CHAPTER 1

Introduction

Corporate capital investment underlies many problems in economics, public policy, and business policy. Business investment influences the level of aggregate demand in the economy and provides the productive base for future development in the macroeconomic context. Optimal capital investment is a prime subject in the microeconomic theory of the firm and the related questions in corporate finance. Public policies directed at managing the economy as a whole, or influencing the behavior of parts of the economy, rest on assumptions about the determinants of investment. Finally, physical investments often form the long-term commitments of corporate policy that lock the corporation into particular technologies, products, and markets. Understanding what determines investment is important.

Although investment is central to many disciplines, different academic disciplines have taken almost diametrically opposed approaches to analyzing investment. Most corporate finance and microeconomic research assumes that the corporation operates in fully competitive markets, thus allowing simple economic analyses to produce neat rules for optimal investment. Corporate strategy, on the other hand, is dedicated to the proposition that markets are not perfect - otherwise everyone earns the normal profits forever. Corporations and governments operating with both sets of concepts face conceptual and operational problems that are only beginning to be recognized (Bettis 1983).

The research reported in this book examines corporate planning and investment processes, as well as actual outcomes, to answer partially the question, "What determines the level of corporate expenditures on property, plant, and equipment?" Out of this analysis come some observations about the determinants of corporate investment and a conceptual framework for the determinants of corporate capital investment.

In studying the level of investment from a behavioral standpoint, this research falls across the several paradigms that concern themselves with investment: micro- and macroeconomics, corporate finance, public policy, and corporate strategy. In crossing the bounds of these disciplines, the research is relevant to the concerns of these disciplines but does not address much that the disciplines hold to be central to their study. The
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alternative disciplinary approaches are discussed in sections 1.2–1.4. In short, this book examines an interesting phenomenon in a manner that I hope provides some insight. This insight may be useful to others working in a number of alternative paradigms, but the research violates the dictates of most of those paradigms. Before proceeding to the research itself, let us consider the theoretical and methodological foundations of this research, the alternative perspectives on corporate investment from different disciplines, and the organization of the remainder of the book.

1.1 Theoretical and methodological foundations

Corporations process information, make decisions, and implement decisions. Consequently, one way of investigating corporate behavior is in terms of the information flows of the corporations, the decisions corporate personnel make, and the impacts of those decisions on behavior.

During the late 1950s and throughout the 1960s, researchers in the organizational decision-making school of organizational behavior examined corporate and governmental decision processes in order to generate both a theory of organizational decision-making (see March and Simon 1958; Cyert and March 1963; Simon 1976) and models of organizational behavior consistent with the theory of organizational decision-making (see, e.g., Cyert and March 1963; Williamson 1964; Crecine 1969). Because the research used information on organizational internal processes in a manner that spoke to both internal processes and external behaviors, the research in this line has been of interest to academics in both managerial and economic traditions. For example, Williamson’s transactions cost approach to economic organization has found interest among organizations theorists as well as economists.

During the early stages of this work, the results appeared extremely promising and attracted the interest of numerous orthodox economists (e.g., Machlup 1967; Baumol and Stewart 1971) as well as business and public policy academics (Bower 1970). Although work in the tradition has continued, after an original qualitative empirical dissertation, researchers have tended to theorize without going back to look at corporate decision processes again, and often without serious investments in empirical testing (Cyert and Simon 1983). A variety of models based on detailed observation of decisions were produced, but the more lasting results have been in theoretical efforts carried on by a number of researchers including Cyert, Nelson, Williamson, and Winter.¹

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Before proceeding further, it may be worthwhile to consider what requirements a behavioral theory should satisfy in order to be useful for policy purposes. Four requirements are proposed:

1. The work must address portions of the corporation's behavior that are interesting from a policy perspective (Baumol and Stewart 1971). Some work has been successful in demonstrating the correctness of the theoretical approach, particularly the importance of routines in decision-making, but has not handled problems that are of policy or general relevance. For example, the department store pricing model developed in Cyert and March (1963), although interesting, does not necessarily address issues of policy relevance.

2. A model must be testable and must have been tested in more than a single case. Baumol and Stewart (1971), in replicating the Cyert and March department store pricing model, demonstrate that the model explains behaviors in a different department store, in another city, ten years after the original research was conducted. Employing hypothetical data to investigate model properties may be useful but does not test the model. To be convincing to the appropriate publics, it is desirable that models be tested with commonly understood techniques.

3. As a matter of intellectual discipline, the models should be developed with a clear justification based on qualitative data on corporate processes. If one argues that one should examine corporate decision processes to understand corporate behavior, one's models should be derived from such examinations. A model that simply incorporates what one thinks is a reasonable way for a corporation to make decisions may be of theoretical interest but lacks a methodological basis for asserting its relevance to actual decisions.

4. The models should be generally consistent with the extant theory of organizational decision-making. Models that demand information the corporation does not have, that demand manipulations of data the corporation cannot do, or that in some other way are inconsistent with our knowledge of decision processes are obviously deficient as descriptions of decision-making.

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2 Congruently, if one argues that neoclassical economic theory, assuming a rational optimizer, is the appropriate approach for generating models, then one should provide such justifications for one's models.

3 However, it is to be hoped that examination of actual decisions may allow researchers to make improvements in the theory.
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The last two conditions may be thought of as a behaviorist’s counterpart to the economist’s desire to have optimizing justifications for the models used. Using a theory for policy purposes demands a belief in a particular interpretation of the causality underlying the observed correlations. In deciding how to influence the system, confidence in the causal interpretation is fundamental. In the classic public policy and economics example, the correlation between the number of television sets in a home and income does not tell us whether income influences ownership or vice versa. In business policy, a correlation between profits and sophistication of planning systems does not tell us whether wealthy firms invest in planning or planning increases profits. The causality must come from theory, additional (usually qualitative) data, or statistically sophisticated analysis using both techniques and data that are well beyond those normally employed. The source of confidence in the causal interpretation in behavioral work is the qualitative data and testing against the theory of organizational decision-making.

The basic research strategy used here employs qualitative data from firms to understand corporate planning and implementation processes related to investment, generates quantitative models that reflect the salient points of the qualitative data, and finally, estimates these models econometrically using data from the firms interviewed. To be consistent with this strategy, corporate behaviors or influences not observed in a given corporation will be ignored. Since the strategy rests on the close tie between empirical observation and model development, it would be inconsistent to put variables or equations in the models simply because they are suggested by the researcher’s preconceptions. For example, the empirical observations below do not include the role of pension regulations, the degree of monopoly in the corporate environment, or the effect of rapid technological or product innovation. Although these and other factors might be appropriate components of a planning or investment model based on economic theory or a researcher’s prior beliefs, they would be included here only if they were observed in the corporations being studied. Of course, later work on other corporations might uncover new variables and obviously could require the development of new models.

The ideal research strategy from this perspective would involve examining qualitatively the planning and investment processes of a large number of firms. Based on the examinations, models would be developed that

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4 This use of theory differs from the conventional economic conception of theory. The theory of organizational decision-making does not imply a particular set of models. Rather, it suggests a strategy for developing such models, some propositions about the structures of such models, and certain facts about human abilities to process information that should not be violated by such models. There are, of course, many other differences between the two paradigms that will not be explored here.
1.1. Theoretical and methodological foundations

reflect the process as observed in each firm. Each model would be estimated on data from the firm on which the model is based. From such estimation and qualitative data, more general models could be produced and tested on larger data sets. Model estimation on one firm at a time would allow accurate specification of hypotheses and a cross-check of the inferences from the interviews with the actual outcomes. Thus, the research would not just rely on “what businessmen say causes investment,” but rather would include what they say is the information carried in certain processes (a far more reasonable question for a manager to answer accurately), and would check such responses against the actual outcomes.

This study deviates from the ideal research strategy in two ways. First, due to limits on data availability, collection, and analysis, only four firms were examined. Although qualitative data on decision processes is collected for all four, data for model estimation is only available for three of the four. Second, rather than ending in a general model and large sample results, this study concludes with the development of a conceptual framework for the determinants of capital investment. Development of a specific model and estimation on large samples is left for subsequent research.

Thus, this research collects qualitative data on corporate decision processes by interviewing corporate managers on how those processes function, what information they carry, and so forth. This qualitative data is used to generate a detailed model for one firm and regression models for all the firms. The regression models are estimated on data from three of the four corporations. These models check the inferences from the qualitative data and provide magnitude estimates for some of the effects identified by the qualitative data. Finally, a conceptual framework is produced to summarize the findings of this research.

The research reported here on the determinants of corporate capital expenditures is inherently inductive: The data assist in the development of understanding of the investment process but no specific hypotheses are made before starting the research. A dependent variable is identified (expenditures on property, plant, and equipment) and a general research strategy is specified; but how the process influences the dependent variable is learned through the research, not hypothesized and then tested. The research attempts to define what determines the level of investment, not to test a specific understanding of that process.

The research strategy omits several desirable features. First, it lacks prior hypotheses that can be tested against the qualitative and quantitative data. The consistency of hypotheses based on qualitative data can in some cases be tested against the quantitative data, but until the process is specified using the qualitative data, it is impossible to specify how it
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affects investment. Second, this is an intensive research strategy: Large samples of firms cannot be studied if one plans interviews and quantitative analysis of data from each firm. On the other hand, small intensive studies allow more complete understanding of the processes being examined. With public data or survey data, the researcher has less control over quality and accuracy of information. It is hard to know in many questionnaires what the question posed by the researcher meant to the respondent. In addition, since the emphasis here is on induction, the size of the data set is not critical. Exploratory data analysis or inductive analysis on large data sets may appear more valid than such analysis on small data sets, but the statistical properties and out-of-sample validity are problematic in either case. This research tries to understand a few corporations relatively well rather than many corporations superficially or only one in substantially greater depth. Given the results of this research, validation could be undertaken using public or questionnaire data – once more specific hypotheses have been developed.

To put this research in context, let us now consider how other disciplines have handled capital investment.

1.2 Capital investment in orthodox economics

Capital investment is fundamental in both micro- and macroeconomics. In macroeconomics, capital investment forms an important factor in demand and is the basis of the productive capacity for future output. In microeconomics, the firm uses capital and labor as the two basic inputs to the production function that generates output. Thus, capital investment is a basic choice for the firm. Although macroeconomic and microeconomic theory differ substantially, in the investment area, much of the work on aggregate capital investment uses models that are essentially microeconomic – justified on rational maximizing of the individual firm and ignoring interactions that are obvious in macroeconomics (see Fisher 1971). Since the research undertaken here is essentially microeconomic, the macroeconomics literature will not be discussed further.

Three major themes dominate the microeconomic literature on capital investment. First, the neoclassical theories associated with Jorgenson argue that investment is a function of sales and the cost of capital. The firm invests in all projects that pay a return higher than the firm’s marginal rental cost of capital. The models in this area have investment as a positive function of sales divided by the rental cost of capital. The models vary in the exact definition of the variables and the lags between decisions and actual expenditures. Second, the cash flow models associated with Eisner propose that sales and profits both influence investment (see, e.g.,
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Eisner (1978). These models have been less elegantly developed than the neoclassical theories and are less fashionable. Third, and last, stock price models and most recently the $q$ models associated with Tobin argue that firms will invest when a given investment will increase their value as measured on the stock market. Although much of the logic behind these models is inherently microeconomic (the model developments usually talk about the firm), economists have been quite free in estimating such models on macroeconomic data and using such models for macroeconomic policy prescriptions (see Fromm 1971).

A closely related literature, corporate finance, has to a large extent taken the microeconomic approach in offering corporate finance prescriptions largely grounded in perfect market economics: The firm should invest in all projects that have positive net present value when the cash flows associated with the investments are discounted using the firm's cost of capital. That firms aim to make economic profits in the long run, an impossibility in perfect markets according to economic theorists, has caused some concern for theorists in this area (Findlay and Williams 1979). Operations research approaches, which provide the flexibility to select profit maximizing sets of projects when the firm faces a number of projects over a planning horizon with limits on the funds available over the horizon, have found less application than conventional finance methods, perhaps due to operations research's greater technical demands.

1.3. Public policy questions

Major public policy questions rest on the correct determinants of corporate capital investment. Often the issues are phrased simply in terms of the economic models under which they are debated. Thus, the kinds of policy issues under discussion will be mentioned, but the points of the debate largely rest on the economic models discussed in section 1.2.

Capital investment is a manipulable and significant component of demand in macroeconomic policy. Although conventional economic models have significant components of capital investment, supply side economics as implemented in the Reagan administration put enormous emphasis on the impact of policy levers on corporate investment. Much of the economic growth the Reagan administration promised in its early years was to be driven by rapid depreciation allowances on corporate investment and cuts in corporate taxes, both of which would allow increased capital investment and thus increased demand and productivity. Knowing what influences the level of capital investment in aggregate underlies much of macroeconomic policy.
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Industry-level microeconomic policies also depend on investment assumptions. Analyses of the impact of alternative systems of water-pollution control assume how firms decide to invest in capital equipment to curb pollution (Kneese and Bower 1968). Defense procurement policy is strongly influenced by enunciated goals to "increase the defense industrial base," which to a large extent means to increase capital expenditures in defense industries. Debates over the future of the steel industry and U.S. heavy industry in general focus on the capital formation process. Underlying almost all these debates are models of corporate capital investment.

Without getting heavily involved in any of these issues, let us simply conclude that the determinants of corporate capital investment underly many significant public policy debates.

1.4 Strategic management and capital investment

Strategic management deals with the holistic direction of an organization: "The pattern or plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole" (Quinn 1980, p. 7). Thus, strategic management must integrate capital investment plans and projects into the overall corporate strategic management process, including marketing, finance, and personnel systems and rewards.

The strategic management literature has two major streams relating to corporate capital investment. The first, a stream typified by Bower and Aharoni's works, examines the process by which the individual projects become identified, developed, justified, and approved (Aharoni 1966; Bower 1970). The second, typified by Lorange's work, examines corporate planning systems and in particular planning systems for capital investment. Each is discussed in turn.

Bower and Aharoni both address how major capital investment decisions come to be made. Using case studies, both found that the behavioral factors that influence the generation of investment ideas and proposals and that govern the sponsorship and advocacy of such projects (project definition and impetus in Bower's terms) critically determined which projects would be approved for implementation. Both studies emphasized the importance of a number of managerial factors (reward systems, information channels, etc.) in shaping the projects (structural context in Bower's terms). Factors of central concern to the economists and corporate finance community (return-on-investment techniques, etc.) were found to be of secondary importance.

See, e.g., the activities of the Congressional Steel Caucus, the Department of the Treasury's Working Group on Capital Formation and Modernization of the Steel Tripartite Committee, and the American Business Conference (Hatsopoulos 1983).
1.5. Study outline

The classic policy study on capital budgeting systems (Lorange 1972) addresses a very different problem. Lorange asks what human relations variables are associated with managers perceiving their planning systems to be “effective.” His data came from surveys where managers ranked a number of characteristics of the planning systems on “very effective for our business” to “very ineffective for our business.”

Lorange attempted to demonstrate that different planning system characteristics were appropriate for different business contexts and management styles. Overall, his results did not support his hopes. His three measures of effectiveness (the primary one being the questionnaire response noted above, secondary ones being profit growth rate and whether management decision styles are confronting or not) appeared hardly related. His efforts to distinguish the characteristics of effective from ineffective systems were hardly more successful. As Lorange notes, his management style and behavioral variables explained very little of the variance in his dependent variables, which were intended to measure planning system effectiveness (Lorange 1972, p. 134).

A more recent survey of the strategic planning literature finds much the same results. The search for a general set of factors to govern a contingency approach to the design of planning systems seems to have been less than successful (Lorange 1979) and indeed is characterized by Henry as “very global and impractical” (1979, p. 246).

As with the economic paradigm, the research reported here misses some factors that are central to the strategic management field. Although it looks at the behavior of a planning system, this research does not attempt to fully integrate the planning system into the corporate strategic process, nor does it attempt to identify effective or ineffective practices. Rather, it attempts to see how the system operates. Some implications of that look for policy are derived in the conclusions.

1.5 Study outline

The next four chapters present empirical results using data from four corporations. Each presents the qualitative data from interviews with corporate officials and models that conform to the qualitative data. For the first firm, Copperweld Corporation, quantitative data sufficient to estimate the model were not available. For the remaining three corporations, the models are estimated along with the model from Corporation Two, which is used as a baseline. Summary sections in each chapter synthesize the results. A final chapter summarizes the empirical conclusions of the research and develops a conceptual framework that presents the
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primary determinants of corporate capital investment as found in this study. The implications of this new view of the determinants of investment for economics, public policy, and business policy research are discussed briefly.