegation that sales and market shares are pursued at the expense of profit must be sought in terms of oligopolistic costs and pricing policies. Sales-wise the oligopolist is in a much more stable position than a competitive firm for purposes of planning the demand-induced investment upon which his future profit partly depends. Inter-firm variations in
managerial motivation and competence, however, affect the
degrees of effort and skill devoted to sales and market
shares in different cases, with consequent effects on profit
results.

The comparative maturity of industry demand exercises
a long-term influence on sales and profit which differs
from and underlies cyclical and seasonal fluctuations. An
initial period of adolescence, during which demand and
(perhaps) profit grow rapidly, is followed by a middle
period of maturity, when the growth rate of demand declines
appreciably to, say, that of the population. In maturity
'Ve the industry, while still expanding, is no longer a
dynamic sector relative to the rest of the economy' [Kmenta
and Williamson, 138, p.173]. Market shares and the state
of competition are normally settled before maturity, and
new entries into oligopolistic industries after
adolescence are comparatively rare. This is due partly to
barriers imposed by capital requirements, and partly to the
fact that low industry-wide growth rates of demand and
established market shares reduce the scope for profitable
entry. Over the whole life of an industry, therefore,
average profits of member firms are likely, given costs and
prices, to follow the trend of total demand.

The overall development of demand is obviously highly
particular to individual industries. Factors and decisions
are involved of which many are beyond even industry
jurisdiction. At individual firm level it can only be
concluded that profit prospects are brighter, other things
equal, the younger the average age of the firm's
product-mix in terms of saturation of market demand. This depends both on managerial strategy (the ability to reallocate resources away from declining industries), and on competitive power (which determines the size of market in which the firm can seek profitable growth). [Marris, 173, pp.184, 251]. Within the shorter term of a firm's sales and profit horizon, qualities of managerial enterprise are best exercised in the absence of exogenous restrictions on demand in growing markets.

(b) Costs

Profitability is determined in relation to costs by the following factors: managerial motivation and competence; the size of markets, growth rates of demand in those markets, and demand fluctuations relative to existing capacity; the degree and type of market competition; technological progress; and changes in factor prices. The rate of real investment is an instrumental variable in profit-determination, within a firm's production and marketing contexts. Since it is understood that all the above factors operate concurrently, frequent use of the ceteris paribus assumption may be left implicit.

Unit costs are lower the closer is output level to the technical or physical optimum utilization rate of a firm's 'fixed' factors. These include managerial and other services whose supply cannot easily be increased in the short period, as well as real productive capacity. Optimum utilization refers to the lowest common multiple of
individual factor capacities, owing to their lack of homogeneity. Unit costs increase with under-utilization because fixed costs are spread over small outputs. Above the optimum unit costs also increase, owing to breakdowns, bottlenecks and errors. However, these increases are not always attributable to fixed capacity: managerial services may become overtaxed first. Within the range of optimum utilization rates set by productive service elasticities of fixed factors, therefore, the direct relation between utilization rate and unit profitability turns over and becomes inverse. During any period shorter than that necessary to increase the supply of the most inelastic factors, unit profitability is higher the smaller the average variance of actual utilization from the optimum range.

Productive service or output elasticities of existing capacity, which determine how far unit costs fall as utilization approaches the optimum, result from previous investment decisions. These were based upon expectations about future sizes of markets or market shares. Therefore, the larger are the latter, the greater the output for which capacity may be designed, and the lower will be unit costs, if and when markets develop as expected. Profitability then depends upon opportunities for investing to secure economies of large-scale production.\(^{10}\) Since relevant

\(^{10}\) Assuming that firms are optimally scaled for their industries, profitability is greater in industries whose minimum efficient scale is larger. Also, a firm which is suboptimally scaled in a given industry will be less profitable than optimally-scaled competitors. However, 'a small firm may find suboptimal operations in an industry requiring large scale to be as profitable as the best alternatives available for a firm of its size' [Hall and Weiss, 102, p.319, n.1].
decisions must often be taken years in advance, and involve choice between various alternatives, profitability is basically dependent upon entrepreneurial competence and motivation of management, in perceiving opportunities and being willing and able to act accordingly.

In both initial entry decisions and subsequent investment decisions, a competent management seeks to make the 'largest' possible allocations of available resources, since these favour both growth and profitability. Subject to expectations, a given quantity of capital is 'more productive in its best employment' [Hall and Weiss, 102, p.330] than a number of separate lots totalling the same amount. This requirement is a possible source of difficulty for both small and diversified firms, however. Markets in which small firms are optimally scaled tend to be competitive and not of the growth variety. Apart from other disadvantages, therefore, these markets do not enable small firms to reduce unit costs through growth economies, and are, if possible, avoided by enterprising managements. In larger, growing markets, on the other hand, small firms are at a scale disadvantage relative to bigger firms, and may be unable to establish themselves. These firms' costs and profitability depend on managerial ability to exploit growth interstices in the economy. [Penrose, 200, Ch.10].

The special cost problem of diversified firms, even quite large ones, is similar to that faced by small firms. This problem consists of attaining and maintaining the optimal scale of operations in each separate field of endeavour, given limited resources. Managerial services are
often important in limiting cost reduction in these firms, owing to shortage of time. Apart from the size and growth rate of each market, unit costs of diversified firms tend to be lower the greater the degree of synergy between different activities, and the greater the extent to which problems and opportunities arise sequentially, rather than concurrently. These factors help to safeguard the efficiency of managerial decision-making, and may also simplify the resource-allocation problem of servicing capital requirements of different activities.

Large markets, from which scale economies are derived, are usually imperfectly-competitive, owing to barriers raised by capital requirements, etc. This attribute satisfies a prerequisite of investment for large-scale production, that of stable market shares. Owing to benefits from entry restrictions, the cost structures of large oligopolists may be more favourable than those of smaller firms in competition. In the latter, lagged sales tend to have a strong negative influence on profits, as noticed in connection with demand, owing to ease of entry. (11) Oligopolists' costs and profits are affected only by fluctuations in industry output levels, whereas competitive

(11) Samuels and Smyth have suggested that 'the usually higher capital-intensity in the larger firms...should lead, other things being equal, to lower profit rates' [216,p.130]. In this case, however, other things are not equal, because oligopolists are in a better position to protect their market shares. Evans found that profits of competitive industries are generally more susceptible to variations in capacity utilization than those of oligopolists. He attributed this result to the situation in which oligopolists earn close to their average profit rates even at low rates of capacity utilization, through market-sharing and price-fixing schemes. [74, p.351].
firms are also susceptible to redistributions of given outputs within an industry. (12)

The cost impact of an oligopolist's inherent market advantage then depends on managerial efforts to maintain and increase sales and market shares, and on industry growth rates. The competitive advantage of a management content merely to maintain sales in a growing market may quickly be eroded, and its ability to reduce costs impaired.

The effect on unit cost of new, demand-induced investment depends upon several factors. Firstly, given technological progress and fixed factor prices, new capacity will be relatively more efficient than existing stock, in the sense of producing a given output at lower unit cost. If prices of fixed assets have risen, this reduction will be correspondingly lower. Secondly, reduction in unit costs will be greater the larger the expansion of productive capacity in proportion to existing capacity; that is, the greater the increase in expected over current normal demand. [Duesenberry, 56, p.58]. This determines the reduction in average technological and physical age of the enlarged capital stock, and the extent to which expansion may be planned to secure economies of scale. The latter are associated with large, discrete expansions rather than with frequent, piecemeal additions. If a large expansion entails the concurrent scrapping of

(12) Evans' opinion is that 'in the manufacturing sector, cyclical fluctuations in output and profits of the firm are usually caused by fluctuations in industry output [sales], rather than by changing market positions within the industry' [75, p.158].
part of existing capacity, future unit costs will be even lower, subject to factor prices. Finally, reduction in unit costs depends on the degree to which managerial forecasts of future demand prove to be justified, and on the length of time before the new normal utilization rate is attained. Even the best forecasts are vulnerable to general restrictions of demand, crises of confidence, etc., which hit growing markets relatively severely, and are beyond managerial control.

Previous discussion clearly indicates that replacement policy is an important determinant of profitability, since its proper objective is minimization of the capital cost (or, when technological progress causes the production function to shift, the total production cost) of a given output. In fact, this aspect of managerial behaviour is a very good indicator of efficiency and effective interest in profitability. [Cf. Barna, 9, p.55]. An optimal replacement policy, or even a 'good' suboptimal policy, ensures that profitability is greatest from the viewpoint of plant and related costs, despite the theoretical separation of cost minimization from overall profit maximization. [Smith, 233, p.161, supra].

Cost reduction is achieved in relation to technological progress and physical deterioration as plant ages in use. The former means that plant or total cost of producing a given output with the latest available new plant is lower than that of existing plant when it was new. The latter, a function of machine hours worked, means that the plant cost of a given output is higher the older is
existing capacity. Output profitability will therefore be lower the older is existing capacity in both senses. [Campagna, 31, p.210; Duesenberry, 56, Ch.4; Meyer and Kuh, 184, p.94; Neild, 192, p.32]. Correspondingly, the older is existing plant when either replacement or expansion investment is made, the greater, given the rate of technological progress, the reduction in unit costs. In fact, the rate of cost reduction at full capacity via replacement cannot exceed the rate of technological progress in the long run unless the latter also induces factor substitution and scale effects to operate beyond the interim period of adjustment in the age pattern of capital stock. [Neild, 192, pp.30-1].

Other factors, which affect the contribution of replacement policy to cost reduction, include capital and current input prices (and changes therein), product demand, uncertainty, and competing claims of long-term investment for expansion. Firstly, cost savings from technologically-newer plant are lower if capital goods' prices rise. Put another way, the operating inferiority gradient of existing capacity is made less steep by these price rises, and introduction of new plant may be delayed. If current input prices increase, however, replacement or additional investment will be stimulated. [Duesenberry, 56, p.61; Smith, 233, pp. 87, 114].

Product demand affects the timing of replacement in at least three ways. Firstly, it determines the utilization rate and, therefore, the rate of increase in unit costs due to physical deterioration. Secondly, given the rate of
technological progress, the higher the utilization rate the smaller the reduction in unit costs as a result of replacement, which then occurs earlier and at a lower degree of technological sophistication. [Knox, 140; Kuznets, 148]. Moreover, this may affect the timing of all future replacements. Thirdly, when demand increases it may pay to replace existing facilities with larger new ones, from which economies of scale are gained, as well as lower costs due to technological improvement. Also, replacement may provide the mechanism whereby the firm can escape over-investment in facilities and, depending upon the durability of the equipment, the adjustment process eventually can be reversed even in the case of indivisible capital goods [Smith, 233, p.113].

Uncertainty affects cost reduction through replacement mainly in relation to technological developments and future product demand. Prediction of the working lives of proposed replacements is very difficult, because obsolescence and utilization rates cannot be known in advance. Uncertainty also attaches to appraisal of competitors' actions regarding cost reduction, which management must aim to forecast and, if possible, anticipate. In these respects cost reduction depends on managerial judgment and temperament, and on development of data-collection procedures for purposes of replacement evaluation.

Perhaps the most fundamental aspect of the relation between replacement and cost reduction is overall resource allocation. Replacement proposals compete with long-term expansion investment and with working-capital requirements for limited resources. Lundberg has made some interesting
remarks on this subject. He first takes note of 'the great
dispersion in the expected internal rate of return (before
tax) of planned investment projects...[both] between
branches of activity and between firms but also within a
firm' [164, p.669]. He then states:

In a firm there always seem to exist many "golden"
investment opportunities in the form of new
labour-saving machines to replace old ones, of methods
of saving fuel, investments to expand bottlenecks and
the like, promising very high and quick returns...
The yields will, of course, depend upon the
expectations of the length of economic life of the
machines in question, but mostly the returns will seem
very high in comparison with the expected returns on
investment in long-term expansion programmes. And
these expansion programmes are given priority although
they are only expected to yield a 10 or 20% rate of
return, compared with a stock of "golden" investment
opportunities yielding perhaps 30-50% on a comparable
basis of estimate. These highly remunerative
investments are squeezed out in order to make room for
the financing of the expansion programme. Over a
ten-year period companies have to make quite
substantial investments in welfare or community
projects of various kinds with no expected direct
yield at all, but with opportunity costs corresponding
to the postponed or neglected golden investment
opportunities [164, p.670].

This behaviour is apparently in conflict with both cost
reduction and the profit goal. Ability of management to
have confidence in the outcome of investment may also be
greater in the case of expansion programmes than for
replacement, owing to the differing lengths of time
involved. However, as Lundberg explains,

the golden opportunities of bottleneck investments are
dependent on the general development of the firm and
the profitability prospects of the firm's total capital.
It may, therefore, be more profitable for the firm in
a given situation to postpone investments which seem
much more profitable than the long-term investment
programme. In this case it can be said that the
profitability estimates are not accurate guides, either
for the investment policy of the firm or for the
economist trying to understand something about the
marginal efficiency of investment [164, p.671].
Subject to availability of investible resources, therefore, a far-sighted management will forgo to some extent cost savings on existing operations in favour of first broadening the firm's production base. This does not mean that existing capacity will be worked until it falls apart. The type of firm which adopts a long-term investment approach is not content to allow replacement needs to be signalled by dilapidation. Instead the firm will seek to apply an efficient replacement policy to an expanding volume of productive capacity, thereby gaining economies of growth and scale in the process. This is tantamount to favouring long-term growth and profitability over short-term profitability. (13)

Many of the arguments presented so far point to the conclusion that large oligopolists are more profitable than smaller firms, even those not subject to effective competition. Two notions are involved here; namely, that profitability is directly related to firm size, and inversely related to degree of competition, usually measured by concentration ratios. The first hypothesis, usually attributed to Baumol [11], was first advanced by Steindl [241] as the asymmetry principle.

Testing of the size-profits hypothesis has been complicated by difficulties of measuring firm size and changes therein. Sales, for instance, are a very bad

(13) Competitive conditions may induce a firm to concentrate its investment on replacement, in order to reduce costs and thereby avoid loss of profits and market shares. That is, oligopolists may need to replace faster than monopolists, leaving aside managerial motivation and competence. [Duesenberry, 56, pp.130-3].
measure of size, especially across industry lines, and the
relation between sales and net profitability is not very
meaningful anyway. [Kamerschen, 128, p.437; Stekler, 242
and 243]. Total assets are more acceptable as a stock
measure of size, whilst value-added has been proposed as a
suitable flow measure. [Kamerschen, loc.cit.].

If the size-profits hypothesis is correct, 'we should
find higher rates of return in large enterprises even in
the long run and even in the absence of barriers to entry
other than those directly associated with availability of
capital' [Hall and Weiss, 102, p.319]. These writers found
that

size does tend to result in high profit rates as
Baumol proposed, that there is a significant though
probably not enormous capital requirements barrier as
a result, and that this barrier very likely has a
greater effect on profit rates than concentration,
the traditional index of market power [102, p.329].

Samuels and Smyth [216], on the other hand, have concluded
that the size-profits relation is inverse, and that size was
a significant determinant of mean profits over the ten-year
period 1954 to 1963. (14) Kamerschen notes that

the (unweighted) average annual profit rate (net
income to net worth) [of the 'Big Three' automobile
manufacturers] over the 1950-1960 period as reported
in Fortune was as follows: General Motors, 21.5 per
cent, Ford 14.5 per cent, and Chrysler, 10.5 per cent.

(14) Two years earlier, Williamson had stated in the same
Journal that 'there is no more reason to expect
profitability to decline with size than there is evidence
to suggest that it does' [264, p.1].
The descending firm sizes are therefore associated with descending profit rates [128, p.441]. (15)

Moreover, he found that the relationship between profitability and the concentration ratio was statistically insignificant. [loc. cit.].

By contrast with the size-profits relation, there is apparently widespread agreement that time-variability of profits is inversely related to firm size, and that there is greater variability in profit rates among small firms of given size than among large firms. [Alexander, 3; Dyckman and Stekler, 60; Hall and Weiss, 102; Hymer and Pashigian, 119; Mansfield, 170; Samuels and Smyth, 216; Stekler, 243; Stigler, 244]. It is also interesting that Samuels and Smyth were unable to explain their negative relation between size and profits in terms of profit variability. Their results rejected the hypothesis that profitability is an increasing function of its time-variability. The latter was found to be directly related to the degree of competition; that is, to the concentration ratio. [216, pp.135, 139].

From the costs viewpoint there are grounds for supposing that the size-profits relationship is in fact indeterminate, and that testing should reveal a direct relation in some cases and an inverse one in others.

Effects of large scale and restricted entry, which support

(15)

Also, his results are not necessarily inconsistent with the Hall-Weiss finding that the positive size-profits relationship approximately held over "...the whole range of large scale firms observed" [loc. cit., n.13]. Hall and Weiss stated that 'General Motors is perhaps the prime example of the Baumol [size-profits] hypothesis in the American economy today...'. [102, p.327].
the hypothesis of a direct relation, do not constitute a complete explanation, although they undoubtedly contribute to its completion. Protected by capital requirements barriers, etc. and capable of great output volumes, large oligopolists have evolved a type of competition all their own. It is based, not on price changes but on product characteristics and differentiation, service, and corporate image. These factors direct emphasis onto sales and market shares: they also involve huge expenditures on product promotion, which is a category of preferred expense from the viewpoint of managerial self-interest, along with staffing and managerial emoluments.

Promotional expenditures bulk much larger in the cost structures of big oligopolists than in those of smaller competitive firms. These expenditures represent a trade-off of cost advantages bestowed by large-scale production for oligopolistic markets. The two elements are closely linked, because the advantages in question are realized through promotional efforts, which in turn are made possible by ability to operate on large scale. There is no corresponding trade-off in smaller, non-oligopolistic firms, because neither the ability nor the need to make

(16) Cf. Samuels and Smyth:
Certain economic pressures might be supposed to be working in the direction of higher rates of return for the larger companies, such as technical and marketing opportunities associated with size. In the opposite direction the usually higher capital-intensity in the larger firms...should lead, other things being equal, to lower profit rates [216, p.130]. This study takes a rather different view of the causations involved. See also footnote 11 above.
this promotional effort exists to any comparable extent. Of course, as growing firms tackle increasingly-large markets, they are eventually confronted by the need to make unprecedented promotional efforts. This is as much a part of the capital requirements and organizational barriers, which such firms must surmount in order to continue growing, as is the need to make discretely-larger investments in productive capacity, for purposes of entering large, oligopolistic markets. 

Indeterminacy of the size-profits relationship is likely because the extent, to which oligopolistic profit advantage from the scale viewpoint is traded-off in promotional and other preferred expenditures, varies between firms and industries and for given firms over time. These expenditures are not always entirely within managerial jurisdiction. The importance of sales and market shares means that competitors' initiatives must be matched, even if budgets are exceeded. Market leaders tend to set the pace. These firms' scale advantage over competitors permits them to emerge as relatively the most profitable, whilst other industry members may then rank in profitability according to market shares.

These arguments also help to explain the observed inverse relationship between time-variability of profits and firm size. When an oligopolistic industry is hit by recession, member firms are able to retrench promotional expenditures, and to gather up various strands of organizational slack. Smaller firms' cost structures may be relatively less output-elastic in these respects. Large
firms are also able to afford to develop superior forecasting ability, whereby unit costs may be stabilized through timely anticipation of fluctuations in activity. These firms also tend to be more diversified than smaller firms.

Changes in factor prices are of interest in relation both to their impact on costs, and to action which may be taken (other than through pricing policy) in response. Each of these aspects depends upon which factor's supply price has increased, and that factor's relevant characteristics. These may be defined according to whether the factor is respectively a fixed or a variable cost, subject to managerial expense preference or not, substitutable or not, and important in relation to total unit costs or not. Managerial costs, for example, include salaries, bonuses, and sundry perquisites. They are respectively a fixed cost, definitely a preferred outlay, not substitutable for other factors, and not usually important in relation to total costs. They are also likely to respond to one or more standards of achievement, and to changes in levels of managerial rewards in other firms and industries.

Raw materials, on the other hand, are a variable cost, not subject to expense preference, sometimes substitutable as to source of supply and technical specification, and often important in relation to total costs. An efficient management seeks to minimize this component of unit cost, but would not normally reduce output in order to do so. Direct labour resembles raw material costs in some respects,
but differs in others. Firstly, labour costs tend to vary (as a component of unit costs) directly with output above a certain level, due to overtime rates, bottlenecks, etc. Secondly, it may resemble a fixed cost at low levels of output, unless hired and fired strictly in accordance with output variations. Thirdly, substitution out of direct labour usually involves investment policy (often in conjunction with efficiency studies). Durable assets may be substituted for direct labour if the latter's supply price rises, provided suitable plant is available, and management is confident that foreseeable levels of activity will support extra capacity. [Smith, 233, pp.70-2, 87].

Rising costs of indirect labour have also stimulated cost-reducing investment in office machines in recent years. In many cases the incentive for substitution has come from labour shortages, as well as from cost increases. The incentive to substitute durable assets for labour may fall if the former's supply price also rises, and the growth rate in operating inferiority of existing plant may also be lower for replacement purposes. In reality it is often difficult to determine the extent to which prices of durable assets have risen, because new plant is technologically superior. [Duesenberry, 56, p.61; Lundberg, 164, p.675; Smith, 233, pp.87-114].

Effects of factor price changes on profitability depend therefore on factor characteristics and on managerial initiative within the scope for action. Cost-consciousness is a principal point of departure between thrusting and sleepy managements. Two other points stand out. Firstly,
quite apart from pricing policy, action in response to factor price changes does not necessarily always involve investment policy. Secondly, managements will not willingly, given satisfactory demand, reduce output in response to factor price increases, unless the latter are so severe that production ceases to be a viable proposition. Net revenue forgone by acceptance of cost increases, if no means for offsetting them presents itself, would need to be considerable to match the opportunity costs, in terms of managerial goals, of curtailing activity in an otherwise satisfactory market.

(c) Pricing Policy

There is a fair measure of agreement in the literature about business pricing policies, the third dimension of profitability. Oligopolistic firms tend to follow long-term pricing policies based on variable cost plus a stable percentage markup. Prices tend to be formed at industry rather than firm level, according to the circumstances of the strongest members, and with regard to what the market will bear. Short-term variations in demand and costs (due to fluctuations in utilization rates, etc.) are not reflected in prices, which are adjusted intermittently in the light of cumulative cost changes. [Duesenberry, 56, pp.53, 131; Gordon, 97; Hall and Hitch, 104, p.12; Kmenta and Williamson, 138, p.175; Kuh, 144, p.19; 146, p.262; Machlup, 166; Marris, 173, p.230; Smith, 233, p.311]. Profitability therefore varies to a greater extent than
either prices or the percentage markup, although some writers believe that short-term marginal cost functions are relatively constant over wide ranges of output [Duesenberry, 56, pp.54-5; Kuh, 146, p.262; Simon, 226, p.10], or at least that firms behave as though they are.

Oligopolistic prices are sticky because price competition is reckoned to be contrary to members' interests (except in unusual circumstances), and because it would destroy the stability of expectations upon which business planning is based. [Simon, 228, p.54]. That is, it would tend to dissipate the collective benefits provided by restricted entry and relatively-stable market shares, which permit members to compete in more congenial and more rewarding ways. In competitive industries these conditions are absent, and individual firms are not strong enough to 'rationalize' the market. These firms must bear the considerable direct and opportunity costs of frequently using the price system for competitive purposes. [Cf. Coase, 38; Malmgren, 169, pp.400-1; Smith, 233, p.311]. The greater scope for planning enjoyed by oligopolists belies the traditional view that a competitively-determined price system signals free-of-charge to its users information on how much to produce. [Koopmans, 141, p.23]. In oligopoly price competition is conducive to uncertainty (i.e. lack of information) about price elasticity of demand and reactions of competitors. Therefore, apart from deliberate collusion in price-fixing, a firm must be reasonably convinced, when it makes price increases, that competitors will welcome the move for reasons similar to its own.
Since oligopolistic prices are usually fixed for considerable periods, albeit at what the industry believes the market will bear, short- and medium-term profitability is determined by sales and costs. Firms interested in profitable development of markets cannot afford to let their costs get out of line with those of competitors. Even if a firm does not lead in cost stabilization, it must aim to match the efforts of competitors, in order to safeguard profitability and market shares. [Kuh, 144,p.53].

Action designed to avoid rising costs and loss of market shares at high levels of capacity utilization must, when prices are fixed, involve investment policy to a greater extent than when prices are variable. As Duesenberry has observed, 'we have only succeeded in moving the indeterminacy from the area of price theory to the area of investment theory' [56, pp.130-1]. This refers to the choice, in the above circumstances, between attempting to capture excess demand by further squeezing existing capacity, or making additional investment, or holding output at the current level. In the first case, market shares may be maintained at the expense of profitability, whereas additional capacity may enable a firm to maintain market shares with increased profitability. If the firm decides to backlog demand at existing prices, competitors may erode its market shares. Price rigidity therefore places a particular onus on managerial initiatives with regard to investment policy, costs, and market intelligence, etc., because it is in these areas that competition is waged.
4.4 The Medium of Decision

There is no substantial agreement about the actual role of profit in investment decisions, either as an objective of decision-making, or as a medium in terms of which decisions are made. In Chapter 1 it was decided that managements have a specific, but limited, interest in profit, to the extent of satisfying shareholders and providing finance for future growth. In Chapter 2 it was argued that uncertainty precludes maximization of either profit or growth, and that managements depend on the quality of their own judgments, and on the efficiency of data-collection and evaluation processes.

Still unresolved is the question of whether profit is the medium of investment decisions for existing lines. This is not true of diversification into new fields, because the necessary data is not available when initial entry decisions are made. The position may, however, be different for established lines, because the profitability of past and current periods is known, and managements are presumably familiar with cost and market characteristics.

Arguments in favour of the so-called 'proxy' role of profit in investment decisions state that the current profit rate, adjusted for any known or expected developments, provides the rule of thumb upon which firms must rely under uncertainty, especially since profitability tends to be correlated with some of the main forces which cause investment changes, and also with investment itself. Expected profitability then determines investment, both as a managerial objective in its own right, and on behalf of
other factors. [Eisner, 68, pp.186-8; Knox, 140]. These views have not been accepted here. It is considered more realistic that investment is determined by those factors which also determine profitability.

Investment in existing lines occurs in response to a need, which must first be perceived by management. Under uncertainty perception does not usually precede existence of the need, which arises in the form of pressures on capacity, threats from competitors, opportunities to improve efficiency, etc. Quite often the need is already subsumed in current profits before investment action is taken. On the other hand, expected profit may rise as the result of previous investment decisions without any effect on current investment. Also, many investment decisions are not accompanied by increased expected profitability.

As Grunfeld has observed, 'not all rises in profits signify increases in the incentive to invest; and, correspondingly, not all increases in the incentive to invest are reflected in rises in profits' [99, p.216]. (17)

Evidence previously cited indicates that most firms do not make detailed calculations of expected profitability, do not employ DCF and other techniques in investment decisions, and do not conduct efficient replacement policies (in the sense of attempting to minimize costs), etc. This evidence makes it difficult to sustain the view that firms typically approach investment mainly in terms of

(17) Cf. Tinbergen's classic assertion that 'it is almost a tautology to say that investment is governed by profits expectations' [251, p.34].
expected profitability. However, the type of management which tends to be efficient in these respects is the growth-oriented thruster, who earns high profits in expanding markets, and probably has relatively less need to concentrate on profitability as a management problem.

In one important sense, previously mentioned, an efficient and expanding firm may actively reject the conventional notion of expected profitability in its investment decisions. That is, replacement projects are often both more profitable and less risky than investment for expansion, yet the former are limited in favour of the latter in the interests of long-term growth and profitability. By so doing, management aims to gain growth and scale economies from expansion, and to secure much greater benefits from replacement at later stages, when the volume of capital is greater. Thus, although opportunity costs of expansion may be high in the shorter term, beneficial effects on profitability over longer periods may be very considerable. In this sense of interdependence of investment decisions, the relevance of conventional profitability estimates may be quite limited. Profitability is then determined partly by the length of the investment horizon, which is a consequence of growth motivation. [Cf. Lundberg, 164, pp.670-1].

Maintenance of adequate periodic profitability within the investment horizon is a constraint on long-term investment strategy. This task resolves itself, however, into problems connected with reception, evaluation and utilization of data from various sources, including
realized profit figures, about difficulties and opportunities which impinge upon profit performance either directly or indirectly. Almost any factor which affects business decisions may be expressed in terms of an effect on profits. Many such difficulties and opportunities, however, would be first perceived in relation to a factor (e.g. market shares) which is conceptually distinguishable from profits, and might be resolved by management without explicit reference to profits. It is also important to note that many such problems are resolved by means other than real investment.

Of all the different aspects of corporate policy, investment, especially for expansion, may actually be one of the furthest removed from direct 'contact' with expected profitability, in the sense of being directly induced or deterred by the latter. Replacement investment is closer in this sense, but only if it is deliberately geared to cost minimization for profit and competitive purposes. The sleepy management replacing capacity in the face of ultimate decrepitude cannot be accused of running a profit-oriented replacement policy. Even in a thrusting firm the 'proximate' cause of replacement may be competitive (growth) advantage rather than expected profitability as such.

In imperfect markets pricing policy is probably most directly affected by profit considerations. In fact, it may be argued that attention devoted by management specifically to profitability manifests itself mainly in the form of setting a full-cost price on the basis of what
the market will bear. Output, marketing and investment policies, etc. then proceed in their own environments, subject only to the general proviso that realized profits must be satisfactory. (18) As Gordon has stated:

Although the influence of profits on investment is a controversial topic, the weight of recent econometric evidence suggests that output is the only current variable which has an appreciable influence on investment, and that the effect of profits, if any, operates with a considerable lag [98, p.1363].

Profit is therefore largely confined to the 'permissive' role of contributing towards investment finance. [Knox, 140, p.294; also Eisner, 71, pp.386-7; Evans, 75, p.152; Meyer and Kuh, 184, p.125].

This conclusion, which differs from the views of tax theory about the role of profit, is profoundly significant for the question of incentive effects of corporate income taxation.

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(18) Marketing outlays, for instance, are often set at some conventional fraction of turnover, or are varied according to competitors' tactics. As is often the case with product prices, a firm may be incapable, by virtue of relative market power, of applying its own policies. It must be content to follow those of market leaders.
CHAPTER 5
CORPORATE TAX CHANGES AND INVESTMENT

5.1 Introduction

Positive theories developed in the previous Chapters have supplied an array of determinants of the main types of managerial real investment under uncertainty. The interrelationships of these determinants have been explored qualitatively for each type, and the relative significance of each determinant has been assessed. There has also been preliminary discussion of increases in corporate tax rates in relation to investment incentives.

In conditions of uncertainty, as defined in this study, it has been considered as important to concentrate on the methods by which incentives or desires to invest are worked out, as it is to explain these desires in terms of rankings of personal objectives. The link between the will and the way under uncertainty is entrepreneurial competence, without which even growth-oriented motivation is ineffective as a determinant of real investment over the longer period.

The objectives of investment decision-makers, the conditions of knowledge under which they operate, and therefore the methods employed to translate objectives into action, have all been found to differ profoundly from those usually visualized for purposes of analysing effects of corporate tax changes on investment. The role of profit is an especially significant example of these differences in each of the three respects above.

It therefore remains to assess effects of corporate tax changes on investment decisions in relation to these positive theories. This discussion involves concomitant
consideration of the comparative roles of investment objectives and methods by which those objectives are pursued under uncertainty, as determinants of effects of the corporate tax. Changes in the tax which are considered include increases in its rate, and introduction or variation of several tax incentive measures which are specifically intended to encourage investment.
5.2 Effects of Changes in Corporate Tax Rates

During the course of the previous Chapters several well-established notions have been rejected which affect the status of the tax from the incentive viewpoint. These include:

1. investment constitutes risk-taking, of which the reward is profit;
2. the probability of loss may be quantified ex ante as risk;
3. tax increases exercise a disincentive effect on real investment because the profit reward has been cut while risk remains unchanged;
4. the incentive to invest may be restored by allowing full tax offset for losses;
5. profit acts as a proxy for other factors in investment decisions.

The incentive to invest has been found to depend on the extent to which management interprets its own self-interest in terms of this activity, mainly for purposes of growth and security. Profit is needed for both these purposes, but it is incorrect to assume that investment serves managerial objectives only to the extent that it earns, or is expected to earn, profit. Moreover, due partly to uncertainty, investment decision processes are not organized in terms of profit, but of other factors which collectively determine profit, as well as serving managerial objectives. With certain exceptions these other factors are by no means inimical to the profit result, and high profits are quite consistent with sustained growth. Since profit is not a
managerial objective as such, beyond the level needed for security and financing purposes, there can be no general presumption that tax changes exercise any effect on the incentive to invest. In Chapter 2 it was concluded that loss offset provisions for tax purposes are largely irrelevant to the question of the incentive effect of the tax.

Given that the main factors underlying these decisions are motivation, competence and opportunities, investment opportunities or needs will not be firmly grasped if either motivation (incentive) or competence is lacking. Uncertainty imposes rather more of a burden of search, evaluation and review activities on management than is the case under risk. The corresponding dependence of investment on managerial desire and ability to perceive opportunities is obvious. A recession in demand impairs not the incentive but the opportunity to invest. More precisely, a recession reduces management's scope for pursuing self-interest through investment.

The literature on economic effects of taxation has always made the general presumption referred to above of a basic disincentive effect of the tax, although various mitigating circumstances have also been identified. In the literature of real investment decision-making, on the other hand, changes in corporate tax rates are accorded hardly any importance, except in connection with investment financing. It seems fair comment that the corporate tax literature has created a subservient decision-making environment around the tax by assumption.
The incentive or desire to invest is a parameter of the investment decision process, rather than a variable susceptible to changes either in 'quantities' of desired benefits actually obtained or expected, or in movements of subsidiary factors, such as profit (above a minimum constrained level). The incentive to invest, that is, has been defined as the desire to utilize the process of real investment within the corporate environment for purposes of furthering individual or collective managerial self-interest. Corporate tax changes may affect managerial 'opportunities' to obtain benefits which are properly objectives of their incentive to invest, but they do not affect the latter as such.

Moreover, if tax effects are confined to profit, even the opportunity to pursue objectives of the incentive to invest may not be affected, except through financial capacity, unless profit stands in some key position vis à vis managerial investment objectives for decision-making purposes. As already stated, this is not the case. Profit is not usually the medium for making investment decisions for diversification and expansion purposes: it is rather only the passive residual of a variety of intermediate production, marketing, investment and other decisions. This refers to the failure of the expectational role of profit, for which econometric evidence is available.

The empirical failure of profit in replacement decisions, in which the efficiency aspect is supposedly relatively clear-cut, is especially significant. This evidences the subordinate role of profit from the viewpoints
of competence and allocative preference, rather than from that of uncertainty. (1) Inefficient managements replace primarily in response to the physical inability of plant to continue in production. Efficient managements, on the other hand, maintain modern capital stocks whilst, at the same time, undertaking diversification and expansion in order to achieve personal and corporate benefits of growth and greater size. This involves favouring the further future to some extent at the expense of the near future. Allocative considerations of this type reveal the inadequacy of conventional expected profit comparisons of different alternatives, even apart from uncertainty.

The expectational (decision-making) failure of profit and the profit-inelastic (parametric) nature of managerial motivation, together help to refute the conventional presumption of an incentive or disincentive effect of changes in tax rates on the rate of real investment. [Cf. Lintner, 157, p.521]. This conclusion does not depend upon whether loss offset provisions exist; nor do these provisions have any substantial opportunity effect of the kind discussed below. A number of other arguments tend to reinforce this main conclusion.

Firstly, the idea of an incentive or disincentive effect appears to conflict with opportunity cost calculations. To the extent that corporate profits from all

(1) In the discussion of replacement in Chapter 3 it was concluded that managements can, despite uncertainty, make 'good' decisions, if not 'optimal' ones, on the basis of relative operating advantages of existing plant and the latest available new plant, rather than merely allowing replacement needs to be signalled by breakdown.
sources (except capital gains, perhaps) are subject to assessment, the tax has no opportunity cost. Thus, it is incorrect from the managerial point of view to claim that the tax may reduce expected returns below their opportunity cost. [Cf. Goode, 88, p.129]. From a slightly different angle, however, it is pertinent to enquire how an ambitious, efficient management should react when the tax rate rises. If management allows itself to be 'discouraged', investment will presumably be retrenched across the board. The opportunity cost, in terms of sales and profits foregone, and market positions and competitive strength lost (perhaps irretrievably), would surely exceed the extra tax incurred by continuing the previous course of action. [Lintner, 157, p.525; Slitor, 231, p.238].

Opportunity cost calculations indicate, not that a disincentive effect should be modified by non-profit benefits from investment, but that actual commission of the effect in investment plans would damage both profit realizations and the latter benefits. Loss of market shares and competitive strength, referred to above, is an almost inevitable result of a firm's failure to service adequately its existing lines. The servicing requirement is an important constraint on the diversification rates of even very large firms, as explained in Chapter 3. If a firm chose to behave in response to a tax increase in the manner predicted by corporate tax theory, market shares abandoned by the firm would simply be snapped up by competitors. Disengagement from an existing line occurs only for the best of strategic reasons, or in times of crisis, as when a firm
is forced out by competitors. (2) Correspondingly, the process of substituting new markets and products for existing ones is a long-term strategic matter, and would never occur as the simple consequence of tax changes.

If, on the other hand, an ambitious management is to be 'stimulated' by a tax increase to recoup profit taken in tax, then, apart from price increases, some new action must be taken that was previously either not considered or was rejected. It is more plausible that actions involving satisfaction of capacity shortages in existing lines or diversification into new areas are no more or no less reasonable and desirable after the tax increase than before it. This follows from conclusions of the examination of determinants of investment for diversification and expansion. The former type was found to depend upon managerial motivation and competence, the existence of suitable opportunities, and availability of qualified managerial and other resources for diversification purposes. In the latter case, investment depends upon managerial motivation and competence, an actual or expected deficiency of productive capacity in relation to future product demand, and upon managerial belief that either such deficiency is of a semi-permanent nature, or that good reasons exist for creating excess capacity. Also, even if the firm is a monopolist, its behaviour must respond to, or seek to anticipate, that of (potential) competitors. This is likely

(2) These remarks are not intended to refer to abandonment decisions involving fledgling ventures which have failed to 'take-off'.
to affect both the volume and the timing of investment. Policies of firms which are not market leaders may be substantially dictated from outside. Even for firms which hold the initiative in their markets competitive considerations are likely to interpose themselves between investment policy and an incentive effect of the tax. Various bottleneck factors, such as shortages of managerial capacity, have a similar effect in reducing the influence of tax changes. [Cf. Butters, 28, p.514; Lintner, 157, pp.527-8].

Much discussion about incentive effects of tax changes centres around whether firms do and should make investment decisions on the basis of pre- or post-tax expected rates of return. The Richardson Committee, for instance, surmised that firms may not be affected by tax changes because they 'look principally at the return before payment of tax' [210, para. 282; also Lintner, 157, p.522]. Of firms interrogated by Neild, only 18 per cent. stated that their calculations for investment purposes were made on a post-tax basis. Moreover, this result applied irrespective of firm size. [192, pp.35-6]. Modigliani and Miller consider that the appropriate measure of the cost of capital for investment purposes is the ratio of pre-tax expected return to market value. [187, p.280]. On the other hand, Gordon [93, p.51] and Solomon [236, p.128] strongly advocate use of post-tax rates for purposes of selecting among alternative investment proposals.

(3) It should be noted that these authors regard such factors as modifying the disincentive effect of tax increases.
Quite apart from the role of rates of return in investment decisions, it is apparent that the 'profitability' or efficiency of investment refers to pre-tax rates of return. A firm does not thereby become less efficient in the profit sense because a tax is levied on its realized profit, or because the rate of an existing tax is increased. This only means, other things equal, that the firm's ability to retain profit is reduced. The post-tax rate of return simply measures funds' flow.

For similar reasons the argument, that the disincentive effect is less if firms aim to earn only reasonable profit, is incorrect, provided only that a tax change does not cause a firm to be confronted with its minimum profit constraint for security purposes. That possibility may be excluded by the assumption that tax changes are capitalized by the stock market. Otherwise, profit which was adjudged 'reasonable' prior to a tax increase does not cease to be so (except, perhaps, from the separate viewpoint of financial capacity) by virtue of such increase. [Cf. Cosciani, 43, p.48; Streeten, 246].

The argument, that taxation is a cost of production which, if increased, is liable to cause production to be reduced [e.g. Cosciani, op.cit.], is usually refuted in terms of the marginal firm, which makes no profit and therefore pays no tax. [E.g. Goode, 88, p.51]. It is preferable to admit, however, that income taxation may be regarded as a cost in a special sense, but that it is also a below-the-line appropriation of realized profit and, in any case, not the type of cost which normally affects
production decisions. [Cf. Brown, 22, p.303; Due, 55, Ch.13]. Many types of avoidable cost are incurred by firms which reduce profit efficiency (which the tax does not) and contribute to organizational slack. The latter costs do not affect production or investment; nor is there good reason to suppose that the tax does so, especially in view of the opportunity cost considerations discussed above.

One argument advanced in mitigation of the alleged disincentive effect relates to formation of new companies. The latter, it is supposed, are not subject to a disincentive owing to the stimulus afforded by advantages of incorporation, and to the satisfaction of starting a new business: also because the uncertainties surrounding initial stages of a company's life make too difficult the task of predicting future profit prospects. [Butters, 28, pp.506, 515; Butters and Lintner, 29, Ch.2; Cosciani, 43, p.45; Kimmel, 135, pp.37, 195; Petrie, 202, pp.174-7].

In this case the exception decidedly does not prove the rule. Advantages of incorporation, admittedly considerable, are capable of repeated and, perhaps, increasing use without depletion by established firms. The motivation to obtain satisfaction from starting a new business differs little from that to achieve sustained growth in new and existing fields by an established firm. Moreover, the uncertainty surrounding the profit prospects of a new firm is shared by managements of established firms which enter new fields by diversification, or even, in many
cases, with regard to their established lines. In one sense managements of new firms are more able than those of established firms to be discouraged by the tax. The opportunity cost (in terms of sales, profits, competitive strength and market positions foregone and sunk costs unrecovered, etc.) of retrenching investment plans is much lower for new firms than for established firms. In actual fact, however, this argument is no more plausible than its converse.

If management feels, despite the above arguments, that a tax increase has reduced the profit 'reward' for its efforts below an acceptable level, what is its most likely reaction? Does it retrench real investment, thereby almost certainly aggravating the profit result? Or does it increase investment by way of an income effect? In the latter case management must be able to select some course of action which had previously been deferred or rejected, or commence to search for fresh opportunities. These possibilities cannot be excluded if one is willing to accept all their implications. A third course of action for a management 'discouraged' by a tax increase is to improve efficiency by reducing costs (but without altering real investment plans). However, if management is so interested in profitability, there should be little room for improvement in its cost

(4) It is necessary, in refuting the above argument, to avoid falling into the same trap as its proponents, the elementary one of attempting to quantify degrees of uncertainty. See Chapter 2.

(5) An income effect of the tax, if it existed, could not occur independently of demand expectations and capacity considerations.
efficiency. Irrespective of managerial autonomy and freedom from effective competition in its product markets, organizational slack in the managerial area would be minimal because managerial concern for emoluments, and the desire to staff for personal prestige, would be thoroughly sublimated in the interests of the profit result. Replacement policy would be close to optimal, because expansion plans would never be allowed to interfere with the short-term calculation of relative operating advantage.

This rather unrealistic situation is contradicted by the views of some authors, who feel that tax increases reduce managerial incentives to improve productive efficiency. [E.g.s. Cosciani, 43, p.99; Due, 55, Ch.13; Slitor, 231, p.237]. If managerial incentives favour published profit, the efficiency goal will be aspired at irrespective of tax changes. The latter affect opportunities for its realization, rather than the incentive itself. Productive efficiency also serves ends other than profit, and even the opportunity effect is not clearcut in this respect, as explained below.

Despite failure of the tax to change managerial incentives, it may still affect the latter's practical application other than through its direct impact upon financial capacity. Incentives are a necessary but insufficient condition of the decision to invest: suitable opportunities must also exist for management to obtain desired results from investment and other decisions. Given managerial incentives, an opportunity effect of the tax may occur if its imposition, or a change in its rate,
alters managerial opportunities for deriving benefits through decision-making. There is a clearcut distinction between the opportunity effect and the traditional incentive effect. In the former case, incentives do not alter as a result of the tax change. The effect depends entirely on whether the tax variation has altered managerial ability to express given incentives. Traditionally, on the other hand, tax changes have been supposed to alter aspirations as such.

No opportunity effect will occur unless managerial incentives and competence lead to evaluation of new potential created by the tax change, and carry through this evaluation to a decision. Sleepy managements, which fail to recognize, or to take up, attractive investment opportunities, are unlikely to adjust investment plans in response to indirect indicators. The opportunity effect should be distinguished from opportunity cost calculations, but is evaluated in terms of the latter. Thus, an opportunity effect may occur if a tax change creates a new opportunity cost (extra goal benefits attainable as a result of the tax change) of maintaining the previous course of action without making a specified decision response. It is then irrational not to respond to the tax in this particular way. This emphasizes the subjective nature of both the opportunity effect and evaluations which precede any decisions induced by this effect, because rational behaviour, defined in this study as the pursuit of perceived self-interest, is itself essentially subjective.

One straightforward instance of a negative opportunity effect would occur if a tax change impairs sales prospects.
It could then be stated that managerial opportunities for realizing growth incentives have been reduced by the tax, and that the investment rate is likely to fall. Insofar as tax increases reduce firms' financial capacity to buy from each other, or cause dividends to be reduced, etc., such an effect does occur. Ironically, however (in view of the conclusion that expected product demand is a primary investment determinant), it is widely agreed that the corporate tax bears relatively lightly on this variable, compared to other taxes. Apart from any direct, restrictive effect on sales realizations, tax increases may also be interpreted by managements as reliable evidence of government expectations about future demand trends. On the basis of this evidence planned investment may increase, so that a tax increase may also have a positive opportunity effect. (6)

This study has found that positive managerial motivation and competence tend to conduce a basic business efficiency, even if profit benefits are partly dissipated (traded-off) to satisfy managerial expense preferences. Williamson has observed that, 'when the "price" of taking satisfaction in the form of profit increases, the compensated tax adjustment always leads to a substitution of staff for profit...' [265, p.47]. (7) The increased 'price' or

(6) Goode's suggestion, that the tax may lower expected returns even before deduction of the tax, owing to its effect on expectations, should be evaluated in relation to both the negative and positive opportunity effects. [88, p.116; also Butters, 28, p.507; Streeten, 246].

(7) This conclusion is widely supported in the literature. E.g.s. Colm, 41, pp.492, 498; Cosciani, 43, p.72; Due, 55, Ch.13; Slitor, 231, p.237; Smith, 232, p.100.
opportunity cost of profit following a tax increase constitutes a prime example of the opportunity effect, in that managerial ability to make expenditures consistent with their self-interest has been enhanced through the greater value of tax deductibility, at the expense of profit.

However, the extent to which profit can be traded-off owing to a tax increase may be quite limited. The exercise of expense preference necessitates what Williamson terms 'discretionary profit', which is 'that amount by which earnings exceed...[the] minimum performance constraint' [265, p.36]. As already explained, the performance or efficiency constraint refers to pre-tax, rather than post-tax, profit. It is also desirable that the profit trend shall be maintained, besides exceeding a basic minimum. Therefore, an opportunity effect of this type usually occurs at the expense of an expected profit increase (over the previous year), rather than as a reduction of annual profit (below that of the previous year). This only means that managements are typically unwilling to pursue positive aspects of their self-interest very far at the expense of the negative security aspect.

The question now is the extent to which investment is involved in the above opportunity effect. This amounts to enquiring whether managerial self-interest will be served by trading-off profit in such a way that the volume or rate of real investment is altered. The conventional corporate tax literature would answer this question in terms of an income effect interacting with (if full tax offset for losses is not allowed) a risk (substitution) effect. Here
it is deemed more analytically correct to evaluate the opportunity effect in terms of the relation between real investment and managerial self-interest, having regard to the role of profit in investment decisions.

It is apparent that an opportunity effect does not usually override demand-capacity considerations. Additional investment will not be made if the resulting extra productive capacity is not expected to be utilized within a reasonable period. Correspondingly, managements will not be deterred by tax increases from making induced investments for purposes of relieving pressures on capacity, and of maintaining market shares and competitive strength: nor will managerial incentives to diversify into new fields be affected. That is, the desirability of investment involving creation of new productive capacity is not generally affected by corporate tax changes, and no opportunity effect occurs.

However, there may be some exceptions to this general conclusion. Firstly, managements may utilize a tax increase to trade-off incremental profit potential for purposes of reducing the failure rate of new projects. It is recalled from Chapter 3 that success or failure of diversification often depends considerably on the scale of the development effort accorded to projects. Stepping up this effort helps to increase the proportion of 'live births', at the expense of short- or medium-term profitability. A tax increase subsidizes this effort, subject to the minimum profit constraint, as mentioned above. In the longer term, of course, it is quite possible that profit foregone will be
amply recovered, but the initial decision is essentially in favour of growth and against profit. Secondly, when a proportion of excess capacity is considered strategically desirable, this may be facilitated (through tax depreciation allowances) by an increase in the tax rate, subject again to the minimum profit constraint. Thirdly, a tax increase may influence managerial lease-or-buy decisions, and those connected with the (flexible) investment content of projects. As previously observed, project capitalization is subject to wide variations within and between industries.

Replacement investment seems especially likely to nurture an opportunity effect of the type under discussion. As previously explained, this category of investment is closely related to profit; it is (conceptually) free of problems associated with creation of additional productive capacity; and it is especially susceptible to managerial procrastination. Replacement also is indirectly related to competitive strength through productive efficiency. Management may be persuaded by a tax increase that relatively less emphasis should be placed on cost reduction through replacement, on the grounds that profit efficiency is penalized by the tax. Resources thus freed may be devoted to other types of expenditure, including real investment, or they may simply be retained. In many cases the opportunity effect may take the form of substituting maintenance for replacement expenditure, owing to the former's superior deductibility. Much depends on the extent to which managements value cost efficiency for purposes of growth and security, rather than simply for profit-generation.
If this need, which refers to pre-tax profit, is strong, there will be less scope for an opportunity effect. Firms which replace only in response to ultimate physical breakdown are also unlikely to revise replacement rates in response to changes in tax rates, because the latter will not be recognized as significant to the former.

In general, the opportunity effect against replacement may be most marked in firms of high overall efficiency, in which there are strong pressures on available resources for expansion purposes. Such firms were found to make long-term allocations of funds for expansion purposes despite the existence of more profitable and less risky replacement and bottleneck opportunities. It is not suggested, however, that an opportunity effect will induce efficient managements to abandon entirely the calculation of relative operating advantages of new and existing capacity, in favour of replacement only in response to physical decrepitude. The opportunity effect is more likely to be purely marginal in practice.

The last category of expenditure to be considered in relation to tax changes is research, although it is probably neither necessary nor desirable to separate out the latter's real investment content for separate discussion. Research normally needs the support of large turnover and resources, and is therefore generally regarded as the prerogative (or obligation) of big firms. The minimum level of expenditure required to make an impact is typically high and increased effort involves discrete allocations of resources. The height of the capital requirements barrier varies between industries.
Apart from size of firm and the type of technology involved, perhaps the main determinant of research expenditure is managerial attitudes. These often seem confined to allocating some conventional proportion of turnover to the research function. Managements are likely to be relatively more research-oriented (a) the faster the growth rate of technologies with which their industries are associated, (b) the greater the extent to which market competition revolves around product differentiation and innovation, and (c) the more interested they are in growth through internal diversification. Licensing arrangements with overseas firms often act as a complete or partial alternative to internal research, and also constitute a growth interstice for smaller firms. The latter may also overcome their size disadvantage by various co-operative and other arrangements, perhaps at trade association level.

The opportunity effect of a tax increase will clearly tend to favour research, to the extent that such an effect occurs. However, it may be prudent, in this connection, not to overrate the extent to which 'a situation in which government is an automatic partner in every deductible outlay gives rise to what may be termed tax dynamism' [Slitor, 231, p.237]. Tax increases will not induce research effort if a firm is too small or too poor to sustain it, if its technological competence is too shallow to conceive it, or if management is too sleepy to value it. An existing research effort will not be increased unless management considers this warranted by expected or desired results. An opportunity effect on research expenditure may thus be
confined to the situation in which profit realizations could accommodate a greater effort, and in which management had been constrained from implementing the latter by pressure on available resources.

The chief attribute of the opportunity effect is its permissiveness. It passively facilitates the pursuit of certain aspects of managerial self-interest through tax deductibility, subject to certain constraints and to managerial initiatives. If management is bent on making wasteful expenditure, an income tax increase will not deter this. Correspondingly, an opportunity effect will not help to transform a sleepy management into a thrusting growth leader. Expressions such as 'tax dynamism' should be avoided, because they impart an entirely illusory quality of goal-creating and goal-varying ability to corporate tax changes. Moreover, decisions involving acquisition of new productive capacity are, with a few exceptions mentioned above, largely outside the scope of corporate tax changes, although the latter may transmit signals about likely trends of product demand.
5.3 Tax Investment Incentive Measures

(a) **Preliminary**

Increases in corporate tax rates are generally considered to exercise disincentive effects upon real investment except, following Domar and Musgrave, when they are accompanied by loss offset provisions. In the postwar period, however, tax policy makers have made heavy use of a number of devices whose overt purpose is to stimulate rates of real investment.\(^{(8)}\) It is widely believed that these devices operate most effectively under higher tax rates, since what they offer in return for increased investment is then more valuable. During this period corporate tax rates have tended to reach high levels in some advanced countries.

In this final Section the ability of these policy measures to increase firms' investment incentives will be analyzed in relation to the foregoing examination of determinants of real investment decisions. As before, investment incentives are interpreted strictly in terms of the 'desire' to invest, as opposed to the financial ability to do so.

The particular devices to be considered include accelerated depreciation, investment allowances (also known as tax credits for investment), and investment grants.

\(^{(8)}\) For instance: Tax devices to stimulate investment have certainly been the greatest fad in economic policy in the past ten years. In a period when the trends in the use of policy instruments were in the direction of more general, less selective devices, all sorts of liberalized depreciation schemes, investment allowances, and tax exemptions were embraced with enthusiasm all over the non-Communist world [Eckstein, 63, p.351].
These devices differ formally from one another, and different varieties of the same device (especially accelerated depreciation) are found in practice. However, in each case the question of an effect on investment incentives reduces to the same fundamentals. Therefore, it has not been considered necessary to discuss each measure separately, apart from drawing such distinctions between them as appear to be of interest for the particular purpose in hand.

Accelerated depreciation, as its name implies, consists of deductions from taxable profits of the cost of approved depreciable assets over a lesser number of fiscal periods than the economic life of those assets. The ultimate degree of acceleration results in depreciable assets being 'expensed'; that is, their cost is fully deductible from taxable profits of the period in which they are purchased.\(^{(9)}\)

Investment allowances consist of deductions from taxable profits (perhaps those of the period in which the depreciable assets are purchased) of a specified proportion of the cost of those assets in excess of their full cost. Over the full tax depreciation period, that is, a taxpayer is allowed to deduct \((1 + a)t\) per cent. of the cost of assets, where \(a\) is the investment allowance and \(t\) is the tax rate. Investment methods employed in practice include straight-line, reducing balance and sum of the years-digits systems. An initial allowance may be provided in conjunction with each of these systems and enables a significant proportion of the cost of assets to be deducted in the first assessment following purchase. The balance is then deducted according to one of the systems indicated. Discussions of actual acceleration methods appear in Brown, 25; Domar, 50; Hall, 101; and Hall and Jorgenson, 103.
grants consist of cash payments of specified proportions of the cost of approved assets. These grants may be regarded as capital receipts which are not assessable to tax on corporate profits and which reduce the cost of assets to which they relate for purposes of tax depreciation allowances. Grants are guaranteed payable at the end of specified periods after submission of claims. [Cf. Department of Economic Affairs, 48]. Over the full tax depreciation period, therefore, a taxpayer receiving an investment grant of b per cent. obtains b + (1 - b)t from the tax system. (10)

(b) The Case for the Incentive Measures

Definition of the exact nature of the incentive effects that are claimed for these policy measures is not an easy matter, since their proponents are not always very precise. Perhaps this is due to the fact that 'the effectiveness of tax policy in altering investment behavior is an article of faith among both policy makers and economists' [Hall and Jorgenson, 103, p.391].

The incentive effect is frequently expressed in terms

(10) Despite the fact that investment allowances do not reduce the depreciable cost of assets for tax purposes, these allowances tend to be less valuable than investment grants of comparable rates. This is additional to the certainty of the latter. Thus, assuming the same depreciation system in each case, and that the rates of investment allowance and investment grant are both a per cent., the latter method exceeds the former in value by 

\[ a + (1 - a)t - (1 + a)t = a(1 - 2t) \]

on a single asset. In these terms, and ignoring minor discounting differences, the value of the allowance therefore equals that of the grant at a tax rate of 50 per cent., and exceeds that of the grant at tax rates above this level.
of 'the increase in the rate of return realizable on a given capital outlay...' [Ture, 257, p.341; also Agarwala and Goodson, 1, p.386; Brown, 26, p.337; Chase, 34, p.37; Meyer and Glauber, 182, p.256]. This is equivalent to 'the plausible argument that businessmen in pursuit of gain will find the purchase of capital goods more attractive if they cost less' [Hall and Jorgenson, loc. cit.; also Neild, 192, p.36]. Alternatively:

By increasing the present value of the stream of net returns that investment projects are expected to yield, depreciation acceleration induces a rightward shift of the schedule of the marginal efficiency of capital. Consequently, depending upon the elasticity of the schedule describing the supply of capital, it is likely to increase $K^e$, the equilibrium or desired capital stock, and $K^g$, the equilibrium capital-output ratio. The increase in $k$ is defined as the "incentive effect" [Hochman, 115, p.221; also Chase, 34, p.39].

Hall and Jorgenson employed a similar model based on the neoclassical theory of optimal capital accumulation, in which

The effects of tax policy on investment behavior enter the investment function through the rental value of capital input. A change in tax policy changes the rental value of capital input. This results in a change in the desired level of capital stock. A change in desired capital stock results in net investment (or disinvestment), bringing capital stock up (or down) to its new desired level...The change in tax policy continues to affect gross investment through replacement of a permanently larger (or smaller) capital stock [103, p.397; also Coen, 39, p.209].

Some authors allot a slightly different emphasis by expressing the incentive effect of tax policy measures in terms of removal of the disincentive effect of the corporate tax itself. For example, Kurihara states:

if the corporate tax cannot be cut for revenue or equity reasons, the closest practicable approximation to the instant depreciation scheme will largely wipe out the tax burden involved and so bring the marginal efficiency of capital after tax into approximate equality with that before tax...[147, pp.221-2; also Chase, 34, p.33].
A number of authors have tended to define the incentive effect in terms of reduction in risk or uncertainty. For instance, Domar states:

Much will depend on the awareness of businessmen that the risk of investing in fixed capital is considerably reduced because no income tax need be paid until a substantial part of the cost has been recovered; also on their understanding that such investment offers a perfectly legitimate method of tax avoidance, and on their readiness to consider these facts in their investment decisions [50, p.212].

In the opinion of Dobrovolsky [49, p.909] and Streeten [246] accelerated depreciation can do much to alleviate uncertainty about future revenues in the absence of provisions for offset of losses. Brown has argued that full loss offsets and one-year depreciation (i.e. expensing) are necessary; the latter to 'eliminate the interest discount applicable to the tax rebates from depreciation and return investment incentives to their pretax level' [22, p.313].

(12) Apart from his use of the (implicitly quantifiable) term risk, which was not specifically defined for purposes of the particular Essay, it is interesting to note that Domar stresses the importance of business awareness as a determinant of the effect of corporate tax investment incentives. Similar stress has been laid on this parameter, comprising managerial perception and competence, throughout this study.

(13) However, if interest is deductible, it would not be legitimate to assume that the rate of discount used by the entrepreneur is unaffected by the tax,...If interest payments are permitted to reduce taxable income, the net interest costs of the entrepreneur are proportionately reduced... Investment incentives would remain unaffected. One-year depreciation for debt-financed investment would not be necessary for incentive reasons. If applied to debt-financed assets, it would raise investment incentives above their pretax level [Brown, 22, p.314].
which it can be taken in the future against otherwise
taxable income' [26, p.336]. Acceleration of depreciation,
for example by provision of an initial allowance, then
causes a 'gain in present worth...from a more prompt
deduction of depreciation and, if uncertainty regarding its
deductibility in the future is present, from a more certain
deduction' [26, p.338; also 25, p.91; Goode, 88, p.217;
Streeten, 246]. 'In a real sense, this decrease in the
present worth of future tax liabilities could be considered
the same as a decrease in the cost of the depreciable
asset' [Brown, 25, p.91].

Uncertainty about the provision of investment
allowances in the U.K. was a principal reason for their
replacement in 1966 by a new system of investment grants.

Industry has stressed the importance of certain and
speedy reimbursement as a feature of any incentive.
But the initial effect of investment allowances is not
felt until about eighteen months (on average) after
the expenditure has taken place; and the longer-term
benefit (which derives from the subsequent grant of
depreciation allowances up to the total cost of the
asset, undiminished by the investment allowance) accrues
over a relatively long period of time, and is uncertain
in its impact since its value ultimately depends on
future rates of taxation, as well as on the current and
prospective tax position of investing firms [Department
of Economic Affairs, 48, p.6].

In contrast to these drawbacks of investment allowances,
the new investment grants were expected to 'provide a
greater certainty of benefit. Investment involves risks
and grants reduce the risks in a way in which an allowance
dependent on the success of the investment does not'
In an article published prior to the introduction of investment grants, Neild stated:

outright subsidies on the purchase price of fixed assets would be a more effective way of achieving the purpose of the investment allowances, which amount to subsidies given in an indirect and delayed manner. They would have an impact on firms which do their calculations pre-tax as well as those which do them post-tax. The timing of their receipt would not be conditional upon earning sufficient profit against which to set the allowances; so it would be more certain.

At present, some firms justify the fact that they ignore investment (and initial) allowances on the grounds that these allowances change so often that they cannot be sure whether, by the time a planned project comes to be paid for, they will still be in force at the present rate... In practice, this seems like an excuse for avoiding the labour of post-tax calculations: we do not have the impression that many firms have tried post-tax calculations and abandoned them in disillusionment [192, pp.36-7].

It seems that the excuses allegedly made by firms for ignoring investment allowances could apply also to the investment grants. In principle there is no reason to expect greater stability in the rates of the latter than in those of the former. Also, while receipt of the grants may not be conditional upon earning sufficient profit, deductibility of asset costs remains so as before, except that the grants reduce the undepreciated balance, whereas the investment allowances did not, and that initial allowances are no longer available.

Administration of the new scheme may contain an element of uncertainty about eligibility for the grants. For instance it will normally be a condition of payment that the recipient should notify the Board of Trade of any disposal (or change from qualifying uses) of an asset within a given period; and there will be power to secure repayment of the grants in certain circumstances [48, p.12].
A distinction often made between different tax policy measures focuses on their respective incentive effects on long- and short-term investment. Thus, investment allowances, at least on gross investment, are believed to favour short-term investment and replacement, because the value of these allowances is a direct function of the frequency with which they are used. Firms which turn over capital fastest are, of course, not necessarily those which grow fastest. [Black, 18, p.47; Brown, 22, p.313; 26, p.337; Chase, 34, pp.37-8]. Accelerated depreciation, on the other hand, tends to favour longer-lived assets. Over the life of a single asset an initial allowance, for instance, is an interest-free loan. The longer the economic life of the asset, the longer the period before the loan must be repaid. The bias of accelerated depreciation towards longer-lived assets is greater the more is depreciation concentrated in the earliest periods of the asset's economic life. This accounts for the advantages of asset expensing or, at least, of a system including an initial allowance over one which does not have this feature. It also means that, given the overall period of acceleration, a reducing-balance formula is superior to the straight-line method. Correspondingly, after the first year, the sum of the years-digits method is more favourable than either of these. [Brown, 25, p.83; 26, p.338].

However, accelerated depreciation is mainly of interest in relation to streams of investment. Whether these are declining, stable or increasing determines when or whether the interest-free loan must be repaid, and,
therefore, the extent of the measure's incentive effect. Over the period necessary for final values to be established (i.e. the depreciation period, assuming steady rates of change), acceleration results in 'permanently' higher, lower or unchanged depreciation allowances, depending on whether the firm's investment stream is respectively growing, declining or constant. [Brown, 26, p.342; Dobrovolsky, 49; Domar, 50; Eisner, 67; Goode, 88, p.216]. The extent of acceleration determines the actual gain or loss in each case, given the rate of change in investment.

The nature of the incentive effect is now clear. A growing firm (in terms of its investment rate) is able to effect a permanent reduction in its tax burden, or, in other words, a permanent increase in its post-tax rate of return. The main proviso with regard to the incentive effect of accelerated depreciation, as of investment allowances, concerns the availability of taxable income from which to deduct the incentive allowances. It is widely agreed that carry-over provisions are essential adjuncts of these policy measures, though not of investment grants.

In general the policy measures considered here seek to hinge their incentive effects on the act of investment itself, rather than provide general assistance to firms. This contrasts with tax rate reductions involving equivalent revenue losses, and, for that matter, with introduction of loss offset provisions. Reductions in tax rates do not distinguish profit on previous investment from that to be earned on current investment. This obviously involves waste
in relation to direct encouragement of the latter. [Hochman, 115, p.239]. (15)

(c) Critique of the Incentive Measures

It has already been observed that the efficacy of corporate tax policy for investment behaviour is an 'article of faith' among its proponents which rests on certain views about the nature of this behaviour, and particularly about its determinants. For instance, the neoclassical theory of optimal capital accumulation has been used directly to produce results which predict substantial incentive effects of various policy changes, through the latter's effect on the desired level of capital stock. [Hall and Jorgenson, 103]. This represents a 'thermostatic' or 'mechanistic' approach to the problem.

The first impression, therefore, is that the effect of the measures is not pre-ordained or inevitable. It depends on whichever theory of investment behaviour one subscribes to for purposes of the exercise. This view is reinforced by realization that 'the customary justification for the belief in the efficacy of tax stimulus does not rely on empirical evidence' [op. cit., p.391].

In fact the empirical evidence that is available suggests that the policy measures have substantially failed to affect corporate investment incentives. This seems to

(15) As Anderson observes, 'measures such as accelerated amortization...lower average tax rates but leave marginal rates intact...' [5, p.121]. The latter rates act as sanctions against taxpayers whose behaviour ceases to conform to the intentions of the policy measures.
turn on the failure of most firms to take account of taxation and tax allowances in their investment decisions. It implies that 'most firms looked only at returns before tax when making investment decisions', and that, although some firms may adjust required pre-tax rates of return after major changes in tax rates, 'it is most unlikely that it happens when investment and initial allowances change' [Neild, 192, p.36]. The conclusion that firms consider only pre-tax returns was reached by the Richardson Committee [210, para. 282]. Other enquiries have yielded evidence that investment behaviour is not influenced substantially by changes in investment and initial allowances. [Butler, 27, p.173; Coen, 39, p.210; Corner and Williams, 42; Hart and Prusmann, 110]. Phelps Brown quotes from results of a survey of investment in machine tools carried out by the U.K. Management Consultants' Association, to the effect that only 5 per cent. of the sample took tax allowances into account. [203, p.246]. In the Brookings Study of Britain's Economic Prospects, Caves and Associates argue that tax incentives to increase investment or measures to raise the rate of household saving seem unlikely to get good results; in the last two decades a highly favorable tax structure and high levels of corporate liquidity have not, in tandem, produced high investment rates [32, p.491].(16)

Various explanations have been advanced in the literature for the apparent failure of accelerated depreciation and investment allowances as investment

(16) In the opinion of Agarwala and Goodson, 'their argument does not appear convincing. If the rate of investment was low in spite of the incentives, it might have been even lower without these incentives' [1, p.386, n.1].
incentives. Having already briefly reviewed the evidence, it will also be advantageous to discuss these reasons before proceeding to relate the tax policy measures to the foregoing analysis of real investment decision-making.

A number of authors state, in effect, that firms base their investment plans on sales prospects in their various markets. If these prospects indicate that capacity will be inadequate, further investment is undertaken to which tax investment incentives are largely irrelevant. Correspondingly, if market prospects are gloomy, tax policy measures will again be ineffective in stimulating investment. [Domar, 50, p.213; Meyer and Kuh, 184, p.104; Phelps Brown, 203, p.241].

Correspondingly, if market prospects are gloomy, tax policy measures will again be ineffective in stimulating investment. [Domar, 50, p.213; Meyer and Kuh, 184, p.104; Phelps Brown, 203, p.241]. Caves and Associates believe that 'a high rate of capital formation will apparently require favorable demand patterns and conditions for productivity growth as well' [32, p.491].

Other arguments claim that lack of business awareness of the benefits to be gained from the investment incentives

Phelps Brown states that the effectiveness of counter-cyclical policy (including investment incentives) 'has been blunted by the continued expansion of public expenditure, the changes in which have been made, save occasionally and recently, in pursuance not of stabilization but of long-run programmes' [loc.cit.].

Arguments relating investment to the strength of product demand make use of capacity-accelerator considerations, which were discussed in Chapter 3. These involve induced increases in desired capital stock and consequent adjustments in the long-term capital-output ratio, by implication outside the scope of tax incentive measures. Hochman, however, defines the incentive effect of accelerated depreciation as the increase in the equilibrium capital-output ratio caused by acceleration 'increasing the present value of the stream of net returns that investment projects are expected to yield,... [which] induces a rightward shift of the schedule of the marginal efficiency of capital' [115, p.221].
is to blame for their failure to influence investment. For instance, Brown believes that 'accelerated depreciation will not make much difference unless it is large enough to be unavoidably present in investment decisions, that is, unless it gets over the threshold of business management's awareness' [25, p.96]. As already stated, Domar emphasizes the importance of business awareness that tax policy reduces the risks of investment. [50, p.212]. Also, the empirical evidence discussed above indicates that the tendency of firms to ignore incentive allowances is partly a question of awareness. Butler believes that

There are practical reasons why cash grants may be superior to investment allowances as investment incentives. These reasons turn to a large extent on the failure of many businessmen to take account, in appraising capital projects, of the difference the investment allowances made to the cash flows of their business as a whole and to appreciate adequately that increments of cash sooner are more valuable than increments later [27, p.173].(19)

Closely related to arguments about the role of business awareness, but distinct from them, is the notion that accelerated depreciation and investment allowances have failed for reasons of business uncertainty. It is recalled that this was a main official reason for replacement of the investment allowances by cash grants in the U.K. Brown has argued that investment allowances can never be regarded as entirely permanent by firms because a present government cannot bind its successors in this way. This fact causes inevitable uncertainty for investment purposes. [23, p.202;

(19) Butler also states: 'The grants should simplify investment appraisal at a time when the corporation tax has complicated it' [27, p.178].
Chase, 34, p.38; Hochman, 115, p.226]. However, Neild suspects that firms overstate the problem to justify their avoidance of post-tax calculations. [192, p.36; quoted supra]. Butler has suggested that 'one possible reason for the greater attention paid in public discussion to the "tax-saving values" of investment incentives than to their effect on estimates of profitability is that the latter involve more variable considerations' [27, p.177]. Since the incentive effect of tax policy measures is conventionally defined in terms of their impact on profitability, this implies that uncertainty confines their ex ante influence to cash-flow calculations.

Some authors believe that incentive allowances may fail to stimulate investment because their effects are dissipated in other directions. For instance, a continuing impetus to investment from receipt of the allowances will not occur if the extra funds remain as higher liquidity, or are devoted to repayment of debt, etc. [Meyer and Glauber, 182, p.256]. If a balancing allowance is available to recover from taxable income the undepreciated balances of existing assets at the time of their replacement, the incentive provided by accelerated depreciation for replacement is undermined. When replacement is considered, that is, the undepreciated balance will always be less if accelerated depreciation has been received. This increases the possibility of a balancing charge being assessed on sale of the old asset, and reduces the debit against taxable income if the latter is scrapped instead. Firms may not be impressed by the reminder that tax has been saved in previous
years through accelerated depreciation of existing assets. [Dobrovolsky, 49, pp.913-4]. Finally, effects of the incentive allowances may be dissipated if they are claimed on purchases of productive assets for purposes of periodic tax assessments without the allowances having ever been considered in connection with the act of purchase itself. (20)

The preceding analysis of determinants of corporate real investment behaviour strongly suggests that tax policy measures, such as investment allowances and accelerated depreciation, will largely fail qua investment incentives. The reasons for this conclusion are those already discussed in connection with the corresponding conclusion about incentive effects of tax changes, with or without loss offset provisions. However, it is worth re-stating and, in some instances, amplifying them, in order to establish the necessary connections with the literature for and against the policy measures, and with empirical evidence on their effectiveness.

The policy measures make a genuine and valuable offer to reduce the cost of productive investment to firms or, equivalently, to raise the rate of return on given capital outlays. This offer is normally subject to availability of taxable income, but firms are usually able to carry-over unused allowances to later, or even earlier, periods. In economic terms the policy measures induce a rightward shift

(20) This is largely a question of business awareness and uncertainty. However, it would also apply in cases where the allowances are considered irrelevant to the criteria in relation to which investment decisions are actually made. For instance, expected returns may not be influential in decisions regarding allocation of resources for investment. [Brown, 25, p.93; Chase, 34, p.47].
in the marginal efficiency of capital and therefore, subject to the supply of capital schedule, cause increases in the desired capital-output ratio which necessitate additional investment.

In contrast this study asserts that investment is determined by managerial motivation and competence in conditions of uncertainty, and various market conditions which determine the need for investment in relation to existing capacity. A competent, ambitious management will regard the investment rate as a principal means of pursuing its self-interest, subject to market conditions and available opportunities. This type of management is interested in sustained growth with satisfactory profits. Investment decisions are not made primarily in terms of profit, however, owing to uncertainty and the availability of various proximate criteria, which express managerial self-interest in the particular circumstances of the firm. Investment incentives provided through the tax system are therefore not really necessary to encourage this management's desire to invest. It mainly only needs suitable market conditions to enable it to exercise its innate investment propensity. Reductions in the cost of investment through tax allowances appear as a windfall to this management.

At the opposite extreme is the management whose self-interest under uncertainty is not perceived in terms of growth, and whose competence is of a low order. This management will also not increase investment in response to incentive measures. It is slow to seek out and utilize
opportunities, and its product-market scope is probably narrow and superficial. Asset replacement occurs in response to physical breakdown rather than to improve productive efficiency. Profitability tends to be low, but management is insufficiently motivated or aware to take available steps, through investment policy and other means, to remedy this situation.

Between these extremes are managements with a host of combinations of growth motivation and competence. Subject to demand conditions and opportunities, as well as firms' endowment with resources of various types, investment rates will tend to depend on the particular combination in each case. It should not be expected that the policy measures will have significant influence on desires to invest, owing to the position of profit in relation to motivation and to the manner in which investment decisions are taken under uncertainty.

Several authors have been cited in connection with the importance of market demand to the relation between investment rates and the policy measures. Domar, for instance, has stated: 'I doubt whether in a period like 1932-33 an initial allowance of even 100 per cent. would have induced much investment' [50, p.213]. Given managerial motivation, etc., the position of this study is that the policy measures are upstaged by market conditions. If the latter are unfavourable the policy measures are inadequate: if conditions are good the measures are unnecessary - at least as investment incentives.
Demand in existing markets emphasizes relief of production bottlenecks, maintenance of market shares, increased sales, etc.: these are the ingredients of managerial ambition and security in existing markets, and the criteria of investment decisions. In new markets the emphasis falls on growth motivation and common threads between a new area and existing business. Even given the necessary motivation, diversification cannot occur unless the firm is suitably equipped. Tax investment incentives should not be expected to supply a deficiency of either motivation or suitable knowledge for this purpose. It is also recalled that managerial unfamiliarity with new areas, together with other aspects of uncertainty, normally preclude exact consideration of profitability in the crucial early stages. Since even the full extent of the investment outlay is often not known initially, it would in any case be difficult to assess the effect of the tax measures. The real investment content of diversification entries depends considerably on circumstances and policy decisions, and managements do not necessarily view these projects only in relation to fixed assets on which tax allowances can be claimed. Diversification by acquisition may not even involve real investment directly.

Empirical evidence about firms' behaviour in the area of replacement, together with evidence about the impact of the tax allowances, provide perhaps the most telling indication of what may be termed the irrelevancy of the policy measures. Investment allowances especially have favoured keen replacement policies [cf. Caves and Associates,
which are desirable per se for purposes of productive efficiency. However, the desired response does not seem to have been forthcoming in many cases, not all of which are explicable in terms of available resources being allocated to expansion.\(^{(21)}\) Since replacement is, at least in principle, further removed than other types of real investment from considerations of expected demand, it is difficult to escape the conclusion that these deficiencies are largely attributable to managements themselves.\(^{(22)}\)

Even if individual managements are not particularly interested in maintaining the efficiency of capital stock by judicious replacement, fear of competitors' initiatives in the area of cost reduction may still provide the necessary spur to action. However, if whole industries demonstrate inertia in this respect (for example, by fixing product prices consonant with low levels of efficiency), or if particular firms discover market interstices in which they are sheltered from the need to reform themselves, this external impetus is absent.

In any case it appears that conditions for the policy measures to exercise an incentive effect are lacking, although the timing of replacement may be affected. Since

\(^{(21)}\) See footnote 1 above.

\(^{(22)}\) One must tread with special caution in evaluating the quality of British industrial management. Its indictment all too often rests upon a process of elimination: after more tangible factors have been tried and found wanting as satisfactory explanations of inferior performance, British management incurs calumny by default [Caves and Associates, 32, p.300]. Their study then proceeds to review a damning dossier of evidence in support of the conclusion in the text. [Op.cit., pp. 300-6].
this type of investment contributes to cost reduction directly, an efficient management (or one induced to embrace cost reduction by external pressures) tends to replace in accordance with calculations of relative operating advantage, subject to competing claims for available resources. In this case the policy measures exercise an opportunity effect (in the sense described in Section 5.2) to the extent that the above calculations are affected.\(^{(23)}\)

Inefficient managements, however, are not interested in or aware of calculations of relative operating advantage. There would be neither an incentive effect nor an opportunity effect in such cases. More generally, the policy measures will have an opportunity effect on investment only to the extent that their impact on the costs of productive assets are regarded by managements as an important factor in decision-making. In practice this condition is likely to be narrowly bounded.\(^{(24)}\)

\(^{(23)}\) In 3.3(b) - p.174 - it was observed that undepreciated balances of the cost of existing assets are irrelevant to the calculation of relative operating advantages of existing and new plant. This conclusion is not altered by imposition of a corporate income tax with associated incentive allowances, provided that both existing and new assets are subject to the same tax treatment. Brown's statement that, 'when the tax is imposed, the undepreciated cost of the old asset will affect the investment decision because it will affect tax liabilities' [22, p.307], presumably refers to the problem of financing replacements. See also Dobrovolsky [49, pp.910-2].

\(^{(24)}\) One case in which the policy measures could exert an opportunity effect involves the degree of project capitalization. Other things equal, tax allowances favour substitution of capital for labour. This effect is predicted by neoclassical capital theory as the result of a rightward shift in the marginal efficiency of capital after introduction of the policy measures. However, whereas effects of this shift are confined to marginal substitution of capital for labour in cases where such a course of action is not otherwise impractical, the theory is used to predict a general expansion in the desired capital stock in these circumstances (i.e. not confined to substitution). See footnote 18 supra.
It is often considered difficult to judge what importance, if any, should be attached to uncertainty as a cause of business failure to take account of the tax allowances in decisions. It is also unclear whether uncertainty is important in relation to future tax rates (which determine the value of deductions), the future rates of the allowances themselves, or to the availability of taxable income from which to deduct the allowances.

Fundamentally the significance of uncertainty lies in inhibiting the comparison of alternative course of action on the basis of probability distributions of expected profitability. Decisions are thus made on the basis of other criteria because of uncertainty, as well as of objectives other than profit. The tax allowances are intended to restrict uncertainty by speeding up the rate at which investment may be deducted from taxable profit. This amounts to an opportunity effect, which is weakened if the allowances themselves are subject to uncertainty.

In Chapter 2, however, it was argued that, since there is an irreducible residue of uncertainty in most business decisions, it is more interesting and meaningful to concentrate on methods adopted by managements to make 'good' decisions in spite of uncertainty. It was concluded that managerial attitudes to (normal) uncertainty constitute an important indication of entrepreneurial competence. Thrusting managements, that is, do not allow their growth motivation to be deterred by the normal uncertainty attached to investment decisions, whereas conservative managements try to limit uncertainty by abstaining from investment.
To the extent of normal business uncertainty, therefore, thrusting managements would not experience an opportunity effect from the policy measures; correspondingly they would probably not be very concerned by elements of uncertainty attaching to the allowances. Conservative managements which are yet sufficiently aware to consider new projects, on the other hand, may be encouraged by the security aspect of the allowances; and this encouragement may therefore be subject to reduction if the allowances are uncertain. Sleepy managements would fail to react either to the allowances, or to uncertainty about them.  

On the other hand, it may be argued that uncertainty does not excuse failure to conduct efficient asset replacement policies. If firms then continue to replace mainly in response to physical breakdown, and to demonstrate low rates of investment for expansion, despite generous tax allowances, perhaps the effect of the latter in relation to uncertainty is less important than some believe. Alternatively firms may severely discount for decision purposes their expectation that taxable income will be available for purposes of recovering the costs of assets. 

The effect of uncertainty on the relation between tax allowances and real investment is of considerable practical

(25) If firms are subject to abnormal uncertainty which causes 'confusion in choice', the opportunity effect on investment by conservative managements would tend to disappear. The natural propensity to invest of thrusting firms may also be temporarily inhibited. See the passage from Simon [228, p.57] quoted on p.100.

(26) Evidence that a majority of firms employ the payoff period method of allowing for uncertainty may substantiate this latter explanation.
interest. As previously stated, it was a principal official reason for replacement of investment and initial allowances by guaranteed cash grants in 1966 in the U.K. Whether, in the terms of this study, the new measure will succeed in providing an opportunity effect on corporate real investment where the previous allowances apparently failed, therefore seems to depend on the above effect.

Without making any prediction about the prospects for success of the cash grants, it still appears that they do not have much of an edge over the previous allowances for purposes of alleviating business uncertainty.\(^{(27)}\) It is also debatable whether an attempt to persuade managements to increase investment rates, by offering to relieve them of a part of (what is after all only) normal business uncertainty, is an effective or efficient method of instigating the economic purposes of the State. Policy measures whose impact is mainly permissive may fail to exert upon many managements the degree of leverage that would suffice to induce them to overcome habitual inertia in order to re-evaluate their self-interest in terms more acceptable to the policy-makers.

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\(^{(27)}\) As Neild has observed, 'in fact changes [in the rates of the allowances] go both ways and, at most, the uncertainty would justify the use of the average rate of allowance experienced over a period. That is far from zero' [192, p.36]. As already mentioned the rates of the cash grants may vary over time to the same extent as those of the allowances. Firms must also rely on availability of taxable income to recover the balance of asset costs as capital allowances.
Main Conclusions

'An investment involves the possibility of a loss. It will not be undertaken unless the expected return appears sufficiently promising. In every investment decision the investor must weigh the advantage of a greater return, or yield, against the disadvantage of a possible loss, or risk. These two variables serve as tools for the analysis of the problem.

'The effects of taxation upon risk-taking are analyzed in two steps: first, we consider how the imposition of a tax, under varying conditions, affects the yield and the risk of an investment (or more correctly, of a whole combination of various assets); second, we inquire how the investor will react to these changes. That the tax reduces the yield, is entirely evident and has been much emphasized; but the equally important fact that the tax may also reduce the degree of risk has received little attention...

'By imposing an income tax on the investor, the Treasury appoints itself as his partner, who will always share in his gains, but whose share in his losses will depend upon the investor's ability to offset losses against other income. Three cases may be distinguished:

1. If losses cannot be offset, the investor carries the entire burden of the loss. The tax reduces the yield (and even by a higher percentage than the tax rate), but
leaves the degree of risk unchanged, so that the compensation per unit of risk-taking is reduced...

2. If a complete offset of losses is possible, the result is very different...The yield and the risk of the investment have been reduced by the rate of the tax, so that the return per unit of risk-taking remains unchanged.

3. If only a partial offset of losses is possible, the yield is reduced by a greater percentage than the degree of risk, and the results fall between those of cases (1) and (2).

'How will the investor react to these changes in yield and risk, which the tax has produced? Prior to the tax, he was in an equilibrium position, which gave him the most advantageous combination of yield and risk available. After one or both of these variables are changed, he may wish to change his position, that is, take more or less risk. We again consider the same three cases:

1. Since, without loss offset, the yield is cut, while risk is unchanged, the compensation for risk-taking is reduced. Risk-taking has become less attractive, so that the investor will want to take less risk. But the reduction in yield also means a lower income from his investments. To restore his income, the investor will try to take more risk, since risky investments can be expected to have a higher yield. These two forces are operating in opposite directions. Theoretically the result is uncertain; practical evidence would indicate that the investor is likely to shift in the direction of less risk.
2. If losses can be offset, and the Treasury assumes part of the risk, as well as the yield, a distinction must be drawn between private risk (and yield), which is carried by the investor and the total risk (and yield), which includes also the share borne by the Treasury. It is the private risk (and yield) of an investment that is reduced by the tax; the total risk (and yield) remains, of course, unchanged. Since the private risk and yield are reduced by the same percentage, risk-taking has not become less attractive. The inducement to take less risk, which was present in the first case, has disappeared. The investor's income, however, has been reduced, and to restore it, he will take more risk, although the private risk taken after adjustment to the tax need not equal the pre-tax level. If the investor had retained the original asset combination, its total risk would have remained the same. But since the investor was shown to adjust his asset combination so as to increase his private risk above the unadjusted level to which it was lowered by the tax, total risk must have increased above the pre-tax level.

3. Under conditions of partial loss deduction, the yield is reduced by a greater percentage than risk. Both forces will be operating as in case (1), and the outcome will be uncertain. But there appears little doubt that the higher is the rate of loss offset, the higher will be the degree of risk taken after the tax.

... 

'A shift towards a more risky investment (or rather asset combination) may be accomplished by reducing the
proportion of the investor's total assets held in cash, that is, by larger total investment, or through a change from less to more risky investments' [52, pp.388-91].

Assumptions

'For purposes of simplicity, our analysis is mainly concerned with the case of financial investment,...In addition, the following assumptions are made:

(a) a given amount of investment funds is available to the investor; (b) investments are divisible into small units, that is, "lumpiness" is excluded; (c) the investment market is perfectly atomistic, so that the investor can neglect the effect of his decisions on yields; (d) the investor's expectations, gross of the tax, are unaffected by the imposition of the tax and by resulting government expenditures' [52, p.393].

'For purposes of this analysis...it is assumed that the investor will consider changes in y [yield] and r [risk] only' [52, p.397].

'Besides investments, the investor's asset combination will also include a proportion of cash. Cash differs from investments by having a zero risk and zero yield. Cash holdings are riskless, since they can not give rise to losses. This is the case because opportunity costs, that is, income not received because investment opportunities were missed, do not enter our analysis. Losses or gains in the real value of cash, due to price changes, are excluded likewise, because the entire analysis is in terms of cash' [52, p.400].
'The indifference map presented in Figure II and in the other figures is constructed on the basis of the following conditions: it is assumed, first, that for any individual the marginal utility of income declines with increasing income, and second, that the marginal disutility of risk-taking rises with increasing risk. We also assume the marginal utility of income to be independent of risk and vice versa. Our analysis being limited to the immediate effects of a tax on investment, without regard for secondary effects such as changes in wealth, this assumption appears reasonable' [52, p.402].

'If the marginal utility of income is assumed to be constant, the slopes of the indifference curves will be constant with increasing values of \( y \) for any given value of \( r \). In other words, the curves will be horizontally parallel. If income utility is thus assumed constant, the second assumption (increasing disutility of risk-taking) must be applied, since the tax will produce no effects on risk-taking whatsoever, if both income utility and risk disutility are held constant' [52, p.403, n.9].

The Model

'To handle our problem, quantitative values for the yield and the degree of risk of an investment are needed; and in the absence of a better approach, they are obtained by means of a probability distribution which the investor will construct for each available investment opportunity. Each possible yield, positive or negative, will include the recurrent income from the investment (such as interest or
dividends), as well as the change in capital value which the
investor expects to realize...Each expected yield will be
net of all monetary costs of investment. The dollar amounts
are transformed into percentage yields on the amount
invested by a process similar to that used by Keynes in
defining the marginal efficiency of capital...

'From the probability distribution thus constructed,
the investor will compute the mathematical expectation of the
percentage yields, to be indicated by \( y \). It will prove
helpful in the following discussion to separate \( y \) into its
negative component \( r \) and its positive component \( g \). Thus, if
\( q_1, q_2, \ldots, q_k, q_{k+1}, \ldots, q_n \) are the expected rates of return, such
that \( q_i < q_{i+1} \) and \( q_k = 0 \), and if the probability of the
occurrence of \( q_i \) is \( p_i \), so that

\[
\sum_{i=1}^{n} p_i = 1,
\]

\[
(1) \quad r = - \sum_{i=1}^{k} q_i p_i
\]

\[
(2) \quad g = \sum_{i=k+1}^{n} q_i p_i
\]

\[
(3) \quad y = \sum_{i=1}^{n} q_i p_i = g - r
\]

The magnitude of the actuarial value is not the only
factor determining the investor's choice. Other
characteristics must also be considered, though for purposes
of this analysis their number must be limited.

'Investment decisions are made in spite of uncertainty
with respect to the relevant data and their implications.
No investor is sure that his estimated probability
distribution is entirely correct, but the degree of
uncertainty will vary with different investors and different investments. It will be a factor in the investment decision. Yet it is extremely difficult to express the degree of uncertainty involved in workable terms. For our purpose it is sufficient to say that the prevalence of uncertainty may induce the investor to require a somewhat higher return than would be required otherwise...

'Of all possible questions which the investor may ask, the most important one, it appears to us, is concerned with the probability of the actual yield being less than zero, that is, with the probability of a loss. This is the essence of risk. Since the investor is not only interested in the probability of a negative return, but also in the chances of suffering losses of various magnitudes, the coefficient of risk should be defined more precisely as \( r \), i.e. the summation of all possible losses multiplied by their respective probabilities as defined in (1)' [52, pp.393-6].

'It should be noted that a distinction is made here between an investment combination, which refers to that part of the investor's wealth which is not held in cash form, and an asset combination, which includes both investments and cash. It will be convenient to assume, at first, that the investor intends to invest all his funds, and then to introduce varying holdings of cash. To the extent that the probability distributions of various possible investments are independent of one another, their combination will reduce the degree of risk in accordance with the usual probability theory. But actually the probability distributions of most investments are somewhat interdependent, primarily due to
their common dependence on general business conditions. A careful selection of investments may thus be more important than the choice of a large number of different investments.

'Let the ordinate and abscissa of the points A and B in Figure I indicate the degree of risk and the yield of two different asset combinations consisting entirely of the investments A and B respectively. Thus no cash is held at all. If the two investments are combined, the magnitudes of the \( r \) and \( y \) of each combination will depend upon the \( r \) and \( y \) of the components, the ratio at which they are combined, and their degree of independence. If they are completely interdependent, the magnitudes of \( y \) and \( r \) of the combinations will equal the weighted averages of the components and will hence be located on a straight line AB. If, as is more likely to be the case, they are more or less independent, the \( r \) of each combination will be more or less below the weighted average of the \( r \) of the components. This reflects the principle that diversification reduces the dispersion of a probability distribution. Therefore the \( r \)'s and \( y \)'s will fall on a curve such as ACB.

...'

'Beginning with an asset combination consisting of investments only, such as represented by a point C, the investor can move his combination towards the origin by increasing the proportion of his assets held in cash. The dotted curve CO described by this movement will be called the cash-investment curve. As the proportion of cash increases, the risk and the yield of the whole asset combination decline, since cash has zero risk and yield.
FIGURE I
THE OPTIMUM ASSET CURVE
The point C will move towards O, not along a straight line, but rather along a curve of the type CO, since \( r \) falls faster than \( y \). The reason is that as the proportion of cash in the asset combination increases, it becomes less likely that a forced sale under unfavorable conditions will be necessary. Therefore the risk of the investment combination will decline, while its yield may even rise.

... 'In order to find the best available asset combination, the investor will draw all possible cash-investment curves between each point indicating an investment combination and the origin, as shown by the dotted curves in Figure I. It is evident that for each level of risk there will be a large (infinite) number of asset combinations with varying proportions of the investments A, B and cash. Of these, however, only the one with the highest yield is relevant. The locus of these points of maximum yield, \( AMO \), is the curve which describes the investor's evaluation of the market situation and which is the principal tool for our analysis. We shall call it the optimum-asset curve.

'In order to determine the investor's choice of the best position on the optimum-asset curve, a preference map between \( y \) and \( r \) can be constructed. Again \( y \) is measured along the abscissa and \( r \) along the ordinate. The essence of the map is a comparison between the investor's advantage of obtaining income and the disadvantage of jeopardizing his wealth. In our analysis both income and losses, measured in terms of \( y \) and \( r \), are expressed as percentage rates on a given dollar amount of wealth. Therefore, any changes in wealth will
result in a change in the indifference map. But since the amount of wealth is assumed to be constant, changes in percentage returns are equivalent to corresponding changes in income.

... 'Since the slope of each indifference curve, or the marginal rate of risk-taking, equals the ratio of the marginal utility of income to the marginal disutility of risk, the slopes of the indifference curves must be positive: an increase in y along any indifference curve must be accompanied by an increase in r and vice versa. The application of the two [preference] assumptions, stated above, to the preference map gives the indifference curves the following three properties:

1. The slope of any one indifference curve must be decreasing upward and to the right. This is the result of either one or both assumptions.

2. The slopes of the indifference curves must decline with increasing values of y for any given value of r - the result of the first assumption.

3. The slopes of the indifference curves must decline with increasing values of r for any given value of y - the result of the second assumption.

... 'The equilibrium position of the investor can now be easily found by establishing the point of tangency of the optimum-asset curve, ABO, with one of the indifference curves, as shown by point B on Figure II' [52, pp.399-403].
FIGURE II
THE EQUILIBRIUM POSITION
Taxation without Loss Offset

'Let the rate of the tax be indicated by \( t \), \((0<t<1)\), and let \( y_t \), \( r_t \), and \( g_t \) indicate the magnitudes of these variables after the tax. From (1) and (2) it is evident that

(4) \[ g_t = g (1-t) \] and
(5) \[ r_t = r, \]
since by assumption, no losses can be deducted. Therefore,

(6) \[ y_t = g (1-t)-r = y (1-t)-rt \]

'From (6) we find that

(7) \[ y_t < y (1-t). \]

Thus the rate of yield is reduced by a greater percentage than the rate of the tax. This, of course, should be expected, because all gains are reduced by the rate of the tax, while all losses are left unchanged. When \( t \rightarrow 1 \), we obtain \( y_t \leq 0 \). In other words, if the tax is sufficiently high, the rate of yield becomes zero or negative.

'Let \( \alpha \) indicate the fraction by which \( y \) is reduced by the tax so that

(8) \[ \alpha = \frac{y-y_t}{y} \]

Substituting the values of \( y \) and \( y_t \) from (3) and (6), we obtain

(9) \[ \alpha = (1+\frac{r}{y})t. \]

'Thus, \( \alpha \) is not a function of risk, but of \( \frac{r}{y} \). This expression may be called the degree of tax sensitiveness, and will be indicated by \( s \).

'Figure III shows that \( s \) can be interpreted geometrically as being the slope of the line connecting any
FIGURE III
TAX SENSITIVENESS
point representing a given asset combination with the origin. It also demonstrates that the degree of risk and the degree of tax sensitiveness are different concepts, and that there is no apparent reason in general why a higher degree of risk should be accompanied by a higher degree of tax sensitiveness...It must be noted, however, that if a comparison is made among points located on the same optimum-asset curve, ABCO, a point with a higher degree of risk (B) will also be more tax sensitive than a point with a lower degree of risk (C).

'As the yield is cut by the tax, the investor may wish to change the asset combination chosen by him prior to the imposition of the tax. The adjustment will depend upon both the reduction in yields and the investor's preferences. It will be the result of the income and substitution effects. On the one hand, the tax will reduce the compensation per unit of risk $\frac{y}{r}$, because $y$ is reduced while $r$ is left unchanged. The investor will therefore tend to take less risk. On the other hand, a reduction in $y$ means that his total income is reduced, which will induce him to take more risk. The substitution and income effects will thus work in opposite directions, and the outcome will depend upon the circumstances of each case...General opinion and empirical evidence would indicate, however, that a shift towards less risk appears more likely.

'A geometric analysis of the problem may permit some more definite conclusions. Let ABO (Figure IV) indicate the position of the optimum asset curve prior to the imposition of the tax, and let B be the equilibrium point. When a tax
FIGURE IV
NO LOSS OFFSET
is imposed, each point of the asset curve suffers a reduction in y, in accordance with its degree of tax sensitiveness. It will move to the left along a horizontal line, since the degree of risk remains unchanged by the tax. Thus, any point F moves to F\textsubscript{25}, F\textsubscript{50}, etc., and so does the whole asset curve, ABO, which now becomes A\textsubscript{25}B\textsubscript{25}0, A\textsubscript{50}B\textsubscript{50}0, and so on, the subscripts indicating the rate of the tax. Because the tax sensitiveness of any point on the asset curve rises with risk, the upper part of the curve bends leftward as the tax rate increases, so that, as shown in Figure IV, its upper part becomes negative, if the tax is sufficiently heavy.

The investor who before the tax was located at the equilibrium point B, will, after a 25 per cent tax, find himself at B\textsubscript{25}. This point is not an equilibrium position. He will therefore move up along the asset curve A\textsubscript{25}B\textsubscript{25}0 to the new equilibrium position C\textsubscript{25}, located at the point of tangency of A\textsubscript{25}B\textsubscript{25}0 with an indifference curve, where his risk will exceed that taken before the tax. In the case of a 50 per cent tax, the corresponding adjustment would have been a downward move from B\textsubscript{50} to C\textsubscript{50}. It should be noted that the price of risk-taking \( \frac{Y}{X} \) falls (increases) as the investor moves up (down) the optimum asset curve, which produces a secondary substitution effect and acts as a check to his movement.

Whenever an investor shifts to a more risky asset combination, he may do so by taking more risky investments or holding less cash or, most likely, by applying both methods at the same time.
'As the optimum asset curve moves to the left, the new equilibrium positions describe the curve $BC_{25C50C750}$, which will be called the tax-asset curve (Figure IV). It first rises and then gradually falls towards the origin. Its shape, proceeding this time from left to right, can be explained in the following manner. If the return on risk-taking is close to zero - that is, if market prospects are extremely poor - the investor will take little risk, if any. As the market improves, he will take more risk. Finally, as his income increases, due to improved market conditions, he may once more become less willing to take risk. The result is determined by the interaction between the substitution and income effects' [52, pp.403-7].

'The faster the slopes of the indifference curves fall as the rate of yield increases along any given horizontal line, that is, the more the investor's marginal rate of risk-taking is (inversely) affected by the size of his income, the sooner will the tax-asset curve begin to fall. Since an increasing tax rate makes the investor move from right to left, an investor who "tires" quickly of taking risk as his income increases, is more apt to shift to more risky investments as a result of the tax than is another investor whose willingness to take risk is less affected by the size of his income. In the extreme case, the investor who insists on a given income, irrespective of the risk involved, will be taking higher and higher risk as the rate of the tax increases' [52, p.407, n.4].

'It follows that if an investor (with a given amount of wealth) is optimistic about the market outlook, so that
the optimum asset curve is further down and to the right, the effect of a tax on risk-taking is more favorable or less detrimental than in the case of a darker market outlook. If the tax is very heavy, the investor may prefer to hold his entire assets in cash.

'The subjective nature of the problem should be emphasized. The indifference curves, by their very definition, are only expressions of the investor's preferences, and the optimum asset curve represents his personal evaluation of the market situation. Since the same market situation may appear more favorable to one investor than to another, it is quite possible that a given tax may induce the more optimistic investor to take more risk, while driving his more pessimistic colleague out of the market. But the general conclusion is likely to hold that a relatively low tax imposed under depressed economic conditions, when expectations are bad, may have more harmful effects on investments than a much higher tax imposed under more favorable conditions' [52, pp.407-8].

'As promised above, the argument is reconsidered on the assumption that the marginal utility of income remains constant with an increasing y, so that the indifference curves are horizontally parallel. In that case, there is no income effect. The tax asset curve moves downward throughout, and the investor takes less risk' [52, p.408, n.5].

**Taxation with Full Loss Offset**

'We shall now assume a complete offset of losses. This implies that the investor is assured of a sufficient amount
of income derived from other sources (than the asset combination), and that adequate provisions for loss offset are made in the law. If he suffers a loss from his asset combination, he can then reduce his other taxable income by the magnitude of the loss. Thus, his total tax liability is decreased by an amount equal to the loss multiplied by the tax rate, so that this part of the loss is recovered. In other words, full loss offset means that whenever the investor suffers a loss, the Treasury reimburses him for a fraction of the loss equal to the tax rate. The Treasury thus becomes a partner who shares equally in both losses and gains.

'Under these conditions, not only are the expected gains in the probability distribution cut by a percentage equal to the tax rate, but all losses are reduced likewise. We therefore have from (1), (2) and (3)

\[ r_t = r(1-t) \]

(10)  
\[ g_t = g(1-t) \]

(11)  
\[ y_t = g_t - r_t = y(1-t) \]

(12)  
Thus, both the degree of risk and the yield are reduced by a percentage exactly equal to the rate of the tax. The question of tax sensitiveness does not arise here at all, because all asset combinations (or investments) suffer the same percentage reduction. These results are in sharp contrast with those of the preceding case, where no loss offset was possible, so that we may expect the investor's reaction to be markedly different.

'Before proceeding further, we must make a distinction between total yield and private yield and between total risk
and private risk. The imposition of the tax reduces the yield and the degree of risk which are left to the investor, or his private yield and private risk, in the manner already described; but the total yield and the total risk of the given asset combination are entirely unaffected by the tax. The fractions of yield and risk which the tax takes away from the investor are simply transferred to the Treasury. The symbols $y_t$ and $r_t$ refer to private yield and degree of risk, respectively. Total yield and degree of risk, being unchanged by the tax, are still denoted by $y$ and $r$. Since our main problem is the effect of the tax on total risk-taking, not much use will be made of the difference between $y$ and $y_t$; but the distinction between $r$ and $r_t$ will be extremely important. This distinction was not needed in the preceding case, where it was assumed that no loss offset was possible. Since in that case the Treasury did not share in risk, private risk and total risk were necessarily equal. From the point of view of the economy as a whole, it is, of course, total risk that is important, not private risk.

'Faced with a reduction in private yield and private risk, the investor will try to readjust his asset combination. His reaction can again be studied in terms of the income and substitution effect. This time, however, the tax produces no initial substitution effect, because the price of risk-taking \( \frac{Y}{r} \) is unchanged, the yield and the degree of risk being reduced in the same proportion. The income effect will make the investor shift to an asset combination with higher risk. This increase in private risk
taken (though not necessarily to or above the private risk taken before the tax) also implies an increase in total risk, since from (10)

\[ r = r_t \cdot \frac{1}{1-t} \]

Thus we reach the important and somewhat unexpected conclusion that the imposition of the tax will increase the total risk taken.

'A geometric demonstration will help to clarify this result. Let ABO in Figure V be the position of the optimum asset curve before the tax, and let B be the optimum point. Since the imposition of the tax reduces y and r equally by the percentage of the tax rate, any point F on ABO moves towards the origin along a straight line FO, covering a fraction of the distance from F to O equal to the tax rate, so that if the new position of F is F_t we have FF_t/FO = t. Similarly, the entire curve ABO moves to a new position, A_tB_tO, and the investor, who prior to the tax was at the equilibrium point B, now finds himself at B_t.

'Finding himself at B_t, the investor discovers that, while holding the identical asset combination, his net return (after tax) has fallen by a fraction equal to the rate of the tax, and so has his private risk. He will then find that he can improve his position by moving from B_t to C_t, the point of tangency of the optimum asset curve, in its new position, with an indifference curve. Since, as shown before, the imposition of the tax will produce an income effect only, the point C_t must be above B_t...
FIGURE V
FULL LOSS OFFSET AND CONSTANT TAX
'From the fact that private risk taken after adjustment to the tax exceeds private risk taken prior to this adjustment (although not necessarily private risk taken prior to the tax), it follows that total risk taken after the tax will exceed total risk taken before the tax. To find the total risk point, \( E_t \), corresponding to the private risk point \( C_t \), we can either apply the formulae
\[
r = r_t \frac{1}{1-t} \quad \text{and} \quad y = y_t \frac{1}{1-t}
\]
or draw the line \( C_tO \) and extend it to its intersection with \( ABO \), which gives the position of \( E_t \). The total risk (and yield) of any optimum asset combination being unaffected by the tax, it is still represented by its original position on the optimum asset curve. Since \( C_t \) is above \( B_t \), \( E_t \) must be above \( B' \) [52, pp.409-13].

'Continuing the story of footnote 5, p.408, we must review the argument on the assumption of a constant marginal utility of income. As explained in note 9, p.403, an increasing marginal disutility of risk-taking must then be assumed. The conclusion reached in the text that the imposition of the tax will increase the level of total risk taken still holds, because the price of risk-taking is unchanged, while the marginal disutility of risk is reduced by the reduction in private risk' [52, p.413, n.l].

'The relationship between the level of total risk and the rate of tax remains to be considered. As the tax rate increases, the optimum asset curve \( ABO \) moves towards the origin, taking the positions \( A_{25}B_{25}O, A_{50}B_{50}O, \text{etc.} \), as shown on Figure VI, the subscripts indicating the corresponding tax rates. The new equilibrium positions located at its tangency
FIGURE VI
FULL LOSS OFFSET AND VARIABLE TAX
App. 291

points with the indifference curves describe the already familiar tax asset curve, BC_{25}C_{50}C_{75}D. This time, however, this curve indicates only the private degree of risk (and yield) taken by the investor under given tax rates, and will be referred to as the private tax-asset curve.

'In Figure VI the private tax-asset curve first rises with an increasing tax rate from B to somewhat beyond C_{25}, and then falls towards the origin, this movement again depending upon the investor's evaluation of market conditions prior to the tax, and the shapes of the indifference curves. Since the equal percentage reduction of y and r leaves the ratio \( \frac{y}{r} \) unchanged, it may appear surprising that the private tax-asset curve should fall at all; that is, that under certain conditions the investor should fail to recover the degree of private risk taken before the tax. When a given, say 50 per cent, tax is imposed, the investor will find his original equilibrium point B moved to B_{50}, and again readjust his position in the direction of increased private risk by moving up along the new optimum asset curve A_{50}B_{50}O. If the latter were a straight line passing through the origin, he would be able to return to the original point B, thus taking just as much risk as he did prior to the tax; but as the slope of A_{50}B_{50}O increases with increasing risk, the investor finds that the ratio \( \frac{y}{r} \) diminishes as he goes up along A_{50}B_{50}O; this secondary substitution effect will finally stop his upward movement. In the general case, it cannot be said whether any given tax will cause the investor to stop short of or exceed the private risk taken prior to the imposition of the tax. But as in the preceding case, a
comparatively favorable market and lower tax rate will be conducive to a higher level of private risk.

'From the point of view of the economy, the question whether the pre-tax level of private risk is recovered is relatively unimportant. What matters is the degree of total risk taken jointly by the investor and the Government. By extending the lines OC$_{25}$, OC$_{50}$, OC$_{75}$ etc. to their intersection with ABO, we find the corresponding points E$_{25}$, E$_{50}$, E$_{75}$ etc., indicating the degrees of total risk which will correspond to the investor's adjustment to various tax rates. We have already proved that all these points must fall above the pre-tax equilibrium B; it can be shown by a similar proof that the degree of total risk taken will be the higher the higher the tax rate. This, of course, is not an argument for a tax rate approaching 100 per cent. The simplifying assumptions upon which the conclusion rests must be kept in mind. In addition, the results for the economy would obviously be chaotic, if the Government were to invite everybody to invest his funds in whatever project he chooses with a "no loss" (and "no gain") guarantee' [52, pp.413-5].

[The general case of taxation with variable loss offset, discussed by Domar and Musgrave in Section V (52, pp.415-21), has been omitted from this Digest].

Application to Corporate Real Investment

'The extent to which investors may utilize... [loss-offset] provisions depends upon the availability of other income. Here the position of various taxpayers differs
greatly. A large corporation or a large-scale financial investor may undertake a risky investment as a side line, and know that possible losses are covered by other income which is reasonably certain to be derived from the main line of business. It is not necessary, of course, that the losses should be realized in the form of capital losses; they may also take the form of a lower taxable income resulting from depreciation costs being charged against other income. Further, a large corporation is assured of the possibility of loss offset as long as the investment in question does not exceed the minimum net income (low as it may be relative to total invested capital) which the management is reasonably certain to derive during the period of carry-over. Thus, if a public utility or a life insurance company were to make a small investment (small relative to other income from operations or interest on gilt-edged bonds) in a very risky venture, it could be quite certain of a loss offset, and would thus have a great advantage over a small competitor who might consider the same venture. The discrimination is even more flagrant in the case of loss carry-back, which gives an "old" corporation (that is, a corporation with past net income) the certainty of possible loss offset, thus placing it in a very advantageous position as compared with a new company. Inequities of this type will tend to increase economic concentration, and may lower the volume of new investment.

'It is evident that the tax law should be adjusted to create the most favorable possible condition for loss offset for all types of investors. This raises numerous technical
problems which are not considered in this paper. A careful analysis should be made of the length of the carry-over period required for this purpose, and, if necessary and feasible, unlimited carry-forward of losses should be permitted, supplemented by a limited carry-back. The possibilities of averaging income over a period of years should also be explored, and the present differential treatment of capital gains and losses, as well as the possibility of providing more flexible depreciation schedules, should be examined. These considerations by no means apply to the corporation tax only, but are equally if not more important with respect to the personal income tax' [52, pp.391-2].

'The probability approach as used here is more nearly applicable to the case of the financial investor than to "real" investment decisions. The manager of a corporation about to decide which of his plants he should expand, and what equipment he should purchase, is confronted with fewer and more unique investment alternatives than is the financial investor, and is thus unable to achieve an equal degree of diversification. Certain considerations which might be of little importance for the financial investor, such as those related to maintaining competitive advantages, might be very significant for him. On the whole, however, it is likely that the rationale of real investment decisions would move along similar lines, and that the general conclusions here arrived at would also apply to the case of real investment' [52, p.422].
Abbreviations of journal names:

AER  - American Economic Review
AJS  - American Journal of Sociology
EJ   - Economic Journal
HBR  - Harvard Business Review
JASA - Journal of the American Statistical Association
JB   - Journal of Business
JF   - Journal of Finance
JPE  - Journal of Political Economy
NTJ  - National Tax Journal
OEP  - Oxford Economic Papers
QJE  - Quarterly Journal of Economics
REStud - Review of Economic Studies
REStat - Review of Economics and Statistics
YEE  - Yale Economic Essays


5  Anderson W.H.L., Corporate Finance and Fixed Investment: an Econometric Study, Boston, Division of Research, Graduate School of Business Administration, Harvard University, 1964.


29 Butters J.K. and Lintner J., The Effects of Federal Taxes on Growing Enterprises, Boston, Division of Research, Graduate School of Business Administration, Harvard University, 1945.

30 Butters J.K., Lintner J. and Cary W.L., Effects of Taxation: Corporate Mergers, Boston, Division of Research, Graduate School of Business Administration, Harvard University, 1951.


59 Due J.F., 'Growth Stocks and the Petersburg Paradox', JF, 12, September 1957, 348-63.


Evans M.K., 'An Industry Study of Corporate Profits', Econometrica, 36, April 1968, 343-64.


Fellner W., 'Distortion of Subjective Probabilities as a Reaction to Uncertainty', QJE, 75, November 1961, 670-89.


100 Haberler G. von, Prosperity and Depression, Geneva, League of Nations, 1940.


109 Hart A.G., 'Uncertainty and Inducements to Invest', REStud, 8, October 1940, 49-53.


125 Kaldor N., 'Mr. Hicks on the Trade Cycle', EJ, 61, December 1951, 833-47.


139 Knight F.H., Risk, Uncertainty and Profit, Boston, Houghton Mifflin, 1921.


142 Koyck L.M., Distributed Lags and Investment Analysis, Amsterdam, North-Holland, 1954.


166 Machlup F., 'Marginal Analysis and Empirical Research', AER, 36, September 1946, 519-54.


205 Preinreich G.A.D., 'The Economic Life of Industrial Equipment', Econometrica, 8, January 1940, 12-44.


Sanders T.H., Effects of Taxation on Executives, Boston, Bureau of Business Research, Harvard University, 1951.


230  Skinner R.C., 'Plant Replacement and Book Values', 
      Accountancy, 80, March 1969, 172-7.

231  Slitor R.E., 'The Role of Corporate Income Taxation', 

232  Smith D.T., Effects of Taxation: Corporate Financial 
      Policy, Boston, Division of Research, 
      Graduate School of Business Administration, 
      Harvard University, 1952.

233  Smith V.L., Investment and Production: a Study in the 
      Theory of the Capital-using Enterprise, 

234  Smyth D.J., 'Empirical Evidence on the Acceleration 

235  Solomon E., 'The Arithmetic of Capital-budgeting 
      Decisions', JB, 29, April 1956, 124-9; 
      reprinted in The Management of Corporate 
      Capital, Solomon E. (ed.), Chicago, Free 

236  Solomon E., 'Measuring a Company's Cost of Capital', 
      JB, 28, October 1955, 240-52; reprinted in 
      The Management of Corporate Capital, Solomon 

237  Somers H.M., Public Finance and National Income, 

238  Standish P.E.M., 'Limits on the Budgeting Process', 
      The Australian Accountant, 37, February 1967, 
      83-93.

239  Steindl J., 'Capitalist Enterprise and Risk', OEP, 7, 
      March 1945, 21-45.


241  Steindl J., Small and Big Business: Economic Problems 
      of the Size of Firms, Oxford, Blackwell, 
      1945.

242  Stekler H.O., Profitability and Size of Firm, Berkeley, 
      Institute of Business and Economic Research, 
      University of California, 1963.

243  Stekler H.O., 'The Variability of Profitability with 
      Size of Firms, 1947-1958', JASA, 59, 
      December 1964, 1183-93.

244  Stigler G.J., Capital and Rates of Return in 
      Manufacturing Industries, Princeton 


