MANAGERIAL CAPITAL BUDGETING OBJECTIVES UNDER ASYMMETRIES OF INFORMATION: A SURVEY OF RECENT TRENDS[1]

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1. Introduction

The objective function typically prescribed by finance theorists for capital budgeting decisions is the maximisation of shareholders' wealth (MSW). The rationale for such a prescription is that shareholders should enjoy primacy of place as owners of the firm which, by assumption, is synonymous with ownership of capital.[3] When viewed from an agency perspective the shareholders are considered as principals served by their agent-managers. Nevertheless, the agency relationship in typical large major corporations is also characterised by a separation of ownership and control.[4]

The economic literature concerning management's utility function, property rights and agency theory is based on the perception that managers (as agents) will seek to maximise their personal utility in a way which may conflict with the maximisation of the utility of the shareholders (principals). When the managers are perceived as self-interested utility maximisers, doubts inevitably arise about the congruence of objectives between shareholders and managers. Given that executive control is the province of the managers and the possible existence of asymmetries of information between management and shareholders, there is obviously a potential for conflict

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[3] *The view that ownership of capital and ownership of the firm are synonymous has been challenged by Fama (1980).*

[4] *See Berle and Means (1932).*

between the interests of the managers and of the shareholders. This in turn may give rise to the problem of moral hazard.[5]

There seems to be a widespread agreement that the potential exists for a divergence of the interests of owners and managers. Such a divergence could only exist if the monitoring and reporting processes did not fully report all alternative choices available to managers and their decisions. It is inevitable that the agency costs of complete monitoring would usually increase to a point at which further monitoring costs were unlikely to be justified by the expected benefits. It is therefore now widely accepted that the reports (to shareholders and capital markets) emanating from listed companies do not usually provide a complete picture of management's options and decisions, so that there exists a situation of information asymmetry (IA) between managers and shareholders. Within the context of an agency relationship, IA generally refers to situations in which the agent has more information about the firm than the principal.

Once IA is acknowledged, then the potential for management objectives other than the MSW also has to be accepted as a possibility. One area in which such conflict may arise is the capital budgeting decision. Logically, capital budgeting decisions should have the objective of maximising the wealth created within the firm if it is to benefit the contributors of its resources. In conjunction with the consideration of return to the firm, capital budgeting process has also been concerned with the risk to which the firm is exposed. Given the dominant paradigm where the prescribed objective function is MSW, portfolio and capital market theories suggest that the risk relevant in a capital budgeting decision is the market-wide risk that affects all firms in the economy which is defined as systematic risk; risk that is specific to the firm (unsystematic risk) is considered irrelevant. Clearly this stance is based on the perspective of diversified shareholders. It follows

[5] *The problem of moral hazard arises when the principal cannot observe the agent's action and "the agent may have an incentive to act in a manner which is different from what was agreed in the employment contract" (Scapens, 1990, p. 150). Some other definitions of "moral hazard" (see [Pauly, 1968, p. 535]) are specifically in the context of an insurer-insuree relationship, which is an agency relationship (see Strong and Walker, 1987, pp. 166-167). One definition listed by Pauly is that of Buchanan (1964) which can be put in the context of a general agency relationship to read: "Moral hazard is every deviation (on the part of the agent) from correct human behaviour that may pose a problem for a principal". Examples of studies in the finance literature relating to moral hazard include Stiglitz and Weiss (1981) who developed models that take account of moral hazard which leads to equilibrium credit rationing; Guttentag and Herring (1984) who considered the presence of moral hazard in the borrower's selection of investment projects.*

that the prescribed return on capital investment is based on such a perception of the risk to which diversified shareholders are exposed. This approach is widely supported by reference to Sharpe (1964) and Lintner's (1965) Capital Asset Pricing Model (CAPM).

Nevertheless, of late the adoption of CAPM-based analysis in capital budgeting has been challenged from the perspective of its underlying assumption about management's objective. Central to this challenge is the argument that managers, as the ultimate decision makers, typically are unable to diversify away *their* specific risk in the firm in which they work and therefore it is reasonable to assume that they have concern for total risk (a combination of unsystematic and systematic risk) as opposed to systematic risk alone. Consequently, an alternative objective function has been suggested for capital budgeting decisions (see Findlay and Whitmore, 1974; Grinyer, 1986). In addition, more recently, a model that incorporates realistic criteria that concern managers, particularly total risk, in capital budgeting has emerged (Currie, 1989).

A historical review of risk and the conventionally accepted approach to the treatment of risk in capital budgeting is found in Daing (1994). Drawing from the portfolio and capital market theories, investment risk is essentially being considered from the perspective of diversified shareholders with a given objective of maximising their wealth. This article considers the likely effect of asymmetry of information on managers' compliance with such wisdom by reference to an extensive literature. To illuminate the issue the discussion draws upon the agency theory and considers the management environment, management objectives and the problem of moral hazard. Managerial risk aversion is discussed with specific reference to capital budgeting, which arguably could lead to a deviation from the conventionally prescribed objective function.

2. Agency Relationship and Information Asymmetry

In the real-world many situations involving human interactions lend themselves to agency relationships. Therefore, it is not surprising when Ross (1973) regards the relationship of agency as "one of the oldest and commonest codified modes of social interaction" (p. 134). Such a relationship is considered to have "arisen between two (or more) parties when one, designated as agent, acts for, on behalf of, or as representative for the other, designated the principal, in a particular domain of decision problems" (Ross, 1973, p. 134). The agency relationship can even be viewed from the legal perspective such that Jensen and Smith (1985) consider an agency relationship as a "contract" in which the principal(s) delegates some decision-making authority

to the agent. While several examples of agency relationship can be cited, the one between owners and manager can be regarded as most important (and cause great concern) from an economic and business point of view. In a company, shareholders and board of directors delegate most decision making authority to managers. Indeed, Strong and Walker (1987) are of the opinion that:

> "From an economic point of view probably the most important agency relationships are the contractual relationships between the managers and the various classes of outside investors in large public companies". (p. 167)

Agency relationships have special features and characteristics that are potentially problematic. Indeed, the attention that has been given to such features and characteristics by the academic circle has given rise to a body of knowledge widely known as the "agency theory". Generally, the theory represents an attempt to analyse the agreements and controls that could lead towards principal-agent goal congruence. The several strands that have emerged from the agency-theoretic literature include examination of optimal contractual (insurance) scheme (Spence and Zeckhauser, 1971), analysis of principal-agent problem (Ross, 1973),[6] analysis of agency cost[7] (Jensen and Meckling, 1976) and the efficiency of the corporate form given the existence of managerial labour market (Fama, 1980). Nonetheless, the discussion of the agency theory has been approached along two distinct lines - the principal-agent literature and the positive agency literature (see Jensen and Smith, 1985; Strong and Walker, 1987). The former attempts to prescribe optimum incentive schemes for an agency contracting parties with conflicting interest. Thus it is normative in nature, generally mathematical and non-empirically oriented. The latter basically concerns itself with attempts to explain the effect of certain factors (e.g. contracting environment,[8] monitoring and bonding techniques) on organisational forms that survive (Jensen, 1983). Thus it attempts to "explain why certain types of organisational form tend to dominate certain areas of economic activity" (Strong and Walker, 1987, p. 193); therefore, the literature is generally non-mathematical and empirically oriented.

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[6] *The attention given to the development of the agency theory has been more pronounced since the publication of these two papers.*

[7] *Agency cost include the monitoring expenditures (by the principal) and bonding expenditures (by the agent) of a contract plus the residual loss which is the value of output lost due to enforcement cost exceeding the benefits.*

[8] *Examples of contracting environments are capital intensity, degree of specialisation of assets, capital markets, information cost and internal and external labour market.*

Investment, financing and dividend models for the firm assume, amongst others, the availability of full information, such as that which concern current earnings and future opportunities, to participants in an agency relationship. However, a phenomenon of concern recently is that firms' participants, while having agency relationships, do not necessarily receive the same information, i.e. there exists an asymmetry of information.[9] When one is talking about the agency relationship between investors and managers, asymmetric information refers to a situation where one group of individuals (the managers) are better informed (at least initially) than another group (the outside investors). In this regard the principal-agent literature (of the agency theory) has offered rigorous mathematical prescription of optimum incentive schemes designed under conditions of uncertainty, risk aversion as well as information asymmetry.[10] In addition the standard finance model has been extended to allow for the possibility of the firm's managers to know more than the outside investors about the firm (see Miller and Rock, 1985).

With this emphasis on asymmetry of information increasingly being accepted, additional attempts can be made at analysing the behaviour of firms in the real-world situation in which significant asymmetries of information exist. If the behaviour of firms (derived from the managers' behaviour), particularly with respect to investment and risk taking, can be described and predicted given the existence of information asymmetry, this strand of the agency relationship literature will have a positive element in addition to the currently normative element alone.

3. The Management Environment, Objectives and Moral Hazard

It is reasonable to expect rational managers to be personal utility maximisers. Such an expectation is not only logical but is backed by a sizeable literature. To start with, it is worth noting that the work of Berle and Means (1932)[11] was the beginning of the establishment of

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[9] *See Altman and Subrahmanyam (1985, p. 88)*
This phenomenon is in fact consistent with the literature on capital market efficiency where three efficient market hypotheses are: strong form, weak form and semi strong form.

[10] *A useful review of the mathematical analysis is found in Strong and Walker (1987, pp. 167-193).*

[11] *Berle and Means (1932) found that in 1929, 88 of the 200 largest U.S. non-financial firms were management controlled since no discernible group owned 20% or more of the shares, and there was no evidence of control through ownership of smaller shares.*
See also Florence (1961) and Larner (1966)

the fact that the management (control) of most large firms is divorced from their ownership.[12] Since then there has been much speculation about the objectives held by these managers with regard to the operation of the firms; for example, whether such managers are as concerned about profit maximisation as an owner-entrepreneur would be. In this regard the economics discipline has, since 1959, offered at least three theories (of the firm) that concern managerial behaviour in relation to the firms' objectives. Baumol's (1959) theory of sales revenue, for example, maintains that managers obtain satisfaction from prestige and power. Since these attributes are correlated more closely with sales volume, growth of sales revenue inevitably becomes their primary objective. Marris (1964) also notes the high correlation of executive remuneration with sales volume and suggests that managers seek to maximise the balanced rate of growth of sales volume and the growth of its capital supply. Williamson (1964) suggests that managers, having considerable amount of discretion, maximise their utility function by empire-building and indulge in what he called "expense preference".[13]

The quoted economics theories have provided alternatives to the generally accepted MSW theory of the firm. It offers plausible pictures of managers as being self-interested personal utility maximisers. Nonetheless MSW is usually regarded by finance theorists as the appropriate objective function, in particular when making capital budgeting decisions. Such a stance apparently disregards the more realistic view that a large modern firm can be described as a "large group of contracting parties who join forces for multifarious reasons" (Williams and Findlay, 1983, p.41) and varied objectives. This "coalition" of parties (see Cyert and March, 1963) includes capital suppliers, managers, non-management employees, suppliers of other factor inputs and customers. The shareholders can be regarded as subset of the suppliers' category; hence large modern firms cannot be depicted as a "scaled-up version of the entrepreneurial firm" (Williams and Findlay, 1983, p.40). It follows that managers should not put shareholders' interests before those of other participants simply because they (the shareholders) are assumed to deserve the primacy of place. The lack of direct control on the part of the shareholders,

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[12] *This fact was subsequently reinforced by Larner (1966, 1970) where he found that 169 of the same group of 200 firms were management controlled, while only five were controlled by a majority ownership group.*

[13] *"Expense preference" is a concept introduced by Williamson that refers to expenditures giving rise to managerial satisfaction (utility) because they supposedly reflect power, status and prestige, for example lavish office accommodation.*

accompanied by the existence of significant asymmetries of information and managers who seek to maximise their personal utility, can easily give rise to managerial conflict of interest. This can in turn generate the problem of "moral hazard",[14] given the implicit assumption that it is the agent's responsibility to act in a way which will best serve the interests of the principals, because the manager is motivated to place his subordinate interest before those of the shareholders who by assumption should receive primacy of place.

Perhaps a less extreme view of the firm is one advanced by Cyert and March (1963). In their behavioural theory of the firm, a firm is depicted as a coalition of groups with conflicting interest whose objectives can only be achieved, due to the complexities of decision making *per se*, when the firm adopts satisficing (see also Simon, 1955) as opposed to maximising, behaviour. Grinyer (1986) further added to the challenge of MSW prescription when he pointed out the diverse groups of people involved in the running of large companies and the need on the part of managers to identify and satisfy the minimum requirement of important participants to ensure their continued co-operation and hence the survival of the firm. When control (management) of the firm is separated from ownership the important participants must surely include the managers themselves. But managers' satisfaction is a function of several factors[15] (and specific situations), one of which is, by implication, their perceived exposure to risk.[16] Unless there is no difference in managers' and shareholders' risk exposure, satisficing behaviour on the part of managers can also generate the problem of moral hazard under conditions of asymmetrical information (see Hull, 1982).

4. Managerial Risk Aversion and Capital Budgeting Decision

Modern portfolio theory (Markowitz, 1952) is the foundation of the conventional shareholders' wealth maximisation model for capital investment decision. In advancing the theory, decision makers are assumed to be risk-averse, economically rational individuals searching for

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[14] *Another problem that can arise in an agency relationship under information asymmetry is "adverse selection". For a recent discussion on the problem of "moral hazard" and "adverse selection" associated with information asymmetries that exist in agency relationships see for example, Walker (1989, p. 433) and Scapens (1990, pp. 150-151).*

[15] *See Maslow (1954, pp. 80-106) for a hierarchial approach to the analysis of human needs that are only satisfied in turn. In the management context of Maslow's work see Stoner and Wankel (1986, pp. 423-424).*

[16] *Risk is closely related to security which is one of the basic need in Maslow's (1954) hierarchial analysis.*

an efficient investment portfolio. These translate into a preference for higher returns for a given level of risk or for lower risk for a given amount of returns. The ideas implicit in Markowitz were incorporated within the CAPM framework, which suggest that the only relevant risk to the shareholder is the market related risk called systematic risk (see Sharpe, 1964). Risk that is peculiar to a particular investment is considered to be irrelevant as it will be diversified away via the investment portfolio.

Nevertheless, it is the professional managers who run today's large, complex organisations, making routine and strategic decisions. Generally, these managers work in one particular firm at a time and it is very likely that they have put a considerable amount of their human capital investment in the firm. That means the performance of their firms are crucial to them as it may very well affect their current as well as future remuneration and careers; as Fama (1980) puts it:

> "[T]he rental rates of their human capital signalled by the managerial labour market are likely to depend on the success or failure of the firm". (pp. 291-292)

While we can reasonably assume managers to be rational and risk averse, their wealth portfolios, including the discounted value of their future income arising from their human capital, are generally undiversified when one considers the proportion of their income drawn from the firm and other sources. Therefore it is doubtful that these managers can ever be expected to treat risk in capital investment decisions the way it is theoretically prescribed, which is solely from a diversified shareholders' perspective. To require a manager to evaluate capital investments based entirely on the CAPM, which is MSW oriented, is asking him to ignore the total risk of the project to the firm; yet he is personally exposed to much of the total risk since he is not as diversified as the shareholders. In this respect Jensen and Smith (1985) maintain that:

> "[M]anagers typically have a nontrivial fraction of their wealth in firm-specific human capital and thus are concerned about the variability of total firm value ...". (p. 103)

Obviously a rational risk-averse manager would not be expected to expose himself to risk any more than necessary (in fact Swalm [1966] had indicated that managers are generally not risk takers). Consequently one can reasonably expect self-seeking, risk-averse managers to deviate from the usually prescribed MSW-based CAPM approach to capital project selection. An

implication of managerial risk aversion may be to ensure the continued viability of the firm. Perhaps one can assume managerial risk aversion to mean that managers prefer a greater likelihood of being judged to perform satisfactorily in the future to a lesser likelihood of such situation. Similarly they would prefer a greater probability of secured future salary, derived from adequate performance of the firm, to a lesser likelihood. If managerial risk aversion is characterised by the desire to be judged favourably and managers have control over the decision making process and the disclosure of information to outside investors, there is no reason why self-interested, utility maximising managers would not make capital budgeting decisions that they anticipate would result in favourable external financial reports. It is not surprising, therefore, that empirical evidence suggests that in capital budgeting analysis managers in fact set growth and stability in the earnings stream as their operating targets[17] (see Mao, 1970). Closely related to the preference for being judged to perform satisfactorily is the motivation to minimise loss. From the managers' viewpoint risk is generally "associated with negative outcomes" (March and Shapira, 1989, p. 81) and the risk in capital investment is the variability of its returns/cash flows and in some cases it is perceived as the probability of loss (Mao and Helliwell, 1969); therefore, it is the total risk (since firm's future cash flows are subject to total risk) that concerns managers most. Perhaps the importance placed on an investment's total risk can be made easier to appreciate when Hull (1980) states that:

> "[I]t is possible for an investment project to have a high marginal risk to the company but a low marginal risk to the shareholders". (p. 109)

Obviously managers whose personal income depends critically on the prosperity of their company, and who also feel obliged to employees not to make decisions that will jeopardise the survival of the firm, will not base their investment analysis on systematic risk alone.

It seems likely that capital budgeting decisions are and will be made without exclusive reliance on MSW based valuation using the conventional CAPM. Empirical evidence appears to suggest that firms based their capital budgeting analysis on concepts of total risk when they used the payback period and/or probability distribution of cash flow analysis (Klammer, 1972;

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[17] *In fact the need to strike a balance between present value of cash flows and growth in earnings in capital budgeting has long been recognised and a compromised technique to achieve it has been discussed in the literature. See Lerner and Rappaport (1968).*

Fremgen, 1973; Schall et al., 1978; Moore and Reichert, 1983; Pike, 1982, 1983a), and also probability of loss (Schall et al., 1978). Even though the trend has been the increased usage of sophisticated capital budgeting techniques, such as the NPV and IRR methods (see Gitman and Forrester, 1977; Pike, 1988), the studies did not usually identify the derivation of the criterion rate (e.g. see Schall et al., 1978).[18] It seems that empirical evidence does not lend much support to the conventional CAPM approach in capital budgeting analysis (e.g. Pike, 1988). In fact recent articles severely question the CAPM applicability (see Fama and French, 1992) whilst Arnold and Moiezer (1984) did not find beta analysis to be a popular approach adopted by UK investment analysts.

5. Emerging Alternative Models

From the theoretical perspective, the underlying objective of MSW in capital budgeting itself has been challenged. Grinyer (1986) suggests that a satisficing approach to capital budgeting analysis is more appropriate considering the firm is but a nexus of the interests of the owners of various resources required for its operation. He argues that managers are unlikely to accept the MSW objective function and instead more likely to take account of the total risk of the firm in making capital budgeting decision. Nevertheless, Grinyer (1986) further argues that as rational individuals managers prefer more cash to less cash.[19] He, therefore, offers an alternative objective function, the maximisation of monetary surplus (MMS), in place of the MSW. The MMS basically "aims to maximise the wealth created within the firm but is sufficiently flexible to permit a variety of management objectives" (Grinyer, 1986, p. 319). Essentially the MMS approach involves the computation of the NPV of cash flows. The NPV based on the CAPM is calculated by discounting the cash flows using a rate that incorporates the risk-free rate plus risk (systematic) premium. The discount rate under the MMS approach is the rate of return required by investors for the same risk class;[20] a separate evaluation of the specific risk to

[18] *Schall et al. (1978) found, in their survey and analysis of capital budgeting methods in the U.S. that several methods were used to determine the discount rate; however only 8% use a risk-free rate plus a premium for their risk class. With respect to risk assessment only 4% of the respondents calculate the covariance of a project's cash flow with the cash flows of other projects.*

[19] *Cash is the primary vehicle for maximising managers' utility. Salaries, perks and "preference expenditures" are derived from cash.*

[20] *Thus MMS would not accept projects that are unacceptable under MSW but could reject projects that would be accepted under MSW if other constraints, such as risk to managers, are not met.*

the firm has to be undertaken. Thus the literature is open for further contributions along this line.

Following Grinyer's (1986) argument, it would be reasonable to postulate that management's utility is a function of total wealth of the firm and total risk to the firm. Currie (1989) advances a capital budgeting model that particularly takes these two criteria into account. Specifically, the model represents an objective function with two criteria and a constraint, which seeks the maximisation of the differences between (1) total wealth of the firm (of which the weighted sum of NPV's[21] of all investment projects undertaken is the proxy) and (2) the risk to the firm (of which the variance of portfolio of investment projects is the proxy) subject to (3) management's risk preference (represented by a predetermined constant, þ). The objective function can be written as follows:

Maximise: NPV – (þ * VAR)

where NPV = weighted sum of net present value

VAR = variance of NPVs of projects undertaken

þ = management's preference for decreased risk versus increased return[22]

The essence of Currie's contribution is the synthesis of various disciplines into a model intended to assist managers who are making capital budgeting decisions. In particular he draws on portfolio theory, risk analysis as advocated by Hertz (1964) for the simulation of the expected NPV's, variances and covariances, and preference theory. Currie argues that the model ensures that "an investment with a positive NPV might still be rejected (even in the absence of capital shortage) if it contributes substantially to portfolio risk ..." (pp. 259-260) and hence increases the risk to the firm to an extent which creates genuine concern among managers. At the end of the day, the model boils down to the old-fashioned Markowitz (1952) portfolio selection theory approach. More importantly, however, is that it forms part of a gradual movement away from the conventional capital budgeting decision model based on shareholders' wealth maximisation objective function.

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[21] *The rate to be used for discounting is the risk-free rate at which the firm can lend its surplus cash which is most likely to be a bank deposit rate. The arguments for its use is that it would be double counting if the rate is adjusted for risk since risk is incorporated in the objective function itself; also the assumption of putting surplus capital in risk-free investment such as bank deposit is a more realistic as compared to returning them to the shareholders (as recommended under conventional MSW objective) due to, amongst others, legal restrictions.*

[22] *The determination of þ is by way of presenting to management a hypothetical capital budgeting decision situation. For further discussion refer to Currie (1989, pp. 261-262).*

6. Conclusion

This article makes reference to agency theory so that the asymmetrical information phenomenon could be advanced in the context of manager-owner relationship. The management environment and objectives are also discussed drawing mainly from the economics discipline and the recent challenges that have been made with respect to prescribed management objectives. Moral hazard on the part of managers is briefly mentioned as a potential problem where information asymmetries exist in an agency relationship. The article also presents a discussion of managerial risk aversion as a rational behaviour. Arguments and empirical evidence are discussed as descriptive of managerial risk-averse behaviour with respect to capital budgeting decision criteria. It appears that managerial risk aversion could lead to a deviation from the conventionally prescribed objective function in capital budgeting. In fact empirical evidence does not suggest that it is employed much in practice. Management's concern about total risk to the firm could be a reflection of a self-interested utility-maximising individual. Seemingly normative theories and the accompanying alternative models have now started to emerge to accommodate expectations of managers' concern for total value as well as total risk to the firm.

It is worthwhile to emphasise that the information asymmetry phenomenon, particularly in the context of capital budgeting decisions, is very real. An earlier study suggests that managers generally perceive that they know more than outsiders with regard to information concerning capital investment proposals, particularly where proposals have been considered but eventually rejected (Daing, 1992). One needs only to refer to a recent case of the general public being less informed than management, about the use of funds for capital investment, to appreciate the existence of information asymmetry — a public listed company was reprimanded by the Securities Commission (SC) for failing to promptly inform its shareholders of the fact that RM10 million earmarked for a business expansion had been deployed elsewhere because the original project was aborted by management.[23] However, one must also admit that the roles played by Malaysian regulatory bodies, such as the Kuala Lumpur Stock Exchange and the SC, can be instrumental in making management's decisions more transparent than they are today, thus reducing the degree of information asymmetry that is widely in existence.

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[23] *The New Straits Times, "Public reprimand for three firms", October 12, 16.*

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