Université de Montréal

The Acquisition Decision in Canada:

A Firm Life-Cycle Perspective

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To my family

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ABSTRACT

This study provides an alternative hypothesis for the firm's acquisition decision, by advancing a life-cycle model where the firm's policy decisions are proposed to be a function of the financial and operational characteristics identified with each life-cycle stage. First, a sample of Canadian firms which made acquisitions during the 1980's is separated into three distinct life-cycle groups with the aid of factor and cluster analysis. Second the relative impact of the corresponding acquisitions on the value of the firm is found by the residual technique via the one factor market model.

The Cumulative Average Residuals (CARs) for all acquiring firms for the 25 month interval around the acquisition date were approximately 2.5%. However, the relative impact of the acquisition was found to be greater for the group of firms which were identified with the "maturity" stage. The group of acquiring firms which were identified with "growth" stage was found to have a negative impact from the acquisition. Lastly, the group identified with the "decline" stage was found to have a rather neutral impact from the acquisition.

Key Words:

   Firm, Acquisition, Value, Shareholders, Management.

RÉSUMÉ

Thème et objectif de la thèse

L'objectif de cette thèse est double: d'abord, proposer une théorie alternative explicitant les conditions sous-jacentes à la decision d'acquisition d'une firme et ensuite, tester empiriquement cette théorie à l'aide de données sur les acquisitions de firmes canadiennes durant la période 1980-1988.

La thèse explique et prédit les prises de contrôle d'entreprises en regroupant tout d'abord les entreprises acquéresses en sous-groupes distincts selon leur phase respective du cycle de vie, et en identifiant par la suite l'impact des diverses acquisitions sur la valeur des firmes en question. Le regroupement des entreprises procède d'une théorie du cycle de vie de l'entreprise et s'obtient par l'application des méthodes d'analyse factorielle et d'analyse des grappes aux données historiques financières des entreprises. Quant à l'impact des acquisitions, il est obtenu, à l'aide d'un modèle d'équilibre des marchés financiers, par l'étude des résidus des taux de rendements des actions des entreprises acquéresses autour de la date d'acquisition .

Résultats des études précédentes

Les résultats des études réalisées à ce jour sur ce thème sont loin d'être uniformes et leurs implications pour l'entreprise et les politiques de concurrence sont peu concluantes.

Les études portant sur la comparaison statistique des données financières de l'entreprise entre l'état pré-acquisition et l'état post-acquisition se réfèrent principalement à l'économie industrielle et à l'école managériale. La plupart de ces études concluent que les acquisitions d'entreprises ont pour effet de réduire la valeur des entreprises fusionnées. La thèse prépondérante proposée par ces analyses pour expliquer ces résultats tient du "problème d'agence" existant, en particulier dans l'entreprise en phase de maturité, entre les gestionnaires et les actionnaires, chaque groupe ayant des fonctions d'utilité différentes.

1

Les études regroupées sous le vocable "études d'évènement" et portant sur l'analyse des fluctuations des prix des actions des entreprises concernées durant la période d'acquisition, sont liées de près à l'approche de l'économie de la finance ainsi qu'à l'école de pensée néo-classique. La plupart de ces études concluent que les acquisitions ajoutent de la valeur aux entreprises fusionnées grâce à l'allocation de ressources additionnelles à l'utilisateur plus efficace. La thèse dominante sous-jacente à ce constat veut que l'existence de "marchés efficaces" discipline les agents de l'entreprise.

Les choix de politique générale de la firme et la thèse du cycle de vie

Afin de développer une thèse du cycle de vie de l'entreprise qui puisse expliquer les décisions d'acquisition, il nous faut un cadre théorique où l'impact des différents choix réels et financiers de la firme peut être mesuré. Par conséquent, un modèle structurel des décisions de politique générale de la firme, explicitant leurs relations mutuelles et leurs impacts sur le risque et le taux de rendement de la firme, est développé. Le modèle tient compte d'une contrainte d'égalité de flux de fonds et permet la détermination simultanée des décisions de politique générale de la firme à un moment donné.

La thèse du cycle de vie considère quatre phases pour caractériser l'évolution économique de la firme: (i) la phase de démarrage, (ii) la phase de croissance, (iii) la phase de maturité, (iv) la phase de déclin. Chaque phase est identifiée par des caractéristiques particulières tant aux niveaux opérationnel, financier et organisationnel qu'au niveau de la structure de propriété et d'autorité. Bien que ces caractéristiques puissent être calculées pour toutes les industries, la thèse ne considère que le secteur manufacturier et le secteur des services.

Cette thèse affirme que les niveaux des caractéristiques en question varient d'une firme à l'autre en fonction des différentes phases du cycle de vie. Ainsi, les différentes décisions de politiques réelles (investissement internes, acquisitions et désinvestissements) sont fonctions de ces caractéristiques.

La thèse du cycle de vie prédit que les décisions d'acquisition de la firme augmentera davantage la valeur de la firme acquéresse lorsqu'elles sont prises en phase de maturité de cette dernière. Par ailleurs, les décisions d'investissement interne seront davantage profitables durant la phase de croissance. Cependant, la thèse du cycle de vie n'affirme pas que la valeur absolue d'une acquisition sera plus grande pour les entreprises en phase de maturité; elle affirme seulement que les bénéfices relatifs d'une telle décision sont plus grands durant cette phase que durant les trois autres.

Le choix des données et le regroupement des entreprises

L'information de base sur les acquisitions au Canada par les entreprises nationales a été obtenue du *Régistre des fusions* du Ministère fédéral de la consommation et des corporations ainsi que de la publication *Mergers and Acquisitions in Canada* par A. Kwinta et alii (1986, 1987, 1988). Les informations financières nécessaires au calcul des variables empiriques utilisées pour le regroupement des entreprises ont été obtenues de *The Financial Post Information Service.*

Suite à l'évaluation de 14 variables empiriques pour les 96 entreprises acquéresses de notre échantillon, nous utilisons l'analyse factorielle et l'analyse des grappes pour regrouper ces firmes en sous-ensembles homogènes. Les méthodes particulières d'analyse factorielle et d'analyse des grappes utilisées sont respectivement la méthode du maximum de vraisemblance et la procédure *Fastclus.* Les trois sous-ensembles de firmes obtenus grâce à ces analyses correspondent assez fidèlement à la phase de croissance (34 firmes), à la phase de maturité (55 firmes) et à la phase de déclin (7 firmes).

La performance des firmes acquéresses

Les tests de performance des firmes acquéresses utilisent un modèle d'équilibre des marchés financiers et l'analyse des résidus. Le modèle permet d'estimer le prix des actions d'une firme acquéresse en fonction des variations dans les conditions générales de l'économie pour la période durant laquelle la décision d'acquisition est susceptible

3

d'affecter ce prix. La variation du prix non–expliquée par le modèle de marché est réputée être causée par la décision d'acquisition. La possibilité d'un changement dans le niveau de risque systématique de la firme acquéresse suite à l'acquisition est également prise en compte par l'estimation séparée des coefficients de régression sur les données pré–acquisition et sur les données post–acquisition.

La moyenne cumulative des résidus (MCR) pour toutes les firmes acquéresses dans un intervalle de 25 mois autour de la date d'acquisition augmente d'environ 2.5%. Cependant, lorsque chaque groupe est traité séparément, nous observons des accroissements de MCR de 6.16% pour le groupe en phase de maturité et de 0.7% pour le groupe en phase de déclin, mais une diminution de 3.28% pour le groupe en phase de croissance.

Quant au risque systématique, mesuré par les coefficients estimés (pré–acquisition et post–acquisition) pour la pente dans le modèle de marché, nous observons qu'il change suite à l'acquisition et ce pour les trois groupes. Le niveau de risque systématique des entreprises en phase de croissance diminue et celui des firmes en phases de maturité et de déclin augmente suite à l'acquisition.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Corporate acquisitions have played an important part in the development of the firm in the North American economy.

The causes and consequences of corporate acquisitions are controversial issues in the literature of finance and economics. There are specific reasons that appear to apply to each individual acquisition decision but researchers usually are searching for a few general principles that can explain and/or predict the broad pattern of these activities.

The two dominant theories that evolved in the economic theory of the firm in this area are:

i.   the neo-classical economic theory of the firm, where acquisitions arise due to inefficiencies in the firms and thus create additional value to the merged firm when these inefficiencies are rectified;

ii. the managerial theory of the firm, where management's utility maximization objective function can deviate from the shareholders' wealth maximization objective function and thus engaging into acquisition activity with little interest on value maximization.

A.   The Objective and Scope of the Study

The objective of this thesis is twofold. First, to formulate an
alternative hypothesis which identifies necessary conditions for
the corporate acquisition decision for the firm, and second to
empirically test this hypothesis with market data on Canadian
firms acquisitions, for the period of 1980-88.

The study advances a life-cycle theory for the firm where the
acquisition decision is considered as a policy instrument along
with other real decisions, i.e. internal investment and
divestitures, and it is determined by the characteristic profile
given by the different life-cycle stages.

Corporate acquisitions along with other forms of investment
and/or disinvestment are considered simultaneously within the
strategic planning process of the firm. The life-cycle model
provides the interrelationship of all real policies of the firm
and their impact on its value. The model establishes the impact
each real policy may have on the firm's value at different life-
cycle stages.

Hence, this study explains/predicts corporate acquisitions by
first separating acquiring firms into distinct groupings, and
then identifying the impact of the corresponding acquisitions on

the value of the firm. The former is achieved through the implementation of factor and cluster analysis on historical firm data and the latter through residual analysis of market returns exhibited during the period around the acquisition event.

B.   The need of the Study

The need of the study springs forth from three areas of concern. First, the theoretical explanation of corporate acquisitions of previous studies treats all firms as elements of one single population, without taking into consideration the evolutionary character of a going concern. The acknowledgement of organizational capital development, the preponderance of disequilibrium in certain markets at a certain point in time, and the existence of agency problem among the major participants in the markets, indicate that some homogeneous grouping is desired to capture the array of characteristics which determine the policy decisions of the firm.

Second, most of the merger and acquisition studies have used data from the United States and the United Kingdom, with motivations on acquisitions in the other economies left to be extrapolated from their results. We study corporate acquisitions conducted by Canadian firms. The Canadian economy differs from those of the United States and United Kingdom in the market structure, industry concentration, and degree of maturity of its industries.

Hence, corporate policy with respect to acquisitions in Canada need not be similar to that of American or British firms.

Thirdly, past studies examine corporate acquisitions as independent decisions, without giving much consideration to their impact on other real policy decisions, such as internal investment and divestitures and financial policy decisions, such as capital structure and dividend policy. We endeavour to capture the interdependence of the real policy decisions as well as their impact upon the financial policy decisions by formulating a corporate policy model where a simultaneous solution arises from the functional relationship among all the endogenous variables.

C. Organization of the Study

The second chapter reviews the relevant economic literature of the empirical studies with respect to the characteristics of the acquiring firms and the evidence on their performance, and provides past applications of the life-cycle theory.
The third chapter presents the theoretical framework for the corporate acquisition decision within the auspices of the general valuation model. The different mergers & acquisitions hypotheses are examined in a parallel fashion in order to substantiate the actual controversy between the existing schools of thought.
The fourth chapter presents a structural model for the firm, where the interrelationship of the different policies and the

firm's rate of return and risk are determined simultaneously.

The fifth chapter provides a life-cycle model for the firm, where a distinct characteristic profile is identified for the different life-cycle stages.

The sixth chapter presents the hypothesis and predictions of the life-cycle model with respect to the acquisition activity. The seventh chapter provides the sources for the data, the estimation of the empirical variables and the classification of the acquiring firms into clusters via factor and cluster analysis. The predictions of the life-cycle model are matched with those attained by cluster analysis to confirm the validity of the model.

The eighth chapter presents the empirical testing of the acquiring firms performance for the identified groups with the aid of the market model and residual analysis, and the interpretation of the findings.

The ninth chapter concludes the study by stating its implications and its limitations and makes suggestions for future research on relevant topics.

CHAPTER II

REVIEW OF THE LITERATURE

The literature survey relevant to our study is divided into the three following categories:

i.   Empirical studies on the characteristics of the acquiring firms;

ii.   Empirical studies on the effects of the acquisition activity on the acquiring firms' performance with respect to risk and return;

iii. Applications of the life-cycle theory.

A.   **Studies on the Characteristics of the Acquiring Firms**

Economists have endeavoured to prove that acquiring and non-acquiring firms do not belong to the same population of elements, and that both have different characteristics from acquired firms. The objective of this statistical exercise of course, is to provide some explanation of mergers by assuming that differences at the firm level are prerequisites for this restructuring activity. In other words, when firms recognize the existing differences within their operational, organizational and financial structures, they simultaneously recognize their weaknesses and/or strengths and attempt to rectify them by

merging their organizations.

Most of the studies have identified differences at the firm level by studying the firms that have actually been involved in merger activity. The studies reviewed here, use a sample of acquiring firms with a control group, and according to some criteria of success, evaluate the performance of both samples.

Kelly (1967) considered a sample of 22 matched pairs of firms drawn from a population of 550 of the largest firms over the years 1946-1960. He compared the market performance of the stocks for the five pre-merger and five post-merger years. He found acquiring firms grew faster and had higher P/E ratios than their non-merging pairs but did not out-perform the matched group after the merger in the stock market evaluation due to higher than normal premium paid to the acquired firm.

Hogarty (1970) examined 43 merged firms over the period of 1953-1964. He developed an investment performance index based on changes in the stock market values. He then compared these indexes for acquiring firms with similarly constructed indexes for their respective industries. Hogarty's findings indicate negative synergy, since acquiring firms performed worse than their industry counterparts.

Lev and Mandelker (1972) took 69 pairs of firms covering the

period of 1952-1963. They measured the differences in performance between pre-merger and post-merger periods for the matched group and found that acquiring firms were somewhat more profitable than their counterparts.

In a comprehensive study, covering a whole business cycle, Mueller (1980) studied 287 mergers dated from 1962 to 1972. The control group was based on size and industry. Mueller found that the typical acquiring firm is larger than its non-merging partners (despite the effort to match them by size) and more profitable than the industry averages. Further, the acquiring firm exhibited higher growth rates and debt/equity ratios than the non-merging firms.

B.   Empirical Studies on the Performance of Mergers

Researchers have utilized two methodologies to study and test the performance of the merged firms. The first one uses statistical analysis to measure the impact upon the merging firms' balance sheet and income statement accounts. The second considers econometric analysis to measure the impact upon the merging firms' risk/return vector over time and is based upon the efficient market hypothesis.

B.1. **Statistical Analysis**

Extensive research has been conducted in an effort to identify synergies that could evolve through the consolidation of the merged firms' operations. Economists and business analysts have analyzed every possible element in the financial statements of the firm that could be affected by the merger. In order to avoid excessive duplication among the previous studies, we will review only those that provide us with the most comprehensive findings.

The first empirical study on merger performance has been conducted by Dewing (1921). He considered 35 mergers covering the period between the end of the 19th century and beginning of the 20th century and compared pre-merger and post-merger earnings. Dewing found that 75% of the acquiring firms had poorer post-merger earnings.

Young (1961) considered 400 firms for the period of 1948-1950 and 1956-1958. He compared high and low growth firms as ranked by growth in sales, profits and stock prices. He found that high growth firms diversify more and place more emphasis on acquisitions.

Reid (1968) examined 478 firms of the 500 largest in 1961. In his attempt to rationalize merger activity, Reid analyzed the firms

that were heavily involved in mergers. His major findings are that merger activity increases the firm's sales, assets and employees but decreases market prices and capital gains. Thus, he asserts that mergers maximize managers objectives other than profit maximization, and management controlled firms have greater propensity to merge than do non-management controlled firms.

Weston and Mansighka (1971) examined 63 conglomerates and 2 control random groups for the period of 1958-1968. They compared total assets, sales, net income, earnings per share, and stock prices. They found that acquiring conglomerates outperformed the two control groups on growth, had higher leverage and had no significant differences on earnings. However, conglomerates have raised their depressed pre-merger rates of returns to the industry average. This last finding was interpreted as evidence of successful "defensive diversification" of over-specialized firms.

Mueller, who has been previously cited, compared group means for total assets, sales, after tax profits, leverage and growth between merging and non-merging group of firms. He found post-merger inferior performance for the merging group. Mueller concluded that mergers lead to a reduction in profitability.

Chung and Weston (1982) developed a hypothesis of merger activity based on a strategic long-range planning framework, where

acquisitions are considered as strategic decisions. Their model stated necessary conditions required for financial and managerial capabilities to be carried-over in a conglomerate merger activity. They tested their hypothesis with a sample of conglomerate mergers for the period of 1957-1977, and found that there is substantial carry-over of financial capabilities for pure conglomerate mergers and a carry-over of managerial capabilities for product or market extension mergers.

You et al (1986) have conducted a cross sectional study of mergers consisting of acquiring firms with a varied distribution of stock ownership. They find that the total shareholder wealth created by a merger is positively related to the percentage of the acquiring company's shares owned by top management. Subsequently, they argue that value enhancing motives are less likely to explain mergers made by companies with low share ownership by top management.

Ravenscraft and Scherer (1987) have investigated over 5,000 mergers occurring between 1950 and 1975. The study employed line of business data for the pre-acquisition and post-acquisition periods. With only two exceptions- tender offers and mergers of equals - significant declines in post-merger profitability were observed for all types of mergers. A few of the possible explanations suggested from the assessment of 15 failed mergers were: unanticipated difficulties in integrating the two

companies; inadequate incentives for target senior management who become line managers after the merger; and lack of experience of the acquiring company's management in the target's industry. Their study confirmed the "like attracting like" hypothesis for advertising and R&D. The only variable that did not conform to the "like attracting like" hypothesis was growth. Bidders in low and high growth industries sought targets in high growth industries. One of the study's conclusions was that bidders sought targets in industries that were growing significantly more rapidly than their own industries and the economy-wide average.

B.2. Econometric Studies and the Efficient Market Hypothesis

The efficient capital market hypothesis states that the firm's share prices adjust (instantaneously) to new information, hence share prices provide accurate signals for efficient resource utilization.[1] By assuming efficient capital markets, these econometric studies measure the movement of stock prices around the time of the merger. This provides the economic impact of the merger and a direct measure of the change in shareholders' wealth. The studies whose results provide useful information for the empirical testing of our acquisitions hypothesis are

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[1] Eugene Fama (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", Journal of Finance, May 1970, 383-417.

summarized in this section.[2]

Halpern (1973) utilized the market model to isolate abnormal performance due to an unusual event for the firm, such as a merger. In his market model, he also included an industry relative to avoid any industry bias effect. He employed the "residual technique" developed by Fama, Fisher, Jensen and Roll (1969) in order to determine the base period (the interval before the announcement date during which merger information is reflected in the stock prices of the merged firms). Halpern finds that on average, merger information is available in the market for seven months before the announcement date. His findings suggest synergy or improvement in the performance of the smaller firms, arising from the prices paid by acquiring firms.

Mandelker (1974) employed the "empirical market line", a variant of the Capital Asset Pricing Model (CAPM), to test two hypotheses. The first one being that acquisitions take place in a perfectly competitive market, and the second , that capital markets are efficient with respect to information emanated from mergers. While employing the two -factor model as developed and applied by Black-Jensen-Scholes (1972) and Fama-McBeth (1973), Mandelker's study also considers changes in risk in analyzing the

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[2] Comprehensive reviews of wealth effects of takeover activities appear in Mueller (1977), Halpern (1983), Jensen and Ruback (1983), Magenheim and Mueller (1987), and Jarrell, Brickley and Netter (1988).

impact of mergers on stock prices. The findings of his study are consistent with the hypothesis that acquiring firms operate in a perfectly competitive market, and that the prices they pay for the acquired firms enable their shareholders to earn normal returns on the acquisitions given their inherent risk. Moreover, his findings are consistent with the hypothesis that anticipatory price movements preceding the effective date of the merger, exhaust all valuable information from the merger event.

Ellert (1976) reinforces Halpern's and Mandelker's results by finding that the information on the market prices of merging firms is reflected 7 to 12 months prior to the event. He shows cumulative average residuals (CAR) for the acquiring firms being positive but not significant for this pre-merger period. This evidence is inconsistent with the managerial theory and its related growth maximization prediction. It is also inconsistent with the monopolistic exploitation theory by not providing monopoly gains to acquiring firms. However, Ellert concludes that competition among acquiring firms does not on the average, eliminate gains to the acquiring firm from the merger activity.

Dodd (1980) employs like Halpern the market model and uses the announcement date rather than the completion of the merger as the "event". He uses daily data in order to pinpoint the significance of the announcement date. He examines 151 merger proposals announced in the <u>Wall Street Journal</u> during the 1971 to 1977

period. He finds the market reaction to be significantly positive for target firms (13%) and significantly negative (-1%) for bidder firms. Dodd concludes that since the net effect target-cancelled mergers is positive, it can not be concluded that managers are necessarily acting against the best interests of shareholders when they veto a proposed merger.

Schipper and Thompson (1983) examine the overall significance of an acquisition program, as it is announced by firms in their strategic policy outlook. However, this announcement is part of a larger package of a corporate policy direction, i.e. intentions on internal investments, divestitures, etc. In this context, the market assesses the planned acquisition program's impact on other real and financial policies of the firm. Their results show that the market reacts positively to the announcement of such a program; indicating that acquisitions are expected to increase the firm's net present value. Hence, they maintain that the small positive returns at the announcement of specific acquisitions is due to the fact that the market has already capitalized most of the expected benefits at the announcement of the whole acquisition program.

McConnell and Muscarella (1985) examine the change in the stock price of a sample of 658 firms around the dates on which they publicly announced future capital expenditures plans. They tested two hypotheses, first whether the information content in the

announcement produced any signalling effects to the equity market and second whether the market responds according to the predictions of the market value maximization hypothesis. They found that the reaction of common stock prices to capital expenditure announcements is generally consistent with the joint predictions of the market value maximization hypothesis and a traditional model of corporate valuation. The announcement of capital expenditures changes by industrial firms was associated with changes in the same direction of "excess" returns, and the announcement of capital expenditures changes by regulated public utilities was not followed by an associated market reaction.

Eckbo (1986) presents the first systematic examination of the evaluation effects of Canadian mergers and acquisitions. He studies 1930 cases that took place over the twenty-year period 1964 through 1983. He employs the "residual technique" applied to similar event studies with a variant of the market model. The study recognizes the possibility of risk shifts that could emerge with the merger event by estimating risk coefficients for the period before and after the event.

Eckbo finds that both target and bidder firms on the average earn large and significant gains from takeover activity; CAR for target firms increased to 10% from month 0 to month 12 and CAR for bidder firms increased to 4.31% for the same time.

Second, the merger gains do not differ significantly across horizontal and non-horizontal mergers. Third, bidder firms

located in western provinces outperformed bidder firms located in Ontario. Eckbo concludes by stating that the "Canadian market for corporate control plays an important role in promoting an optimal resource allocation".

Singh and Montgomery (1987) test the hypothesis that acquisitions which are related in product/market or technological terms create higher value than unrelated acquisitions. They find through the residual technique that related acquisitions do provide greater dollar total gains than unrelated acquisitions. However, only the gains of the acquired firms in related acquisitions were found to be significant. The implication raised by this study for the management of participating firms is that a search for the appropriate match of resources between the two firms is warranted, since the market recognizes synergistic combinations and values them accordingly.

Morck, Schleifer and Vishny (1990) consider a sample of 326 acquisitions in the U.S. taking place in the 1975-1987 period. They used the announcement period returns as a yardstick to determine the impact of acquisitions on the acquiring firm's returns. They found that acquisitions yielded lower returns to firms which had poor pre-acquisition performance, which acquired with the objective of unrelated diversification and which acquired a rapidly growing firm. In all these cases they suggest that the management of the acquiring firms will overpay for

target firms. They argue that these acquisitions are a "manifestation" of agency problems in the firm. The proposition that these acquisitions were conducted with the objective of maximizing management's utility function by undertaking investments which have a negative present value is not tested directly. The study assumes that the management of the acquiring firms can avoid the market discipline following these acquisitions. Mitchell and Lehn (1990) find that bad acquirers become good targets following their acquisitions; suggesting that bad management may be ousted by the new raiders, and as such be worse off than their original position before their acquisitions.

B.3 The Rationale for the Mixed Evidence

The findings of these studies are not uniform. The studies associated with the statistical comparisons between financial variables from pre-merger state to the respective post-merger are closely associated with the discipline of industrial economics. The studies which are usually termed "event studies"and measure the stock price fluctuation of the participating firms during the time of the acquisition, are closely associated with the discipline of financial economics.

Before we compare the results of the two sets of studies, it would be useful to examine the inherent assumptions that are embodied in each methodology. The reasons behind this

inconsistency may be due to sampling differences, different testing methodologies and the different time periods that each study has considered.

C.   Applications of the Life - Cycle Theory

The life cycle concept has been applied in physical and social sciences to study the development of natural and social organisms. In the fields of psychology and sociology, the concept of life cycle provided a useful avenue for the classification of the subject under research (e.g. psychologists utilized the life cycle of a man to analyze and predict human behaviour and sociologists utilized group or society life-cycle to investigate people's norms and cultures). In business and economics, the life-cycle concept has been useful in the product development domain, in the consumption /savings patterns and to some extent in the development of the firm.

The versions of the firm life-cycle theories that have been advanced , spring-forth from the origin of their foundational objectives. Hence, organizational theorists have advanced life-cycle models with stages for the firm that help explaining the development of organizational structures.[3] Economists have

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[3] D.H. Thain (1969), in "Stages of Corporate Development", The Business Quarterly, Winter 1969, 33-45, develops a model of organizational structure development based on a firm life-cycle framework.

recognized the evolution of the firm with respect to its

financial and operational structures (Mueller 1972; Senchack and

Lee, 1980; Schwartz, 1984; and Pashley 1986), and have used this

framework to explain the various policy decisions that its agents

have taken at some point in time.

Mueller (1972) attempts to explain the evolution of the firm from

inception to decay by identifying stages where the objective

function for the firm changes over time. He states that the

entrepreneurial stage is characterized by profit maximization

because ownership and control are inseparable. As the separation

of ownership and control increases, the firm's objective shifts

to managerial utility maximization and then to growth

maximization for the more mature firms where ownership and

control are assumed to be completely separable. Mueller alleges

that many conglomerate mergers take place at the mature stage

because management is pursuing a growth maximization objective.

Senchack and Lee (1980) developed a dynamic financial model for

the firm assuming balanced-growth and financing variables as

earnings proportional. They have derived optimal financial

decisions for every one of the three stages considered in their

life-cycle model (high, low and negative growth rate stages).

Further they determine through comparative dynamics the optimal

duration of the firm's growth stages and growth rates from

changes in its environment. Finally, with the aid of simulation

analysis, they found that changes in the investment rate of return have the most significant and direct influence on the optimal duration of the firm's different growth stages and optimal growth rates, while changes in leverage had the least effect.

Schwartz (1984) tested the managerial life-cycle hypothesis cited by Mueller (1972). He considered a merger equation which incorporated the following functional relationship:

M = h (Investment, Dividends, Owner/Manager Control Variables, Life-Cycle Variables, Cost of Capital Variables)

The time period covered in his study was 1962-1977. This period was divided into four sub-groups, each of which corresponded to a particular part of the merger cycle: 1962-66 average merger activity, 1967-70 more rapid activity (including peak of cycle), 1971-75 declining merger activity (including trough of cycle), and 1976-77 more rapid activity. The author's results did not support the contention that any of the hypothesis could serve as a "single cause" of merger activity. Among the life -cycle variables, the internal growth ratio coefficient was significant for the last three periods, however no other life -cycle variable from his listing (firm age, technology patents/sales) was statistically significant. The owner/manager control variables' performance was ambiguous. Among the cost of capital/cash flow

variables, only the cash flow variable was significant in the 1976-77 period. Schwartz concludes by supporting Steiner's "eclectic" theory of mergers where no single explanation of merger activity exists.

Pashley (1986) has considered the life-cycle hypothesis of the managerial school of thought to explain and predict voluntary divestitures in the United States. She considered a life-cycle model where the firm's objective function changes with the different life-cycle stages. Pashley examined a sample of 138 divestitures that were effected during the period of 1970-1978. A control group was set up based on asset size, industry membership, time frame, profitability and debt ratio to conduct a "pair sample" comparison technique (similar to Lev and Mandelker 1972). Pashley found support for three of her four life-cycle motivation hypotheses for divestitures. Evidence was presented for debt reduction motive for the late expansion/early maturity group, a profit improvement motive for the late maturity/early decline group, a liquidity improvement motive for the decline group.

CHAPTER III

THE ECONOMIC THEORY OF CORPORATE ACQUISITIONS

Corporate acquisitions are a result of the firm's policy decision
to allocate its resources. They, along with other real policy
decisions, endeavour to optimize the objective function of the
firm's shareholders or the one assumed by its management. The
objective functions of the shareholders and the firm's management
could be identical or they could be different depending on
certain fundamental conditions within the governance structure of
a particular firm and the level of efficiency in the market
place. Specifically, the objectives between the shareholders and
the firm's management tend to converge when the ownership and
control are inseparable and/or when markets are extremely
efficient. In this chapter we present an analytical framework of
the existing controversy between two major school of thoughts in
explaining corporate acquisitions.

A.   The Neo-classical Theory of the Firm

The predominant proposition of the neo-classical theory of the
firm is, that it exists to maximize the welfare of its
shareholders by utilizing its resources at the optimum level,
dictated by the marginal conditions of its costs and revenues.
This proposition however, can only be achieved if markets are

efficient and if there are no agency costs.

Under the strict neo-classical theory model of the firm, its agents - management, employees, shareholders and bondholders are expected to take decisions with respect to real or financial policy that would maximize the firm's value, because only then their individual objective function will be optimized (Fama, 1980). Hence, corporate acquisition decisions will be taken only in regard to their contribution to the firm's value. However, the theory does not reject the existence of the agency problem between shareholders and management and its associated costs; it merely recognizes them as a normal cost which the firm tends to minimize (Fama and Jensen, 1985).

Thus, the neo-classical theory of mergers proposes that the main motive for acquisitions is to channel resources to higher-valued uses; i.e. to satisfy the marginal conditions for all factors of production and distribution. Its main prediction is that acquisitions enhance allocational efficiency in the economy.

We can determine the effect of an acquisition on the value of the firm through comparative statics. Characteristically, the firm's value under a finite growth can be described by the Miller-Modigliani valuation framework, where the value of a firm at any point in time will be the sum of two components:

i.   the value of the perpetual cash flows discounted at the firm's cost of capital;

ii. the value attributed to the marginal difference between the internal rate of return and cost of capital for a finite number of years.[4]

Mathematically, we have:

$$V_\phi = \frac{E(NOI_1)\,(1-\tau)}{\xi} + KT[E(NOI_1)\,(1-\tau)]\,[\frac{r-\xi}{\xi(1+\xi)}] \qquad (3.1)$$

Where:

V_ϕ = the firm's present value

NOI_1 = Net operating income for period 1

τ = the corporate tax rate

ξ = the cost of capital

K = the investment rate, assumed constant

T = the number of years for which $r > \xi$

r = the internal rate of return, assumed constant for T years

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[4] The major steps in deriving the formula for the value of the firm are provided in Appendix I. A more rigorous derivation is given by Copeland and Weston, in Financial Theory and Corporate Policy, Addison Wesley, 1983.

Functionally, we may express equation (3.1) as;

$$V_\phi - f[E(NOI_1), \tau, \xi, K, T, r] \qquad\qquad (3.2)$$

By taking the first partial derivatives of V_ϕ with respect to its arguments, we may pose the theoretical directional impact of each variable on the firm's value.

Thus,

$$\frac{\partial V_\phi}{\partial(NOI_1)} > 0$$

$$\frac{\partial V_\phi}{\partial\tau} < 0$$

$$\frac{\partial V_\phi}{\partial K} \geq 0\, for\ r \geq \xi \wedge \frac{\partial V_\phi}{\partial K} \leq 0\, for\ r \leq \xi$$

$$\frac{\partial V_\phi}{\partial\xi} < 0 \qquad\qquad (3.3)$$

$$\frac{\partial V_\phi}{\partial r} > 0$$

$$\frac{\partial V_\phi}{\partial T} \geq 0\, for\ r \geq \xi \wedge \frac{\partial V_\phi}{\partial T} \leq 0\, for\ r \leq \xi$$

The different merger hypotheses can be analyzed under the framework of equation (3.2) and its partial differentiation. Some of the most prevalent hypotheses are examined in this chapter.

A.1. The Differential Efficiency Hypothesis

Under this hypothesis the objective of the merger is to increase E(NOI) by eliminating some cost inefficiency in the production function of the target firm and/or increase efficiency of its revenue function. The hypothesis proposes that firms operate within their production possibilities curve, leaving some resources only partially utilized. Palepu (1985), Bartley and Boardman (1986) show that target companies have unutilized debt capacity (i.e. lower debt to equity ratios, higher net current liquidity, and/or higher coverage of fixed charges) than the bidding firm or non-acquired companies. The hypothesis could be very well applied to inefficient management being replaced (management considered as another factor of the production or revenue function). Hasbrouck (1985) and Bartley and Boardman (1986) find that acquired firms experience below normal stock price performance prior to the acquisition announcement (i.e. relatively lower values of market value to replacement cost ratios). However, that finding alone may be sufficient to prove that the target's management is inefficient only if the stock market is efficient. A stronger case is made by the findings of Morck, Schleifer and Vishny (1987), who find that only hostile takeover targets have below average Tobin's q values. The latter suggested that the management of a mismanaged or undervalued firm will more likely resist a friendly takeover, and force the bidder to make a hostile tender offer.

The inherent assumption of this hypothesis is the potentiality of carry-over of capabilities between firms without incurring additional costs.

A.2. The Synergy Hypothesis

The hypothesis of creating synergies through mergers is based on the assumption that economies of scale and/or scope exist in a particular industry and that prior to the merger, the firms are operating at levels of activity that fall short of the optimal quantity. Stewart, Harris and Carleton (1984) find that companies do not diversify in a random manner, but by seeking targets with strategies and strengths that will enhance synergies with both operational and financial domains. Marshall, Yawitz and Greenberg (1984) find a negative correlation in the cash flows of the bidder and target in conglomerate acquisitions. Synergy advocates maintain that the conservation of value additivity principle is violated with the merging of the income streams in the basic valuation framework of (3.1), synergies will tend to increase $E(NOI)$ through enhanced efficiencies and/or decrease the firm's cost of capital (ξ) through a reduction in the overall business risk. An often neglected element in this hypothesis is the underestimation of the dissynergies that arise from the merging activity, e.g. conflicts of corporate cultures, difficulties in coordinating the operating parts of the new organization, resistance to change, etc. (Ravenscraft and Scherer 1987).

A.3. **The Market Power Hypothesis**

Market power is often defined as the degree of influence that a
firm has in determining the price of its input factors and/or
those of its final products. In order for a firm to increase its
market power, it must integrate horizontally to a degree that its
market share has expanded substantially, and vertically to a
point where it enjoys some degree of monopoly or monopsony.
Assuming that competition policy at different jurisdictions
challenges transactions which could impair competition in the
market, market power can only be enhanced through "tacit
collusion"among the major firms in a particular industry. If
there is a market power gain, it will be reflected on the
internal rate of return (r), since the firm will produce less and
sell at a price higher than its marginal cost. Eckbo (1983) has
indirectly shown that market power is not a significant motive.
By estimating the abnormal returns to major horizontal
competitors of target firms around their merger proposal, Eckbo
found no significant dependence of their CARs to the merger
proposals announcement. Hence, he concluded that the source of
merger gains could not be due to potential "collusion" and/or
expected "predatory" pricing by the merging firms.

A.4. The Diversification Hypothesis

Under the assumptions of perfect and non-frictionless markets, individual shareholders may obtain any level of diversification in the market which is suited to their level of risk aversion. However, transaction costs, differences in borrowing and lending rates, and asymmetry of information between different investors renders investment decision making more constrained on the individual level. Thus the firm endeavour to accomplish what individual investors are constrained to achieve, namely optimal diversification. Technically, a merger between two firms having uncorrelated cash flows will provide a smaller variance of income stream, which could reduce the business risk and hence the overall cost of capital. Alternatively, the merged firm could increase its overall leverage position due to its decreased business risk and increase the return (r) to the existing equity holders. (Galai and Masulis (1976), Shastri (1982)).

A.5. The Strategic Realignment Hypothesis

This hypothesis proposes that the firm is constantly going through a dynamic adjustment on its asset-position, in order to survive and grow (Chung and Weston,1982). The objective of profit maximization is attained by the firm by pushing outwards its production possibilities frontier. This in turn is achieved

through the enhancement of the investment rate (K) and
sustainment of growth over a longer period (T). The hypothesis is
partly supported by findings that show acquired firms growth
rates exceeding those of acquiring firms; Wansley, Roenfedlt and
Cooley (1983), and Herman and Lowenstein (1987). The latter study
finds that targets of hostile takeovers had a rate of growth
twice that of the bidder firms.

A.6. The Economic Disturbance or Information Hypothesis

The economic disturbance hypothesis is based on the assumption of
asymmetric information possessed by the different players in the
market. The hypothesis explains the discrepancy in the value of a
potential target company between different assessments as the
result of differences in each firm's set of information messages.
Gort (1969) cited three specific types of economic disturbances
that are likely to produce accelerated merger activity: rapid
growth,technological change and changes in stock market values.
The information hypothesis was further supported by findings of
Bradley (1980) and Firth (1980) on the impact of 33 unsuccessful
tender offers to the target firms stock price. They find that
post - execution price levels are higher than the rejected offer
premium by 15%. However, Bradley, Desai and Kim (1983) found that
targets of unsuccessful tender offers which were not followed up
by subsequent tender offers had their market prices reversed;
suggesting that it is rather information on potential synergies

that produced the increase in the market price of the target firm and not necessarily the lack of symmetric information. Under this hypothesis, all endogenous variables in the corporate valuation model could be affected, depending on the information content that is assessed.

B.   The Managerial Theories of the Firm

"Economists have long been concerned with the incentive problems that arise when decision making in a firm is the province of managers who are not the firm's security holders".[5] The managerial theory of the firm rejects the model of an owner-manager who operates the firm to maximize profits in favour of the motivations of a manager who controls but does not own and who has little resemblance to the classical "economic man".

The managerial theories spring-forth from the recognition of the motives that characterize the individual behaviour, the imperfections in the markets and the assumed "bounded" rationality of managers. Marris (1964) argues that the three dominant motives are income, status and power.
The most prevalent managerial theory of the firm is the one that posits growth maximization as the objective because that objective tends to optimize the management's utility function

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[5] Quote from Adam Smith, The Wealth of Nations, (1776), cited by Jensen and Meckling (1976).

(Marris (1964), and Mueller (1977)).[6] However, this objective often leads to over-expansion at a point where the internal rate of return is lower than the firm's cost of capital (Baumol et al 1970), (i.e. in equation 3.1 the second component will be of negative value, since $\xi > r$).

The managerial theories of the firm consider these motives and propose different hypotheses for objective maximization usually with some constraint imposed by the market or the firm's shareholders. A range of scenarios could thus persist in the industry depending on the degree of ownership separation from management control, the efficiency of markets and their competition level. Hence, one would expect to see at one extreme a completely uninhibited management's utility function being maximized and at the other extreme a very restricted case (Williamson, 1963).

Hence, the main motive for the majority of mergers is derived from the management's utility function and the main prediction is that mergers provide no allocational efficiency gains to the economy.

B.1. The Size Maximization Hypothesis

Mueller (1970) proposes a hypothesis for conglomerate mergers

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[6] Lewllen and Huntzman (1971) find that managers' compensation is significantly correlated with the profit rate and not with its level of sales.

based on the assumption that managers perceive the discount rate of the firm's capital to be at a level which is lower than the one perceived by its shareholders. In other words the stock market evaluation of the firm will always be lower than the one estimated by the growth maximizing management. This he maintains is the rationale for over-expansion in the large and mature firms. He acknowledges that managers will first consider acquisition candidates which will render synergies but they will not stop acquiring until the last candidate offers a rate of return equal to their perceived opportunity cost of capital. Although, Mueller acknowledges that the price of the stock of such a firm will decrease to the point that a takeover threat is eminent, he maintains that such a firm is always under the threat of a raid from another firm with growth maximizing management.

Mueller's hypothesis runs counter to other managerial economists; in the sense that management is acknowledged as more risk averse than the firm's shareholders (Coffee, 1986), its opportunity cost of capital should be higher than the one provided by the market.

B.2. The Implicit Contracts Hypothesis

This hypothesis views the modern corporation as a complex institutional mechanism designed at least in part to uphold "implicit contracts" reached between the shareholders and other "stakeholders" in the corporation - for example managers,

creditors, employees and possibly certain suppliers (Coffee, 1986; Knoeber, 1986). This hypothesis endeavours to explain the negative synergies assumed to persist within conglomerate empires, where the firm is more valuable broken up than intact (a characterization of the "bust-up" takeovers in the 1980's). A number of theories offered, including managerial risk aversion, imperfect information, the redundancy of diversified investors owning diversified conglomerates and managerial compensation practices under which the firm promises an "ex post" settling-up, a promise that the bust-up takeover breaches.

C.   Neo-Classical Theory with Managerial Constraints

C.1. The Market for Corporate Control Hypothesis

Manne (1965) proposed that mergers provide an effective mechanism for disciplining inefficient management by establishing a threat to their control of the firm's resources. He suggests that the market for corporate control is efficient and can substitute and or complement other monitoring mechanisms instituted by the firm's shareholders in order to mitigate agency costs between themselves and the managers. Shleifer and Vishny (1988) after reviewing evidence of internal control devices maintain that although takeovers provide a threat to inefficient management, the mechanism is not instituted without problems, i.e. the free rider problem, strategic defence by management, disruption of

long-term contracts. The hypothesis is supported by the recent wave of Leveraged-Buy-Outs and the corresponding trend in ex-ante bonding practices in many North American firms.

Grossman and Hart (1988) consider a model where the optimal allocation of voting rights and dividends to securities is determined by its effect on allowing rivals to obtain control from an incumbent management. The critical assumption of the hypothesis is that "control" of the corporation has a positive value to management teams.

Malatesta and Walkling (1988) examine defensive mechanisms such as "poison pills" desired by the incumbent management to discourage takeovers. The securities associated with these plans all have the common feature that on the occurrence of a takeover attempt not approved by the board of directors, certain rights accrue to the security holders.

C.2. The Free Cash Flow Hypothesis

Jensen (1987) defines free cash flow as cash flow in excess of the funds necessary to undertake projects with positive net present values. Free cash flow develops when a company has limited growth potential. Companies with free cash flow are attractive takeover targets, as the acquiring firm can use the target's free cash flow to finance the takeover. Companies with free cash flow may also embark into an acquisition activity as a

means to dispose of it, instead of paying it out to their shareholders. On the one hand, the hypothesis suggests that growth opportunities may increase by using the excess cash flow for acquisitions within higher growth industries, instead of distributing it to the firm's shareholders. However, it also implies that "managers of firms with unused borrowing power and large free cash flows are more likely to undertake low-benefit or even value-destroying mergers". On the other hand, the hypothesis predicts that value increasing takeovers may "occur in response to breakdowns of internal control processes in firms with substantial free cash flow and organizational policies that are wasting resources".

C.3. The Hubris Hypothesis of Takeover Mergers

The Hubris hypothesis is developed by Roll (1986), and it is a corollary of the market efficiency hypothesis in its strong-form. It proposes that managers are ignoring the relevant information existing in the capital markets concerning the valuation of firms, and they pay higher premiums in their belief that the incumbent managers are inefficient, only to find out later that the market correctly assessed the acquired firm. Roll's hypothesis further suggests that product and labour markets are efficient,"in the sense that (a) no industrial reorganization can bring gains in an aggregate output at the same cost or reductions in aggregate costs with same output and (b) management talent is

employed in its best alternative use". However, he admits the limitations of his hypothesis by acknowledging that some acquisitions do provide additional value to the acquiring firm.

D.   Towards an Alternative Acquisition Hypothesis

All hypotheses reviewed in the previous two sections are concerned primarily with the objective analysis of the mergers and acquisitions phenomena. They endeavour to explain why these activities take place and predict their outcome to the parties involved; i.e. stockholders of acquiring and acquired firms, bondholders, managers, general economy, etc. In this respect these hypotheses are useful in providing implications for the general welfare of the national economies, by providing some meaningful explanation of how the market reacts to the firm's policy decisions such as acquisitions and by establishing the sources for improved efficiency on the firm level.

We, on the other hand, develop an alternative hypothesis which determines who should engage in acquisition activity. In other words we identify some necessary conditions that a firm should have in order for the acquisition program to be optimal. It is without doubt that some acquiring firms have benefited from an acquisition more than others.[7] Our hypothesis endeavours to

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[7] The acquiring firm's benefit from an acquisition is a relative measure of its pre-acquisition performance.

establish the characteristic profile of the firm that entices

acquisition activity to add value to it.

CHAPTER IV

THE FIRM'S POLICY DECISIONS

In this chapter we provide a structural model for the policy
decisions of the firm, we study their interrelationship and
assess their impact upon the firm's risk and rate of return.
The model is a variant of the basic corporate valuation model
developed by Miller and Modigliani (1961). It incorporates the
firm's flow of funds equality, and it allows the simultaneous
determination of all the policy decisions of the firm at a
specified point in time.

A.   The Relationship Between Real and Financial Decisions

The relationship of the firm's real policy decisions as it
concerns internal investments, acquisitions and divestitures, and
the financial policy decisions concerning capital structure and
earnings distribution, is of central interest to the discipline
of financial economics. Modigliani and Miller (1958, 1961) have
stated the irrelevancy of financial policy for the determination
of the firm's value by assuming perfect capital markets, no
personal taxes, no bankruptcy costs, no growth, no risk
variability and no transaction costs. Stiglitz (1974)
demonstrates the limitations of the irrelevancy hypothesis by
proving the crucial significance of some of the assumptions in

it. Specifically, he argues that the assumptions of independent expectations from financial policy, of perfect substitution between individual borrowing and firm borrowing, and the non-existence of bankruptcy costs, alter the firm's investment opportunity set.

The assumption of independence of expectations from financial policy has been examined by Ross (1977), who through the signalling hypothesis demonstrates that changes in financial policy provide information for the firm's real policy decisions and as such affect value expectations. The effect of bankruptcy costs upon the value of the firm has been studied by Baxter (1967), Kraus and Lintzenberger (1973) and Kim (1978).[8] These studies show that bankruptcy costs affect the optimal capital structure of the firm by placing an upper limit on debt to equity ratio.

The existence of an optimal capital structure does not itself provide support for the interdependence of financial and real policy decisions. The optimal capital structure of a certain firm is acknowledged by both its management and the participants in the capital markets as a function of the business risk and expected return of the firm's projects. Assuming that management is rational, then a change in financial policy could only come as

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[8] Bankruptcy costs are recognized as "dead weight" losses which cause the value of the firm in bankruptcy to be less than the discounted value of the expected cash flows from operations.

a result of changes taking place in the firm's risk/return vector. In this respect any change in financial policy which does not reflect a change in the real policy decisions would only have short term influence on the firm's value.

A change in the optimal capital structure can arise as a result of major changes in the firm's investment opportunity set. This may arise as a result of decisions taken within the firm, such as major expansion programs, acquisitions in different markets, divestitures of divisions, or any other restructuring activity. Since these decisions have to be accompanied with the appropriate financial policies (the timing of each policy being instituted may vary depending of the necessary conditions that each one would require). Alternatively, changes in the economic business cycle or the industry structure may affect the investment opportunities of particular firms in different ways, and as such require an appropriate financial policy response.

B. The Interdependence of Real Policy Decisions

The interdependence of the real policy decisions among themselves can be studied under the substitution - complementarity framework. It is important to consider whether firms undertaking internal investment and acquisition, do so as an alternative or complementary activities. If it turns out that there is a trade-off between them, one may be able to make inferences about the

managerial and financial constraints facing the firm.

We may state that the elasticity of substitution between investment expenditures and acquisition expenditures is a function of the specificity of resources at the firm's disposal. We can argue that both acquisition and investment are likely to compete for various resources, and if they can both satisfy the firm's objectives equally, there may be substitution between them. On the other hand complementarity between them may arise if one activity enhances the other.

Acquisition activity could overcome the firm's managerial and financial constraints when it is accomplished through the stock exchange and proceeds to operate the acquired entity as a separate subsidiary without managements assimilation. Investment expenditures will be enhanced by acquisition activity when the latter reduces uncertainty in a specific market area or when the firm acquires into an industry which is growing faster than its own.

The degree of complementarity and the rate of substitution between internal investment and acquisitions is a function of the life -cycle of the firm. When the firm is found at the early faster growing stages both financial and organizational constraints are binding, and a trade-off is eminent. Complementarity should increase with the firm passing from the

faster growing stages to less growing ones.[9]

The policy decisions concerning divestitures affects investment and acquisition decisions in a rather complementary fashion; since the firm is disposing an operating unit for funds to be invested in more profitable projects, to acquire other going concerns or to be distributed to its stockholders.

All three real policy decisions have an impact upon the risk/return vector of the firm and they are simultaneously affected by the firm's risk/return vector. Hence, both the firm's business risk (β) and its rate of return (r) are endogenous variables for the determination of the firm's real policy decisions.

Functionally, we may have the following relationships between the firm's three real policy decisions and its risk/return attributes:

$$I = f1 \ (A, \ D, \ \beta_*, \ r_*, \ Xi) \tag{4.1}$$

$$A = f2 \ (I, \ D, \ \beta_*, \ r_*, \ Xa) \tag{4.2}$$

$$D = f3 \ (I, \ A, \ \beta_*, \ r_*, \ Xd) \tag{4.3}$$

$$\beta_* = f4 \ (I, \ A, \ D, \quad X_\beta) \tag{4.4}$$

$$r_* = f5 \ (I, \ A, \ D, \quad X_r) \tag{4.5}$$

Where:

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[9] A life-cycle model for the firm is developed in the next chapter.

I = Gross Investment expenditures

A = Acquisition expenditures

D = Divestiture Receipts

$\beta_\bullet$ = The firm's business risk

$r_\bullet$ = The firm's rate of return

Xi, Xa, Xd, X_β, X_r, denote vectors of exogenous variables affecting each endogenous variable respectively.

Exogenous variables for the investment equation are: the demand growth of the firm's products (g), the depreciation rate (d), the long-term interest rate (i), and the owner/management control variables (C). The demand growth along with the internal rate of return define the investment opportunity set of the firm. The depreciation flows are important since often changes in the depreciation rate affect net investment as well as replacement investment. The long term interest rate is included to capture investors' expectations through the term structure of interest rates. Finally, the owner/management factor is included to recognize the agency problem, where different rates of return on investment could maximize either group's utility function, and hence affect the investment rate.

Exogenous variables for the acquisition equation are: the demand growth of the firm (g), the organizational capabilities (z), the liquidity position, (L), and the owner/management control

variables (C). The demand growth of the firm will indicate the maturity of the firm's products or overall industry and determine the threshold for complementarity between internal investment and acquisitions. Organizational capabilities motivate acquisitions since they define the boundaries of management's efficiency, and provide grounds for synergy in the organizational structure when carried-over to the acquired firm. The liquidity position of the firm motivates acquisitions as a risk-adjusting factor in the working capital or the short-term undertakings. Again, the owner/management control variables will reflect the degree the agency problem affects the external growth of the firm.

The exogenous variables for the divestiture equation are the same as to the acquisition equation. However, the opposite effects are expected, the magnitude might be smaller or larger depending on the life-cycle of the firm.

Exogenous variables for the firm's rate of return (r) are the overall market' s return (Rm) and the industry (ies) (in which the firm is operating) return (Rin).

The business risk of the firm (β_φ) can be affected exogenously by the owner/management control variables (C). If the two groups' utility functions exhibit different degrees of risk aversion, the existence of the agency problem could influence the risk of the overall capital expenditure program.

C. The Interdependence of Financial Policy Decisions

The firm's financial policy decisions relate to the constitution of its capital structure, working capital position and distribution of income. The financing decision (i.e. selecting the source of long-term and short term capital for the firm) is interdependent with the dividend policy decision, given that the various capital providers are affected differently by alternative capital structures and distribution policies.

The position of debt holders is enhanced by an increase of both external equity and retained earnings financing due to improved fixed charges coverage, which decreases the probability of default and increases the market value of the debt security. On the other hand, the position of the equity holders is affected differently for every marginal change in the debt financing – the change affects the risk of bankruptcy which in turn affects the required rate of return on the firm's equity capital.

The relationship between retained earnings and external equity financing can be analyzed within the framework of the agency problem existing between the stockholders and the management. In this context, the position of management is secured by more retained earnings financing than external equity or debt, because the firm will avoid the market's examination and evaluation of

its securities.

Functionally, we may state the following relationship:

$$S = f6 \ (B, \ R, \ W, \ X_s \ ) \tag{4.6}$$

$$R = f7 \ (B, \ S, \ W, \ X_r \ ) \tag{4.7}$$

$$B = f8 \ (S, \ R, \ W, \ X_b \ ) \tag{4.8}$$

$$W = f9 \ (\ S, \ R, \ B, \ X_w \ ) \tag{4.9}$$

Where:

S = External equity financing

R = Retained earnings financing

B = Debt financing

W = Working Capital position

X_s, X_r, X_b, X_w, denote vectors of exogenous variables for the respective financing source.

The business risk $(\beta_\bullet)$ is considered as an exogenous variable to the financing equations because it is determined by the real policy decisions. The owner/management control variable (C) is also included in the exogenous variables to acknowledge the difference in the agents preferences structure. The corporate tax rate (τ) is also included to capture the differential impact upon each source of capital.

D.   A Structural Model

We now combine the equations of the real policy decisions with those of the financing policy to construct a structural model, where all the endogenous variables are simultaneously determined:

$$I = f1 \ (A, \ D, \ r_\varphi, \ \beta_\varphi, \ g, \ d, \ i, \ C \ ) \qquad (4.10)$$

$$A = f2 \ (I, \ D, \ r_\varphi, \ \beta_\varphi, \ g, \ z, \qquad C \ ) \qquad (4.11)$$

$$D = f3 \ (A, \ I, \ r_\varphi, \ \beta_\varphi, \ g, \ z, \qquad C \ ) \qquad (4.12)$$

$$r_\varphi = f4 \ (I, \ A, \ D, \ Rm, \ Rin, \qquad C \ ) \qquad (4.13)$$

$$\beta_\varphi = f5 \ (I, \ A, \ D, \qquad\qquad C \ ) \qquad (4.14)$$

$$S = f6 \ (B, \ R, \ W, \ r_\varphi, \ \beta_\varphi, \ \tau, \qquad C \ ) \qquad (4.15)$$

$$R = f7 \ (B, \ S, \ W, \ r_\varphi, \ \beta_\varphi, \ \tau, \qquad C \ ) \qquad (4.16)$$

$$B = f8 \ (S, \ R, \ W, \ r_\varphi, \ \beta_\varphi, \ \tau, \qquad C \ ) \qquad (4.17)$$

$$W = f9 \ (S, \ R, \ B, \ r_\varphi, \ \beta_\varphi, \qquad C \ ) \qquad (4.18)$$

$$\text{and } I + A + W = S + R + B + D \qquad (4.19)$$

Equation (4.19) is expressing the flow of funds equality and it can be used to eliminate the variables by substitution.
The structural model dichotomizes into two sub-systems of equations (4.10 - 4.14) and (4.15 - 4.18). Once the real policy variables are found, the financing policy sub-system can be solved. Under this model, the adherence of the financing variables to the real policy variables is in accordance with the neo-classical theory of the firm.

CHAPTER V

A LIFE-CYCLE MODEL FOR THE FIRM

In this chapter we develop a life-cycle hypothesis for the firm. We propose that the firm evolves through time in identifiable stages, with each stage varying in duration and posing choices to management with respect to real and financial policy decisions. The underlying proposition of our hypothesis is that a firm endowed with certain resources and capabilities comes into existence in an industry where disequilibrium exists, passes through certain stages where it develops more resources and capabilities, reaches a stage where equilibrium persists in the industry and then it is drawn out by a subsequent disequilibrium in the industry.

We determine each stage's characteristic profile by assessing these resources and capabilities for every life-cycle stage, and provide a meaningful explanation and prediction of the firm's policy decision with respect to acquisition activity.

A. Some A-Priori Considerations

A new firm is created when an innovating entrepreneur (or a team of entrepreneurs) endowed with the right information and capabilities decides to enter into an industry (Schumpeter,

1934). The decision to enter depends on the discrepancy between the observed profitability and the long-run equilibrium profitability, as well as on the past industry's growth rate of output, on the total size of the industry and of the anticipating risk (Orr, 1974). These two arguments infer that although the initiative for the firm's creation comes from the entrepreneur, its viability depends upon the market forces. The fact that market forces such as consumer tastes, technological advances, demographic changes, etc., have created a certain disequilibrium in favour of demand, instigated the entrepreneur to enter into it. Naturally another disequilibrium in another industry could very well instigate the exit of a firm from it.[10]

The evolution of the firm takes place in its organizational, capital, operational and corporate governance structures. The organizational evolution of the firm from the original entrepreneurial structure to functional structure (U-Form) and then to divisional structure (M-Form), is necessitated by the value of information required for decision making at different responsibility levels in the organization and the need to minimize transaction costs (Williamson, 1967,1981).[11]

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[10] Some of the forms considered as exit of a firm from an industry are bankruptcy, liquidation, re-organization and acquisition.

[11] For a different approach to organizational choices, see Boyer & Jacquemin, "Organizational Choices for Efficiency and Market Power", Economic Letters 18(1), 1985, pp.79-82 [see also Boyer & Jacquemin, "Organizational and Industrial Actions for Efficiency and Market Power: An Integrated Approach", pp. 223-246

The capital structure of the firm reflects at any point in time its real policies with respect to its investment opportunity set and its business risk structure. In its efforts to expand its investment opportunity set, the firm engages in asset substitution where the allocation of its resources, either financial or organizational, will be more efficiently utilized. Operational efficiency or economies of scale in production or marketing reflect the specialization and division of labour, the existence of indivisibilities, the economies of increased physical dimensions of some plant and economies of learning processes (Haldi and Whitecomb, 1967). Lastly, the corporate governance structure of a firm evolves through owner/management agency relationship, which in general tends to be increasing with the its size and maturity (Mueller, 1972).

B.   The Life-Cycle Hypothesis of the Firm

In our life-cycle hypothesis we consider four stages to characterize the firm's economic evolution.; (i) the establishment stage, (2) the growth stage, (3) the maturity stage and (4) the decline stage. Each stage is identified by operational, financial, organizational and governmental characteristics. Although identifiable characteristics could be traced for all industries of the economy, in this study only the

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in J.Schwalbach (Ed.) <u>Industry Structure and Performance</u>, Edition Sigma, Berlin, 1985.]

manufacturing and service sectors of the economy have been considered.[12]

B.1. The Establishment Stage

The new firm's primary task is to institute its factors of production. The organizational capital in the original production plan comes basically from the entrepreneur or the team of entrepreneurs. The financing capital is expected to be predominantly equity capital since the firm's opportunity set is rather uncertain and debt financing could jeopardize the firm's short-term existence, due to fixed charges attached to it.[13]

Once the production plan is established, the firm's concern at this stage will be to establish a viable market presence. If competition is limited (e.g. due to innovative characteristics of the firm's product(s)), we would expect few firms in the market and each one may enjoy a substantial market share position. When market presence is established, the key challenge for the firm is keeping up with the growing demand by launching the right marketing strategy with respect to its price, quality, promotion

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[12] The life-cycle model attempts to capture the characteristic profile of a group of firms by abstracting from extreme cases where some firm(s) may exhibit an erratic evolutionary pattern due to irrational decision making or insufficient information in the particular market.

[13] Debt financing by an entrepreneur who is being personally liable in case of default is not considered as purely debt capital to the firm since additional collateral is applied.

and distribution. On the cost side, the increase in production/sales leads to a declining average cost due to the fixity of the original capital and overhead. Whether the firm will enjoy profits in the establishment stage depends on (a) its fixed costs vs. sales level, (b) the price elasticity of demand, (c) the price elasticity of its inputs and (d) its marketing expenditures. Often the capital intensity of the industry dictates the timing of profitability (e.g. in general service industry firms become profitable faster than manufacturing firms).

The real policy decisions at this initial stage will reflect upon the difference between the internal rate of return of its projects and the corresponding cost of capital. As long as the entrepreneur(s) is(are) compensated by a higher return than they would have received in the capital market, they will prefer the reinvestment of all the capital allowances as well as any profits.

Acquisitions at this stage can only affect investment expenditures inversely. The firm is constrained by organizational capital; its actual entrepreneurial team cannot handle the integration of an acquisition and at the same time keep up with increasing investment to satisfy the firm's existing product(s) growing demand. The capital markets, upon evaluation of the firm's endowments and capabilities will not provide the required

additional financing without demanding steep increases in the financing cost rates. Effectively, should the firm launch into an acquisition program it will restrain its actual growth of internal investment. Naturally, internal investment and acquisition activity are substitutable at this stage.

Rationally, the firm's objective of profit maximization could be pursued by capitalizing on its existing opportunity set and by utilizing its resources and capabilities to fully exploit it.

B.2. The Growth Stage

The growth stage is entered as the firm's investment rate starts to increase or when the firm's assets begin to increase at an increasing rate. The firm begins to add new product features and refinements to move into new parts of the market. New competitors are expected to enter the market, attracted by the promise of a large market with opportunities for large scale production and profit.

Operationally, the profitability rate should be increasing at an increasing rate since sales are further increasing and average costs are decreasing; the firm is within its production possibilities frontier, and marginal revenue products are increasing. Certain firms will probably forgo some short-term profits in exchange for market share by lowering prices to

attract the next layer of price sensitive buyers.

The working capital position will have to be high at this stage because of the increasing demand on the firm's products. The firm should have adequate levels of inventories to meet this growing demand and a healthy liquid position to efficiently manage its growing short term liabilities.

The effective cost of capital will tend to decrease in this stage. Financing policy with respect to growth will be enhanced by the possibility of some debt financing, coming as a result of the lowering business risk, brought by the stable growth of profits.[14] Although equity capital might be a little costlier with the debt infusion in the capital structure, the tax shield component is expected to incite an overall decrease in the weighted cost of capital by outweighing the marginal increase in the cost of equity (at least for low debt/equity considerations).

The total capitalization of the firm as well as the range of capital mix in the capital structure would of course be functions of the size of the investment opportunity set and its related risk/return vector. If the investment opportunity set requires capital expenditures which cannot be financed entirely from

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[14] The debt capacity of the firm is directly related to its ability to repay back the principal and interest of the obligation, which ability is a function of its profitability and degree of variability.

retained earnings and debt, then external equity will have to be raised. However, the recourse to the capital markets could lead to some dilution of control. Mueller (1972) says that the beginning of the dilution of control in the firm is also the beginning of the agency problem. The dividend policy decision of the firm at this stage will mainly depend upon the tax structure of the major shareholders (capital gains vs. dividend tax rates) as well as on the opportunity cost attached to retained earnings. We expect dividends to be of small percentage of profits at this stage, primarily due to their informational content that they may provide to market on the firm's expected performance.

Organizationally, the firm will evolve from the pure entrepreneurial structure to a functional structure where authority and responsibility could segregated and specialization could enhance significantly the enlarged operations efficiency (Thain, 1969). The management's capabilities will be broadened to encompass the industry specification since the firm has expanded into other products of the industry (Chung and Weston, 1982).

At this stage the firm is presented with major choices. One choice concerns the type of ownership to take the firm into the next stages; stay privately held, go public or be acquired by another firm. The second choice concerns whether it should begin to make acquisitions or continue emphasizing internal growth , or to take a mixed strategy of both. The firm must evaluate internal

investment and acquisitions concurrently and derive the return on the total capital expenditures.[15]

The accessibility of the capital markets can make an acquisition possible at this stage by the issuance of a new equity or bonds, and hence leave the ensuing internal investment rate unimpaired. However, the acquisition which will provide the highest returns would be one of a horizontal nature. Synergistic results may arise from such an acquisition since industry specific organizational capabilities could be carried over to a firm where those capabilities are not fully developed (Chung and Weston, 1982). On the operational side, synergies are possible due to potential integration of marketing systems, R & D operations and accounting systems, since we would expect duplicate functions to be eliminated (Galbraith, 1977). However, the decision to acquire at this stage does not complement internal investment, it simply increases the scope of the firm's operations.

B.3   The Maturity Stage

At some point in time most of the firms will experience a slowing -down of their growth rate and enter a stage of relative maturity where their growth rate will be equal to that of the general economy. This stage normally lasts longer than the previous

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[15] The interdependence of the real policy decisions and their relationship to the firm's rate of return and associated risk was explained in the preceding chapter.

stages, and it poses some of the most formidable challenges to the firm's management.

The maturity stage can be divided into three phases. The first one can be characterized with a continuation of growth in assets and sales (due to price reduction, customer awareness research), and it could be called "growing maturity". The second phase could be called "saturation", where growth is maintained at a constant level (adjusted for inflation), consisting almost entirely of replacement demand. The third phase could be called "decaying maturity, where the absolute level of sales starts to decline (customers move to substitute firm products). In the growth phase the firm sustains its performance by leading itself to new areas, at least concentrically. Second product lines related to initial product lines , and third product lines related to second, are developed. This expansion and diversification may continue to take place in radial directions moving even further away from the position from which the firm started. All along the firm may continue to decentralize its organizational structure by forming divisions. A point is reached where any further expansion would only lead to a reduction of its internal efficiency (Coase, 1937). The saturation phase comes concurrently with the firm's loss of market power (influence upon price) due to increased competition, and with the beginning of profit erosion. The firm will attempt to avail itself from the ultimate decline stage by realigning itself around its capabilities through spin-offs or

divestitures and concurrently acquisitions in more growing industries (Pashley, 1986; Chung and Weston, 1982). Once the firm passed into the decaying maturity phase, its choices are rather limited to strategic divestitures and/or investing less than the capital allowances.

At the maturity stage we should be observing some conditions which are often identified with long-run equilibrium in the industry. According to the neo-classical theory of the firm, we should have a firm with optimal capital structure, i.e. minimum cost of capital, (Miller and Modigliani, 1959, 1961), average costs to be at the minimum level, earnings to be perpetual and an unvaried business risk level. In turn all these conditions will provide the firm with the maximum net income.

However, some evidence of overinvestment or overexpansion is presented by findings of Baumol et al (1970) than the marginal conditions would allow for the optimization of all factors of production at the maturity stage. They have observed (in certain mature industries) firms having internal rates of return significantly lower than their respective cost of capital suggesting that some element of the shareholders / management agency problem could be in place. The argument from the neo-classical theory advocates suggests that this discrepancy may either be a temporary phenomenon or it is due to possible clientele effects with respect to dividend vs. capital gains tax treatment of the firm's shareholders.

The financing policy should be dictated by the stable returns on investment and steady demand growth. Hence, the firm should accommodate a larger portion of debt in its capital structure. Moreover, long term capital should finance a larger portion of the firm's capital expenditures than working capital. The latter should be at a lower level at this stage, in order to allow the firm to minimize the overall financing costs.[16]

Corporate acquisitions could serve as a necessary mechanism for the firm's sustenance of growth at the maturity stage. When a firm operates in saturated industry(ies) any major internal expansion will have to compete for the existing market; naturally, this will render the internal rate of return to be lower than the cost of capital.[17] Acquisitions at this stage cannot impair investment expenditures; they can only complement them by directing the firm's resources into more growing industries. The redeployment of capital to more growing subsidiaries will enhance shareholders position by converting highly taxed dividend to lower tax capital gains. Furthermore, the management's generic capabilities can be carried over to any

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[16] It is assumed that short term capital is on the average more expensive than long term capital.

[17] The firm will only be able to capture additional market share if it lowers the price on its products or if it increases considerably its marketing expenditures; assuming that competitors follow suite, either one policy will yield a lower internal rate of return.

industry and produce synergies.[18]

Rationally, the firm at this stage will maximize its objective function by redeploying its resources more efficiently. Even if the shareholders/management agency problem is more prevalent at this stage, the value of the firm will be maximized by undertaking a suitable acquisition program rather than overinvesting in existing saturated markets. Although growth is often linked to profitability, its perusal at a level where the marginal conditions are not respected will lead to spoilage of resources and ultimately losses to both shareholders and management (Dean and Smith, 1974).

B.4 The Decline Stage

The decaying maturity phase of the previous stage provides the firm with some important signals to its ultimate direction. When sales are plateauing the signal indicates that there is some overcapacity in the industry(ies) which the firm is operating. This overcapacity leads to intensified competition where mark-downs and off-listing pricing takes place (Kotler, 1976). There is a strong increase in promotional budgets, in the form of trade and consumer deals. Other firms increase their R &D budgets to

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[18] Chung (1982), shows that mature, diversified firms provide the opportunity for their management to develop capabilities with generic overtones such as controlling, planning, directing and financing.

regenerate innovations. All these steps, to the extent that they do not stimulate adequate sales increases, mean some profit erosion. Some of the weaker competitors start dropping out (e.g. bankruptcy, reorganization, complete restructuring, acquisition). The industry eventually consists of a set of well-entrenched competitors whose basic orientation is toward competitive advantage.

The shareholders/management agency problem could be identified nowhere more clearly than at this stage. It could be substantiated by the results of inefficiencies in the factor utilization. We would expect changes in the senior management, brought by the dissatisfaction of the shareholders. In the labour factor, concessions will be demanded or lay-offs will take place.[19] Overall, tensions are expected to persist in all echelons of the organization, since the senior management will apply pressure to the middle management strata.

The erosion of profits will drastically increase the firm's business risk. The firm's financial policies with respect to capital structure and dividend policy will have to be adjusted accordingly. The former will have to absorb more equity financing; conversions of existing debt into equity capital or by simply granting more residual rights to the existing bondholders are some of the firm's options. This will tend to change the dividend policy of the firm by lowering the payout ratio;

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[19] The North American automotive industry experienced similar conditions in the early 1980's.

signalling to the capital markets that the firm's investment opportunity set has become smaller. The value of the firm will then be adjusted by the capital markets downwards to reflect the new information.

Can the firm stop this trend? The answer is a qualified yes; only if the firm embarks into a successful restructuring program, entailing the divestiture of unpromising operations and the redeployment of the receipts to acquiring into industries with higher growth prospects. The latter will be suitable only if the acquired projects are expected to yield higher returns than the shareholders opportunity cost. If not, then receipts from divestitures should be distributed to the shareholders. Firms in the declining stage can regenerate growth through conglomerate acquisitions provided their organizational capabilities can be carried over to the growing industries (Weston and Mansighka, 1971).[20] Although firms will endeavour to reverse the decline stage, for most, it is beyond their capabilities to fight-off the market mechanism (e.g. consumer tastes and preferences change, technology changes, international developments emerge, etc), and eventually they will decline.[21]

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[20] During the 1970's we have seen some firms in the Canadian economy operating in declining industries such as tobacco and alcoholic beverages develop themselves into highly successful conglomerates.

[21] Note that a firm which goes through a certain re-organization and transformation of its inputs could be assumed to be a new firm.

CHAPTER VI

HYPOTHESES AND PREDICTIONS

Relatively few firms have grown exclusively by acquisitions or through internal investments. Often we observe firms engaging in both acquisition activity and other forms of expansion and/or contraction activity at the same time. Thus, acquisitions like other real policy instruments, are not an exclusive avenue for growth or an irreversible one. Our hypotheses begin with the proposition that acquisitions like any other form of expansionary or contracting activity are instruments of strategic decisions that enable the firm to engage in asset substitution and lead it to towards long-run equilibrium , where factors of production are utilized at the optimal level.

We are subsequently stating that the firm is confronted with a set of real policy choices at each distinctly identifiable life-cycle stage. Each set of real policy decisions forms a specific directional strategy, which is characterized by its respective risk/return vector. The firm implements the directional strategy which maximizes its objective function at every life-cycle stage.

The hypothesis does not predict the profitability of acquisitions, internal investment or divestitures. It provides necessary conditions for maximizing the firm's value by

indicating which real policies should be adopted by the firm at different life-cycle stages and thus shows when acquisition activity is most appropriate for the firm. Sufficient conditions for the firm's maximization of value with respect to acquisition policy are provided by the value of the acquired firm vis-a-vis its price of acquisition.

Specific hypotheses and predictions for the acquiring firm and its acquisition activity are stated separately for every stage of the life-cycle.

A.   The Establishment Stage

A summary of the firm's characteristic profile at the initial stage will constitute a firm with high risk, low profitability or losses, high demand growth, high average costs, high cost of capital, moderate liquidity and firm specific management.

The hypothesis states that a high trade-off between internal investment and acquisition activity is present at this stage, with acquisitions hampering internal investment and endangering the firm's viability through excessive risk. Hence, the life-cycle model predicts that acquisitions are not the most desirable instrument for the firm's objective function to be maximized at this stage, since the difference between the internal rate of return and the cost of capital is widening.

B.   The Growth Stage

A summary of the firm's characteristic profile at the growth
stage will constitute a firm with moderate risk, high
profitability, high demand growth, moderate average costs,
moderate cost of capital, high liquidity, industry specific
management and low agency costs.

The hypothesis states that acquisition and internal investment
activity could be undertaken independently, without affecting the
contribution of each other, i.e. there is no trade-off between
them. However, the fact that the firm is still within its
production possibilities frontier and demand for its products is
higher than the one of the general economy, suggests that
internal investment's marginal contribution to the firm's value
will be higher than the one provided by acquisitions. Hence, the
life-cycle hypothesis predicts that acquisitions will not
contribute significantly to the value of the firm.[22]

C.   The Maturity Stage

A summary of the firm's characteristic profile at the maturity

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[22] Firms at this stage are trading at the stock market with
relatively high price/earnings ratio; indicating that the market is
expecting future cash flows to grow substantially and it assess
them accordingly.

stage will constitute a firm with low risk, moderate profitability, high liquidity, low cost of capital, low average costs, low demand growth, generic management and moderate agency costs.

The life-cycle hypothesis states that internal investment and acquisition activity are complementary at this stage. Since internal growth is constrained by saturated markets, (the firm is assumed to be operating at its production possibilities frontier) the only avenue to increase growth and profitability is by acquisition activity into growing industries. The firm's cheaper capital and generic management capabilities can be redeployed to acquired subsidiaries which are operating in growing industries but have inefficient management and high cost of capital.[23] However, the possible presence of the owner/management agency problem may lead to overexpansion by undertaking acquisitions along with an expansionary internal investment; at a point where internal rate of return becomes smaller than the firm's cost of capital. Under this scenario, acquisitions will not enhance the firm's value or stock price. However, the possibility of high agency costs in mature Canadian corporations is a function of the corporation's governance structure. Specifically, the closer the equity position is held the less the agency problem arises. There

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[23] The redeployment of mature firm's resources (i.e. capital and management) into acquired subsidiaries assumes that the firm will have to go through some divestiture program in its existing operations, in order to allow the availability of both capital and management , which is needed to be carried over.

is evidence that the Canadian corporations are more closely held than their American counterparts (Eckbo, 1986; Leighton & Thain, 1990).

Hence, we should expect the group of firms belonging to the maturity stage to be dichotomized into two sub-groups: one with closely held ownership and the other with wide distribution of ownership. The return from acquisitions in the first sub-group should exceed that of the second. But the overall returns derived from acquisitions should be relatively higher than the acquisitions conducted by firms in the growth stage of the firm's life-cycle.

D. The Decline Stage

A summary of the firm's characteristic profile at the decline stage constitutes the firm with moderate risk, low profitability, low liquidity, moderate cost of capital, negative demand growth, moderate average costs, generic management and high agency costs.

The life-cycle hypothesis predicts that divestitures will be the most appropriate real policy for the firm at this stage. The firm should be divesting operating units and/or exiting product lines which provide a rate of return that is lower than the firm's cost of capital. The receipts from divestitures will enhance the firm's liquidity and debt capacity, and will decrease its

business risk. The firm will move back to the maturity stage.

Hence, acquisitions at this stage can only be considered in a sequential manner, after a successful divestiture program. The tendency will be towards conglomerate acquisition program, by focusing into industries with growth opportunities. The contribution of such a program to the firm's value can be significant, since the market had provided a low pre-acquisition capitalization rate.

CHAPTER VII

DATA SELECTION AND FIRM CLASSIFICATION

A. Data Sources

The data for corporate acquisitions in Canada by domestic firms for the period of 1980-88 were obtained from the following two sources:

i.   Department of Consumer and Corporate Affairs, <u>The Merger Registry</u>;

ii.   Aran Kwinta et al, <u>Mergers and Acquisitions in Canada,</u> Richmond Hill, Ontario, Harris-Bentley, 1986,1987, 1988;

B. Selection Procedure

The acquiring firms were selected under the following rules:

i.   The firm's stock was listed on the Toronto Stock Exchange 36 months prior to the acquisition announcement and continued to be listed 36 months after the announcement date ;

ii.   The acquired company constituted at least 5% of the acquiring firm's equity market value;

iii. The acquisition entailed more than 50% of the acquired

firm's assets;

iv. The acquiring firms were drawn only from the manufacturing and service industries;

C. The Empirical Variables

The theoretical derivation of the acquiring firm's characteristic profile is given in the life-cycle model, developed in the previous chapter. In order to apply this model to our sample of acquiring firms we estimated 14 variables for each firm, measuring the financial and operational performance exhibited before the acquisition. These variables form the input for the factor and cluster analyses to scientifically group the acquiring firms into meaningful groupings.

The information required to derive the empirical variables was extracted from The Financial Post Information Service. Historical information related to both accounting and market data was utilized to estimate each variable.

The financial variables estimated here provide the relative position of each firm with respect to its capital structure, working capital and dividend policy decisions. The estimated operational variables provide the relative position of each acquiring firm with respect to market power, growth, efficiency and risk levels.

We assess the capital structure decision by measuring the leverage position and associated debt capacity of the acquiring firms in the year before the acquisition. The debt to equity ratio and the inverse of the total interest charges coverage have been estimated. These two ratios show the relative financial risk exposure of the acquiring firms in the sample.

The working capital decision is assessed by measuring the liquidity position of the firm for the year before the acquisition. We have estimated both current and quick ratios since not all acquiring firms have similar distributions of short term assets and liabilities.

The dividend policy decision is measured by the distribution of profits between the firm's shareholders and its investment into future projects. Both the dividend payout ratio and the respective yield on the shareholders value have been estimated for the year preceding the firm's acquisition.

The efficiency of the acquiring firms is normally measured by their operating results and their relative profitability. The variables estimated as proxies for measuring efficiency are the operating margin, return on assets and return on book value of equity. Again all stock and flow values utilized for the estimation of these ratios were applicable to the year preceding the acquisition.

In order to measure the relative market power of the acquiring firms before the acquisition we estimated a variable reflecting

the market value of the firm's equity and its book value. This variable is almost equivalent to the value expressed by "Tobin's q", and it shows how the firm's replacement value is associated to the original cost value.

As a proxy for the acquiring firm's opportunity cost of equity, the return to market value of equity is estimated. Although this variable is expected to measure closely the cost of equity in a longer horizon, its value over short time horizons may be vulnerable to cyclical performance of the individual firm or industry.

A measure of the acquiring firm's stock price variability in the year prior to the acquisition is utilized as a relative risk variable.[24] The variable is standardized to adjust for absolute share value discrepancies among the acquiring firms.

As a measure for the acquiring firm's internal growth, the growth rate of the acquiring firm's fixed and total assets is estimated for the five year period prior to the acquisition.[25] The annual growth rates were estimated on a compounded basis to take into account the cumulative effect of new asset capacity over the estimation period.

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[24] The coefficient of variation of a firm's stock price during the year prior to the acquisition provides a measure for the firm's business risk. However, the variable is found to have low communality with the other variables and its validity is limited as such.

[25] The period of estimation varied for the 96 firms due to data availability and the period interruption by major acquisition or divestiture programs; 5 years data were utilized in 58 firms, 4 years for 9 firms, 3 years for 9 firms, 2 years for 10 firms and 1 year for 10 firms.

The estimated variables are defined as follows:

1. DTE_{t-1} = (Long Term Debt)$_{t-1}$ / (Market Value of Equity)$_{t-1}$

2. FCR_{t-1} = (Interest Charges)$_{t-1}$ / (Net Operating Income)$_{t-1}$

3. CR_{t-1} = (Current Assets)$_{t-1}$ / (Current Debt)$_{t-1}$

4. QR_{t-1} = (Current Assets-Inventories)$_{t-1}$ / (Current Debt)$_{t-1}$

5. DP_{t-1} = (Dividends)$_{t-1}$ / (Net Income)$_{t-1}$

6. DY_{t-1} = (Dividends)$_{t-1}$ / (Market Value of Equity)$_{t-2}$

7. AP_{t-1} = (Net Operating Income)$_{t-1}$ / (Total Assets)$_{t-1}$

8. ROA_{t-1} = (Net Income)$_{t-1}$ / (Total Assets)$_{t-1}$

9. $ROMVE_{t-1}$ = (Net Income)$_{t-1}$ / (Market Value of Equity)$_{t-2}$

10. $ROBVE_{t-1}$ = (Net Income)$_{t-1}$ / (Book Value of Equity)$_{t-2}$

11. $MVTOBV_{t-1}$ = (Mkt Value of Equity)$_{t-1}$ / (Bk Value of Equity)$_{t-1}$

12. $CV_{t-1} = (\text{Std Dev'n share price})_{t-1} / (\text{Mean share price})_{t-1}$ [26]

13. $(1+FAG)^5 = (\text{Fixed Assets})_{t-1} / (\text{Fixed Assets})_{t-5}$

14. $(1+AG)^5 = (\text{Assets})_{t-1} / (\text{Assets})_{t-5}$

Table 7.1 provides the values of these 14 variables for the 96 acquiring firms considered in this study.

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[26] The standard deviation and mean of the share price of each acquiring firm for the fiscal year before the acquisition were determined based on their closing monthly prices.

Table 7.1
VALUES FOR THE 14 EMPIRICAL VARIABLES

COMPANY	DTE	FCR	CR	QR	DP	DY	AP	ROA	ROMVE	ROBVE	MVMV	CV	FAG	AG
1 ACKLAND'S LTD.	0.364	0.524	1.67	1	0.27	0.032	0.085	0.039	0.12	0.107	0.87	0.19	0.045	0.08
2 ATCO LTD	0.637	0.338	1.29	0.838	0.12	0.028	0.176	0.047	0.23	0.263	1.36	0.28	0.138	0.116
3 BATON BROADCASTING LTD.	0.037	0.023	1.17	0.807	0.213	0.0163	0.23	0.095	0.075	0.175	2.6	0.268	0.144	0.08
4 BOMBARDIER INC.	0.245	0.126	1.628	0.735	0.16	0.0246	0.128	0.0382	0.14	0.12	0.97	0.4	0.065	0.065
5 BRIGHT,T.G. & Co. LTD.	0.097	0.197	2.2	0.545	0.2	0.02	0.154	0.056	0.102	0.091	0.907	0.166	0.026	0.078
6 CANADIAN MARCONI LTD.	0.03	0.005	2.632	1.89	0.213	0.037	0.27	0.142	0.172	0.278	2.08	0.418	0.23	0.22
7 CANADIAN MANOIR INDUSTRIES	0.0001		2.22	1.4	0.08	0.02	0.17	0.088	0.22	0.275	1.25	0.259	0.075	0.065
8 CHARAN INDUSTRIES INC	0.101	0.094	4.23	2.5			0.167	0.084	0.108	0.138	1.56	0.508	0.25	0.36
9 CHUM LTD	0.003	0.005	2.345	2.345	0.14	0.014	0.28	0.115	0.095	0.148	1.89	0.286	0.189	0.12
10 CONTRANS CORP.	1.14	0.19	1.25	1.1	0.29	0.038	0.121	0.026	0.137	0.128	0.96	0.344	0.09	0.18
11 CORBY DISTILLERIES	0	0	4.2	2.05	0.48	0.047	0.137	0.096	0.096	0.114	1.54	0.283	0.02	0.04
12 CCL INDUSTRIES	0.76	0.31	1.495	0.523	0.58	0.064	0.17	0.043	0.11	0.148	1.25	0.41	0.18	0.16
13 CANRON INC	0.54	0.264	2.58	1.56	0.229	0.02	0.112	0.03	0.0873	0.08	0.91	0.25	-0.01	-0.01
14 CARA CORP.	1.2	0.358	0.725	0.48	0.222	0.044	0.26	0.055	0.2	0.2	1	0.373	0.12	0.15
15 CINEPLEX CORP.	0.7	0.279	1.01	0.62	0.045	0.005	0.091	0.035	0.11	0.167	2	0.571	0.24	0.37
16 COMTECH GROUP	0.16	0.108	0.84	0.713	0	0	0.111	0.067	0.157	0.258	1.35	0.219	0.144	0.288
18 CONSUMERS PACKAGING	0.093	0.12	1.62	0.6	0.45	0.069	0.23	0.078	0.154	0.165	1.16	0.407	0.05	0.09
19 R.L. CRAIN LTD.	0.002	0.002	2.87	2.38	0.45	0.071	0.225	0.103	0.157	0.158	0.976	0.362	0.021	0.042
20 DEVELCON	0.006	0.017	3.8	2.33	0	0	0.356	0.025	0.134	0.351	4	0.848	0.5	0.42
21 DEVTEK	0.239	0.102	1.63	0.82	0	0	0.192	0.064	0.075	0.23	2.18	0.331	0.4	0.4
22 DOFASCO LTD.	0.3	0.118	3.59	1.74	0.392	0.036	0.121	0.048	0.093	0.11	0.87	0.29	0.07	0.04
23 DOMINION TEXTILE	0.604	0.225	2.47	0.48	0.406	0.047	0.134	0.033	0.115	0.089	0.84	0.233	0.08	0.02
24 DYLEX LTD.	0.23	0.15	2.06	0.94	0.009	0.002	0.18	0.092	0.206	0.29	1.69	0.31	0.1	0.15
25 EMCO LTD.	0.53	0.285	2.2	1.03	0.4	0.038	0.12	0.031	0.091	0.088	1.09	0.359	0.12	0.09
26 FEDERAL INDUSTRIES LTD.	0.614	0.278	1.653	1.19	0.185	0.019	0.117	0.03	0.103	0.12	1.39	0.265	0.12	0.24
27 FINNING LTD.	0.71	0.58	1.9	0.96	0.25	0.025	0.14	0.038	0.109	0.117	1.24	0.5	0.06	0.04
28 FLEET AEROSPACE CORP.	0.081	0.096	2.202	1.014	0.087	0.012	0.13	0.062	0.14	0.123	1.57	0.524	0.144	0.105
29 FRASER INC.	1.95	0.569	1.728	0.778	0.55	0.023	0.098	0.17	0.059	0.05	0.67	0.476	0.14	0.06
30 GSW INC	0.032	0.185	2.267	1.26	0	0	0.11	0.083	0.125	0.142	1.136	0.58	0.12	0.13
31 GALTACO INC.	1.69	0.55	1.134	0.666	0	0	0.071	-0.004	-0.051	-0.031	0.61	0.422	-0.02	0.02
32 GANDALF INC.	0.049	0.022	3.27	2.307	0	0	0.18	0.075	0.038	0.181	2.92	0.255	0.8	0.45
33 GRAFTON GROUP	0.18	0.107	2.3	1.33	0.171	0.032	0.22	0.093	0.19	0.234	1.35	0.282	0.05	0.06
34 HALEY INDUSTRIES LTD.	0.006	0.001	4.5	3.09	0.35	0.03	0.22	0.085	0.084	0.15	2.15	0.326	0.11	0.11
35 HARDING CARPETS	0.69	0.487	2.099	1.046			0.11	0.021	0.124	0.08	0.833	0.471	-0.1	-0.05
36 HARRIS STEEL GROUP	0.071	0.107	1.52	0.76	0.2	0.04	0.156	0.065	0.196	0.189	1.52	0.593	0.14	0.14
37 HAYES-DANA INC	0.236	0.158	2.452	0.857	0.45	0.049	0.175	0.048	0.108	0.11	1.37	0.276	0.01	0.04
38 IMASCO LTD.	0.255	0.126	1.47	0.417	0.277	0.056	0.16	0.082	0.203	0.288	1.58	0.39	0.14	0.14
39 INNOPAC INC.	0.2	0.145	1.262	0.663	0.2	0.002	0.166	0.066	0.096	0.146	1.78	0.394	0.4	0.36
40 IPSCO INC	0.422	0.192	3.7	1.83	0.7	0.038	0.083	0.021	0.053	0.039	0.73	0.425	0.06	0.04
41 INTERMETCO LTD.	1.25	1.33	1.91	0.88	0.45	0.028	0.097	0.013	0.059	0.038	0.56	0.395	-0.2	-0.15
42 INTERPROVINCIAL PIPELINES	0.4	0.168	1.9	1.9	0.507	0.061	0.184	0.079	0.124	0.188	1.71	0.222	0.1	0.14
43 IVACO INC.	1.43	0.34	2.73	0.723	0.213	0.039	0.107	0.027	0.154	0.154	1	0.307	0.12	0.14

#	Company	1	2	3	4	5	6	7	8	9	10	11	12	13	14
44	JANNOCK LTD.	0.107	0.114	1.58	0.91	0.252	0.051	0.152	0.107	0.202	0.254	1.42	0.46	0.05	0.02
45	JOHN LABATT LTD.	0.425	0.145	1.67	0.986	0.373	0.036	0.188	0.056	0.098	0.174	1.51	0.214	0.12	0.14
46	LAIDLAW TRANSPORTATION LTD	0.23	0.103	3.19	3	0.158	0.014	0.213	0.073	0.09	0.185	2.037	0.53	0.35	0.4
47	LAKE ONTARIO CEMENT LTD.	0.501	0.109	2.06	1.62	0.2	0.068	0.25	0.091	0.197	0.15	1.05	0.47	0.05	0.095
48	LAWSON MARDON GROUP LTD.	0.858	0.311	1.22	0.704	0.21	0.023	0.144	0.033	0.11	0.102	0.888	0.47	0.011	0.19
49	LOBLAW COMPANIES LTD.	0.482	0.18	1.87	0.46	0.169	0.017	0.125	0.037	0.103	0.173	1.84	0.169	0.15	0.14
50	LOGISTIC CORP.	0.68	0.188	1.64	1.64	0.48	0.059	0.165	0.052	0.122	0.154	1.28	0.14	0.06	0.11
51	LUMONICS INC.	0.045	0.007	3.13	2.09	0	0	0.177	0.054	0.039	0.08	2.6	0.253	0.75	0.75
52	MDS HEALTH GROUP LTD.	0.122	0.12	2.88	2.61	0.15	0.017	0.23	0.084	0.144	0.218	2.59	0.627	0.18	0.26
53	MACLEAN HUNTER LTD.	0.44	0.198	1.87	1.66	0.36	0.06	0.242	0.08	0.164	0.396	3.43	0.43	0.35	0.32
54	MARKS WORK WEARHOUSE LTD.	0.44	0.42	1.54	0.372	0	0	0.138	0.04	0.095	0.123	1.29	0.45	0.05	0.08
55	NATIONAL SEA PRODUCTS	1.71	0.227	2.06	0.78	0.1	0.0198	0.144	0.028	0.189	0.15	0.79	0.623	-0.02	-0.06
56	NOMA INDUSTRIES LTD.	0.016	0.074	1.94	0.85	0.15	0.038	0.295	0.139	0.256	0.32	2.1	0.543	0.05	0.15
57	THE OSHAWA GROUP	0.175	0.084	1.58	0.65	0.176	0.029	0.177	0.0748	0.163	0.185	1.415	0.341	0.05	0.08
58	PCL INDUSTRIES	0.333	0.33	1.14	0.59	0.05	0.0043	0.127	0.046	0.0877	0.158	2.06	0.43	0.15	0.25
59	PEERLESS CARPET	0.45	0.254	1.51	0.53	0.103	0.021	0.173	0.039	0.128	0.137	1.06	0.707	0.055	0.081
60	PROVIGO INC.	0.34	0.211	1.14	0.64	0.2	0.026	0.161	0.053	0.206	0.341	2.139	0.465	0.42	0.45
61	PHILIPS CABLES LTD.	0.056	0.051	2.57	1.18	0.45	0.083	0.181	0.114	0.21	0.17	0.8	0.285	0.015	0.025
63	PRINCIPAL NEO-TECH INC.	1.25	0.43	1.23	0.89	0.22	0.07	0.109	0.029	0.175	0.095	0.54	0.632	-0.045	0.02
64	QUEBECOR INC.	0.17	0.125	1.06	0.7	0.13	0.014	0.174	0.063	0.103	0.213	2.64	0.45	0.33	0.28
65	RED PATH INDUSTRIES LTD.	0.3	0.182	2.29	2.03	0.17	0.037	0.18	0.104	0.217	0.191	0.88	0.29	-0.08	-0.03
66	ROLLAND INC.	0.32	0.157	2.09	1.01	0.34	0.052	0.142	0.051	0.153	0.118	0.94	0.29	0.05	0.07
67	SHL SYSTEMHOUSE INC.	0.035	0.208	2.06	2.02	0	0	0.317	0.265	0.128	0.471	3.67	0.755	0.5	0.2
68	SCHNEIDER CORP.	0.214	0.08	2	0.99	0.18	0.025	0.191	0.075	0.14	0.117	1	0.234	0.05	0.06
69	SCINTREX LTD.	0	0.022	2.72	1.55	0	0	0.143	0.074	0.095	0.111	1.73	0.365	0.06	0.12
70	SCOTTS HOSPITALITY INC	0.75	0.21	1.02	0.93	0.188	0.028	0.221	0.066	0.15	0.275	2.07	0.478	0.08	0.11
71	JOSEPH SEAGRAMS AND SONS I	0.136	0.113	2.12	1.01	0.192	0.013	0.094	0.069	0.068	0.117	1.85	0.365	-0.10	0.082
72	SELKIRK COMMUNICATIONS LTD	0.252	0.197	1.66	1.58	0.28	0.036	0.161	0.08	0.122	0.152	1.37	0.28	0.144	0.16
73	SHAW CABLE SYSTEMS LTD.	0.165	0.22	2.06	2.06	0.22	0.013	0.196	0.038	0.06	0.077	1.33	0.453	0.12	0.18
74	SHAW INDUSTRIES LTD.	0.006	0.073	1.65	1.17	0.16	0.028	0.22	0.105	0.17	0.17	1	0.26	0.045	0.06
75	SICO INC.	0.247	0.0406	1.78	0.78	0.309	0.033	0.164	0.09	0.106	0.45	3.72	0.498	0.33	0.51
76	SILCORP LTD.	0.5	0.22	0.94	0.44	0.36	0.024	0.103	0.014	0.071	0.057	0.91	0.23	0.015	0.02
77	SHEPHERD PRODUCTS LTD.	0.124	0.127	2.77	1.24	0.18	0.027	0.194	0.069	0.149	0.107	0.718	0.4	0.01	0.03
78	SLATER INDUSTRIES INC.	0.397	0.188	2.6	0.875	0.046	0.044	0.115	0.044	0.095	0.095	1	0.345	0.06	0
79	SOMMERVILLE BELKIN IND.	1.12	0.247	2.32	0.93	0.47	0.12	0.162	0.061	0.256	0.22	0.859	0.29	-0.076	-0.01
80	SOUTHAM INC.	0.315	0.337	1.15	0.7	0.45	0.045	0.232	0.077	0.1	0.2	2	0.321	0.135	0.16
81	SPAR AEROSPACE LTD.	0.037	0.166	1.3	0.88	0.186	0.016	0.123	0.032	0.085	0.115	1.72	0.397	0.18	0.36
82	ST. LAWRENCE CEMENT INC.	2.02	0.35	2.6	1.58	0.24	0.044	0.187	0.042	0.18	0.135	0.75	0.142	0.04	0.05
83	D.A. STUART LTD.	0.054	0.001	1.8	0.84	0.193	0.024	0.146	0.068	0.123	0.122	0.96	0.108	0.03	0.03
84	STANDARD BROADCASTING CORP	0.067	0.054	1.52	1.36	0.43	0.041	0.315	0.122	0.095	0.193	2.02	0.294	0.18	0.17
85	TOROMONT INC.	0.585	0.236	1.47	1.13	0.72	0.046	0.083	0.035	0.077	0.084	1.1	0.176	-0.08	-0.002
86	TRIMAC LTD.	0.765	0.128	1.44	1.16	0.095	0.02	0.32	0.08	0.216	0.45	2.17	0.506	0.24	0.28
87	THE TORONTO SUN PUB. CORP.	0.189	0.08	2.7	2.58	0.105	0.014	0.195	0.0736	0.135	0.302	1.22	0.41	0.2	0.3
88	THOMPSON NEWSPAPERS	0.06	0.03	1.9	1.77	0.39	0.042	0.308	0.153	0.107	0.277	2.79	0.27	0.087	0.145
89	VULCAN PACKAGING INC.	0.318	0.316	1.58	0.811	0.035	0.0041	0.164	0.048	0.11	0.365	2.34	0.636	0.13	0.15
90	VARITY CORP.	1	0.43	1.57	0.863	0	0	0.085	0.003	0.012	0.01	0.83	0.699	-0.144	-0.14
91	V.S. SERVICES LTD.	0.094	0.022	1.87	1.57	0.263	0.036	0.193	0.0812	0.138	0.155	1.47	0.165	0.18	0.144
92	UNICAN SECURITY SYSTEMS LT	0.39	0.18	1.71	0.64	0.082	0.008	0.19	0.059	0.097	0.197	2.203	0.671	0.39	0.31
93	UAP INC.	0.24	0.136	2.11	0.71	0.26	0.032	0.135	0.057	0.12	0.141	1.3	0.235	0.18	0.18

94 WESTERN INTL COMMUNICATIONS	0.545	0.345	1.91	1.91	0.496	0.043	0.15	0.033	0.088	0.062	0.94	0.201	0.097	0.128
95 WAFERBOARD CORP. LTD.	0.252	0.222	3.01	1.71	0.14	0.028	0.19	0.045	0.188	0.181	1.4	0.336	0.022	0.055
96 WARRINGTON INC.	3.99	0.63	1.3	0.688	0	0	0.123	-0.046	-0.044	-0.034	0.6	0.597	-0.020	0.005
97 GEORGE WESTON LTD.	0.9	0.176	1.32	0.45	0.2	0.024	0.154	0.038	0.125	0.171	1.55	0.255	0.12	0.1
98 WHONNOCK INDUSTRIES LTD.	3.42	0.574	1.52	0.37	0.2	0.03	0.128	0.021	0.148	0.1	0.7	0.432	0.02	0.03

D. Factor Analysis

In order to classify our multivariate data set, it is appropriate to reduce its dimensionality from the existing 14 variables to a smaller number of characteristics. In this context, factor analysis has been implemented to reduce the dimensionality of the data set and at the same time to retain most of the information in it.[27]

Although a thourough discussion of the technical aspects of factor analysis is beyond the scope of this thesis,[28] some reference to the properties of the model are desirable in order to assess its suitability to this study. An elementary discussion of the common factor model is provided in Appendix 2.

The analyses performed were through the Statistical Analysis System (SAS) and included the principal components method, the principal factor method and the maximum likelihood method.

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[27] For an interesting application of factor analysis and cluster analysis to the identification of investments opportunity, see Boyer, M., Dagenais, M.G., Martin, F., "Identification de grappes industrielles pour la génération de projets d'investissements", Revue Canadienne de Sciences Régionales", Vol. IV, no 1, 1981, pp.47-71. [see also Boyer, M., Dagenais, M.G., Martin, F., "Génération et évaluation des projets d'investissement pour l'économie québécoise", C.R.D.E., Université de Montréal, 1980, 152 p.]

[28] Harman (1976) gives a lucid discussion of many of the more technical aspects o factor analysis.

Principal components extracted 5 factors, principal factors extracted 5 factors and maximum likelihood extracted 6 factors. All analyses were completed with Varimax and Promax rotation and produced 5 distinct factors.

The Maximum Likelihood (ML) analysis was chosen here because it provides better estimates than the principal factor analysis in large samples,[29] its estimates have desirable asymptotic properties[30] and allows hypothesis testing for its extracted number of factors. Moreover, the ML method does not require a data set of multivariate normal distribution. The rotated factor pattern of the ML analysis with a Varimax Rotation are shown in table 7.2.

The CV variable was omitted from the analysis because of its very low communality (0.328) with the other variables. All other variables were retained in the analysis. Table 7.3 shows the prior communality estimates, the preliminary eigenvalues indicating that six factors should be retained, and the convergence criterion been satisfied after 11 iterations.

Table 7.4 shows the significance tests based on 96 observations. The 6 factors are sufficient in explaining the data set, e.g.

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[29] Bickel and Doksum (1977)

[30] Ibid

$\chi^2=34.32$, DF=15, and the probability of obtaining a greater χ^2 statistic than that observed is only 0.0031. Akaike's information criterion and Schwarz's Bayesian criterion attain their minimum values at 6 common factors and Tucker and Lewis reliability coefficient is equal to 0.87. Moreover, squared canonical correlations for the first 6 factors are particularly high, confirming the robustness of the 6 factor solution.

Each of the 5 common factors shown by the <u>factor structure</u> on table 7.5 is adequately defined by at least two of the original variables, with the sixth factor being a unique factor (defined by only one variable).

The extracted common factors are interpreted as follows:

Factor 1 is identified as an operating efficiency factor, and is defined by AP, ROA, ROBVE, and MVTOBV;

Factor 2 is identified as a growth factor, and is defined by FAG and AG;

Factor 3 is identified as a liquidity factor, and defined by CR and QR;

Factor 4 is identified as a dividend policy factor, and is defined by DP and DY;

Factor 5 is identified as a financial risk factor, and is defined by DTE and FCR;

Factor 6 is identified as an opportunity cost or cost of equity rate and is strongly defined by its proxy ROMVE.

The scores of these 6 common factors and the values of the CV variable were standardized to a mean of zero and a variance of one to form the input data set for the Cluster analysis.

Table 7.2

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4	5	6
1	-0.22739	-0.11010	-0.15892	0.03057	0.95361	-0.02450
2	0.27416	0.38797	-0.06013	0.41075	0.10672	0.76850
3	0.00114	0.87331	0.01497	-0.41154	0.11074	-0.23554
4	-0.16459	0.25127	0.13486	0.80895	-0.02619	-0.48631
5	0.25494	-0.06765	0.93859	-0.06389	0.21199	0.02135
6	0.88377	-0.08349	-0.26790	0.05006	0.14609	-0.34113

ROTATED FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
DTE	-0.22739	-0.11010	-0.15892	0.03057	0.95361	-0.02450
FCR	-0.28757	-0.24898	-0.23120	-0.03976	0.54194	-0.16362
CR	0.03294	-0.01525	0.75047	0.03929	-0.14794	-0.02496
QR	0.21388	0.13228	0.93960	0.01495	-0.11894	-0.05136
DP	-0.06077	-0.15798	0.04751	0.77969	-0.03982	-0.10795
DY	0.05836	-0.17905	0.01372	0.91879	0.05437	0.34236
AP	0.70433	0.15698	0.23034	0.04763	-0.10796	0.15861
ROA	0.59433	0.00527	0.18700	0.04001	-0.30801	0.12679
ROMVE	0.33033	-0.12872	-0.08098	0.12902	-0.13283	0.91294
ROBVE	0.80008	0.29806	-0.09617	-0.08471	-0.14233	0.34755
MV_TO_BV	0.70976	0.55354	0.03053	-0.16022	-0.19626	-0.20073
FAG	0.25795	0.83839	0.07151	-0.19253	-0.11018	-0.09904
AG	0.13951	0.96324	0.04983	-0.17876	-0.13514	0.00242

VARIANCE EXPLAINED BY EACH FACTOR

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
WEIGHTED	15.417764	9.374321	25.737738	2.359306	1.980874	1.859266
UNWEIGHTED	2.376642	2.216068	1.639557	1.578762	1.457003	1.205092

FINAL COMMUNALITY ESTIMATES AND VARIABLE WEIGHTS
TOTAL COMMUNALITY: WEIGHTED = 56.729270   UNWEIGHTED = 10.473124

	DTE	FCR	CR	QR	DP	DY	AP
COMMUNALITY	1.000000	0.520195	0.588571	0.963092	0.652060	1.000000	0.612858
WEIGHT	.	2.083973	2.430741	27.095017	2.874032	.	2.583240

	ROA	ROMVE	ROBVE	MV_TO_BV	FAG	AG
COMMUNALITY	0.500771	1.000000	0.886436	0.915583	0.833560	1.000000
WEIGHT	2.003103	.	8.804948	11.846231	6.007984	.

SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
0.914220	0.999074	0.956986	0.999569	0.995923	0.987590

Table 7.3

INITIAL FACTOR METHOD: MAXIMUM LIKELIHOOD

PRIOR COMMUNALITY ESTIMATES: SMC

DTE	FCR	CR	QR	DP	DY	AP	ROA	ROMVE	ROBVE	MV_TO_BV	FAG	AG
0.548672	0.557415	0.622859	0.677104	0.672738	0.757978	0.628867	0.555228	0.792264	0.852103	0.856858	0.851126	0.844933

PRELIMINARY EIGENVALUES: TOTAL = 41.0812   AVERAGE = 3.16009

	1	2	3	4	5	6	7
EIGENVALUE	22.164518	9.592945	4.883574	3.085922	1.963118	1.151644	0.381810
DIFFERENCE	12.571573	4.709372	1.797652	1.122804	0.811474	0.769834	0.294664
PROPORTION	0.5395	0.2335	0.1189	0.0751	0.0478	0.0280	0.0093
CUMULATIVE	0.5395	0.7730	0.8919	0.9670	1.0148	1.0429	1.0521

	8	9	10	11	12	13
EIGENVALUE	0.087146	-0.143809	-0.358603	-0.484863	-0.582651	-0.659584
DIFFERENCE	0.230955	0.214794	0.126259	0.097788	0.076933	
PROPORTION	0.0021	-0.0035	-0.0087	-0.0118	-0.0142	-0.0161
CUMULATIVE	1.0543	1.0508	1.0420	1.0302	1.0161	1.0000

6 FACTORS WILL BE RETAINED BY THE NFACTOR CRITERION

ITER	CRITERION	RIDGE	CHANGE	COMMUNALITIES						
1	0.494649	0.000	0.26345	0.79531	0.54613	0.52792	0.94055	0.69063	0.88137	0.60196
				0.52022	1.00000	0.87198	0.87989	0.81743	0.97966	
2	0.447140	0.000	0.09518	0.82810	0.54643	0.54195	0.96367	0.61113	0.97656	0.60215
				0.51670	1.00000	0.87785	0.89034	0.81492	1.00000	
3	0.440672	0.000	0.02344	0.82848	0.54797	0.54267	0.96849	0.59486	1.00000	0.60217
				0.51654	1.00000	0.87850	0.89185	0.81611	1.00000	
4	0.411911	0.000	0.04381	0.87229	0.54602	0.55153	1.00000	0.62586	1.00000	0.60483
				0.51316	1.00000	0.88376	0.90339	0.82547	1.00000	
5	0.402045	0.000	0.06215	0.93444	0.53496	0.57256	1.00000	0.65034	1.00000	0.60990
				0.50690	1.00000	0.88653	0.91464	0.83267	1.00000	
6	0.400206	0.000	0.06556	1.00000	0.51648	0.57325	0.99360	0.65032	1.00000	0.61088
				0.50060	1.00000	0.88557	0.91609	0.83297	1.00000	
7	0.399954	0.000	0.01870	1.00000	0.51808	0.58260	0.97490	0.65194	1.00000	0.61317
				0.50026	1.00000	0.88520	0.91660	0.83338	1.00000	
8	0.399907	0.000	0.00605	1.00000	0.51935	0.58549	0.96885	0.65201	1.00000	0.61308
				0.50031	1.00000	0.88613	0.91578	0.83354	1.00000	
9	0.399896	0.000	0.00360	1.00000	0.51979	0.58750	0.96525	0.65204	1.00000	0.61296
				0.50067	1.00000	0.88621	0.91576	0.83353	1.00000	
10	0.399894	0.000	0.00138	1.00000	0.52005	0.58817	0.96387	0.65205	1.00000	0.61292
				0.50070	1.00000	0.88640	0.91560	0.83356	1.00000	
11	0.399894	0.000	0.00078	1.00000	0.52015	0.58860	0.96309	0.65206	1.00000	0.61289
				0.50077	1.00000	0.88643	0.91558	0.83355	1.00000	

CONVERGENCE CRITERION SATISFIED.

<u>Table 7.4</u>

<u>INITIAL FACTOR METHOD: MAXIMUM LIKELIHOOD</u>

<u>SIGNIFICANCE TESTS BASED ON</u>   96 OBSERVATIONS:

TEST OF H0: NO COMMON FACTORS.
   VS HA: AT LEAST ONE COMMON FACTOR.

    CHI-SQUARE =   855.277 DF =   78   PROB>CHI**2 = 0.0001

TEST OF H0:   6 FACTORS ARE SUFFICIENT.
   VS HA: MORE FACTORS ARE NEEDED.

    CHI-SQUARE =   34.324 DF =   15   PROB>CHI**2 = 0.0031

AKAIKE'S INFORMATION CRITERION =   190.3898
SCHWARZ'S BAYESIAN CRITERION =   192.6401
TUCKER AND LEWIS'S RELIABILITY COEFFICIENT =   0.8707207

SQUARED CANONICAL CORRELATIONS

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
1.000000	1.000000	1.000000	1.000000	0.959848	0.893514

EIGENVALUES OF THE WEIGHTED REDUCED CORRELATION MATRIX: TOTAL =   32.2966   AVERAGE =   3.58851

	1	2	3	4	5	6	7
EIGENVALUE	.	.	.	.	23.905651	8.390943	0.501413
DIFFERENCE	.	.	.	.	15.514708	7.889530	0.091013
PROPORTION	.	.	.	.	0.7402	0.2598	0.0155
CUMULATIVE	.	.	.	.	0.7402	1.0000	1.0155

	8	9	10	11	12	13
EIGENVALUE	0.410401	0.135249	-0.094021	-0.175300	-0.373220	-0.404523
DIFFERENCE	0.275152	0.229270	0.081279	0.197919	0.031304	
PROPORTION	0.0127	0.0042	-0.0029	-0.0054	-0.0116	-0.0125
CUMULATIVE	1.0282	1.0324	1.0295	1.0241	1.0125	1.0000

VARIANCE EXPLAINED BY EACH FACTOR

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
WEIGHTED	8.116420	4.039304	9.358670	2.918282	23.905651	8.390943
UNWEIGHTED	2.397597	1.741297	2.616154	1.064694	1.526124	1.127259

Table 7.5

FACTOR STRUCTURE (CORRELATIONS)

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
DTE	-0.44969	-0.28104	-0.30718	0.05357	0.99927	-0.08989
FCR	-0.48106	-0.36190	-0.33545	-0.01366	0.65512	-0.19431
CR	0.12606	0.03875	0.76331	0.07665	-0.28618	-0.06366
QR	0.34640	0.23125	0.96773	0.03076	-0.35109	-0.09673
DP	-0.13783	-0.29576	0.09250	0.77909	0.00232	0.05014
DY	-0.01462	-0.34664	0.05632	0.96864	0.06372	0.52534
AP	0.75562	0.31964	0.31666	0.03754	-0.32094	0.26486
ROA	0.64376	0.17502	0.28468	0.05113	-0.45952	0.24982
ROMVE	0.37870	-0.09799	-0.04616	0.24529	-0.19174	0.98721
ROBVE	0.88412	0.48036	0.00183	-0.11493	-0.33780	0.44734
MV_TO_BV	0.84035	0.75175	0.14112	-0.29217	-0.40951	-0.14927
FAG	0.49939	0.90891	0.12932	-0.35521	-0.27704	-0.20411
AG	0.43679	0.99416	0.10200	-0.35300	-0.28938	-0.14593

VARIANCE EXPLAINED BY EACH FACTOR IGNORING OTHER FACTORS

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
WEIGHTED	22.878177	15.991877	27.807609	3.679238	8.574900	2.931765
UNWEIGHTED	3.645554	3.225317	1.968245	1.968660	2.430176	1.730235

FINAL COMMUNALITY ESTIMATES AND VARIABLE WEIGHTS
TOTAL COMMUNALITY: WEIGHTED = 56.729270   UNWEIGHTED = 10.473124

	DTE	FCR	CR	QR	DP	DY	AP
COMMUNALITY	1.000000	0.520195	0.588571	0.963092	0.652060	1.000000	0.612858
WEIGHT	.	2.083973	2.430741	27.095017	2.874032	.	2.583240

	ROA	ROMVE	ROBVE	MV_TO_BV	FAG	AG
COMMUNALITY	0.500771	1.000000	0.886436	0.915583	0.833560	1.000000
WEIGHT	2.003103	.	8.804948	11.846231	6.007984	.

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
0.944356	0.998832	0.962855	1.000000	0.999930	0.998819

E.   Cluster Analysis

Cluster analysis was utilized in our study through the SAS
package to produce meaningful groupings of acquiring firms,
sharing similar characteristics. These groupings form the basis
of the classification scheme needed for predicting the
suitability of the acquisition decision under each life cycle
stage.

Clustering methods may themselves be classified into types
according to the clustering objective and process utilized in
them.[31] An elementary discussion of the different clustering
methods is provided in Appendix 3.

A common problem to all clustering techniques is the difficulty
of deciding the number of clusters present in the data. For those
techniques which seek to optimize some clustering criterion, it
is generally suggested that a plot of the criterion value against
the number of groups will indicate the correct number to consider
by showing a sharp increase (or decrease if the criterion is
minimized), at the correct number of groups.[32]

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[31] The different clustering methods are discussed in Anderberg
(1973), Hartigan (1975), Everitt (1980), and Spath (1980).

[32] Everitt (1980).

Several of the clustering methods available in SAS were
implemented in order to determine the optimal number of clusters
for our data set. They include - Average Linkage, Centroid,
Density Linkage, Single Linkage, Two Stage Density, Ward's
Minimum Variance and FASTCLUS.

For the average linkage method, the cubic clustering criterion
(CCC) has a peak at 6 clusters. The pseudo F statistic has peaks
at 6 and 3 clusters. The pseudo t^2 statistic attains lows at 7
and 3 clusters.

For the centroid method, the CCC has peaks at 4 and 8 clusters.
The pseudo F statistic has a peak at 4 clusters and the pseudo t^2
statistic has lows at 4 and 8 clusters.

For the density linkage, CCC has a peak at 6 clusters, The pseudo
F statistic has a peak at 7 clusters and the pseudo t^2 has a low
at 4 clusters.

For the single linkage, CCC has a peak at 6 clusters, The pseudo
F statistic has a peak at 4 clusters and the pseudo t^2 statistic
has a low at 4 and 7 clusters.

For the two stage density linkage, CCC has a peak at 6 clusters.
The pseudo F statistic has a peak at 4 clusters and the pseudo t^2
has a low at 4 and 7 clusters.

For the Ward's minimum variance method, CCC provides peaks at 1
and 20 clusters. The pseudo F statistic has a peak at 2 clusters
and the pseudo t^2 has lows at 4 and 7 clusters.

There is some inconsistency between the solutions produced by all

of the above six clustering methods, although there seem to be a
range of solutions anywhere from 3 to 7 clusters, with the
majority indicating a 4 or 7 cluster solution.

FASTCLUS was executed for solutions providing 3 through 6
clusters and table 7.6 shows the values for the CCC and the
pseudo F statistic. The 3 cluster solution is chosen since both
the CCC criterion and the Pseudo F statistic reach their maximum
values, and it is better interpreted than the other solutions.
The solution from FASTCLUS is preferred in this study because it
partitions the data set distinctively and provides clusters with
better sizes than the other hierarchical clustering methods.
The frequency of the 3 cluster solution provides for 7, 34, and
55 cases.[33] Appendix 5 lists the acquiring companies in the
three cluster solution.
In order to study the direction of the differences of the three
groups, we conducted canonical discriminant analysis. The aim of
this analysis was to find linear combinations of the original
factors that show large differences among the group means. The
linear combinations are called the first, second,... nth (linear)
canonical discriminant variables for optimally differentiating
among the given number of groups.

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[33] The frequency for the 4, 5, and 6 cluster solutions given
by FASTCLUS were {7, 18,21,50}, {6,14,15,26,35} and
{3,5,9,15,17,47} respectively. The main difference between the 4
and 3 cluster solution was that the former divided the growth
companies into two sub-groups.

The first two canonical discriminant variables transformed the individual company scores to a single discriminant score, and that score is the individual location along the two dimensional space of the first and second canonical variables. Figures 7.1 to 7.4 plot the 3 to 6 cluster FASTCLUS solutions by the first two canonical discriminant variables. We see clearly that the three cluster solution partitions better the acquiring firms and as such reinforce the statistical significance of the pseudo-F and CCC criterion shown in table 7.6.

The most appropriate measure to describe the representative firm of every cluster for each of the original 14 variables would be the median value in each group. The mean may not describe the representative firm for each variable because it is sensitive to outliers and to small size groups. Table 7.7 shows the mean and median values for the 14 empirical variables of the three clusters.

TABLE 7.6.

CLUSTER EFFECTIVENESS IN FASTCLUS SOLUTIONS

Number of Clusters	Pseudo-F	CCC
3	22.81	8.70
4	19.67	6.82
5	19.54	7.24
6	16.61	4.10

Table 7.7

VARIABLE FREQUENCY STATISTICS BY CLUSTER

Variable	Cluster 1 Decline Stage		Cluster 2 Growth Stage		Cluster 3 Mature Stage	
	Mean	Median	Mean	Median	Mean	Median
DTE	2.14	1.71	0.2	0.16	0.45	0.36
FCR	0.62	0.57	0.13	0.11	0.2	0.36
CR	1.6	1.57	2.1	1.92	2.00	1.90
QR	0.72	0.78	1.44	1.09	1.09	1.00
DP	0.19	0.10	0.12	0.10	0.29	0.25
DY	0.01	0.02	0.01	0.01	0.04	0.04
AP	0.11	0.10	0.20	0.19	0.16	0.15
ROA	0.03	0.01	0.08	0.07	0.06	0.05
ROMVE	0.05	0.06	0.12	0.11	0.14	0.13
ROBVE	0.04	0.04	0.23	0.21	0.15	0.14
MVTOBV	0.68	0.67	2.19	2.09	1.18	1.09
CV	0.52	0.48	0.46	0.45	0.31	0.29
FAG	-0.03	-0.02	0.27	0.20	0.06	0.05
AG	-0.03	-0.01	0.27	0.25	0.08	0.07

Figure 7.1

THREE CLUSTER FASTCLUS SOLUTION

PLOT OF CAN1*CAN2   SYMBOL IS VALUE OF CLUSTER

CAN1
5
4
3
2
1
0
-1
CAN2
-2
-3
-4
-5
-6
-7
-8

-3.5   -2.0   -0.5   1.0   2.5   4.0   5.5
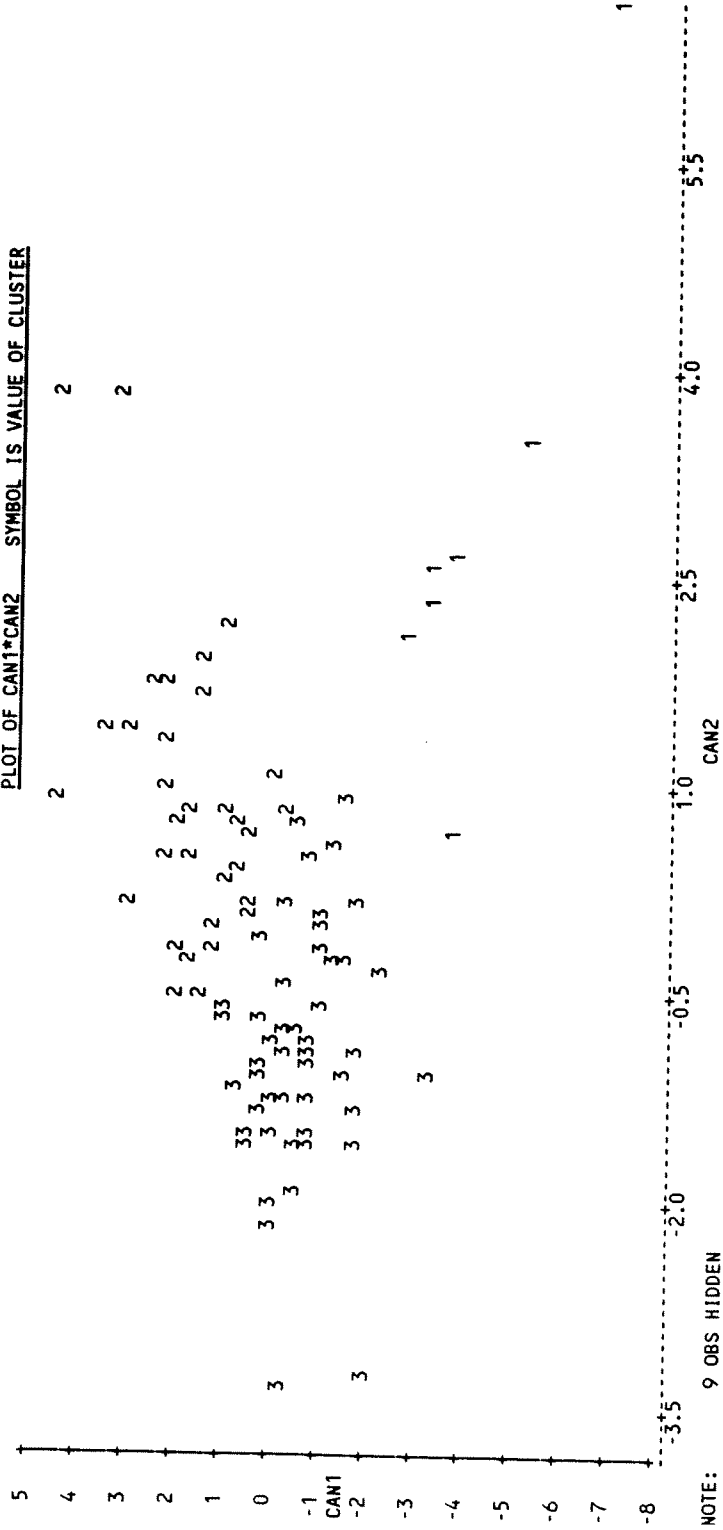
CAN2

NOTE: 9 OBS HIDDEN

Figure 7.2
FOUR CLUSTER FASTCLUS SOLUTION
PLOT OF CAN1*CAN2   SYMBOL IS VALUE OF CLUSTER

NOTE: 2 OBS HIDDEN

Figure 7.3
FIVE CLUSTER FASTCLUS SOLUTION
PLOT OF CAN1*CAN2   SYMBOL IS VALUE OF CLUSTER

NOTE: 8 OBS HIDDEN

Figure 7.4
SIX CLUSTER FASTCLUS SOLUTION
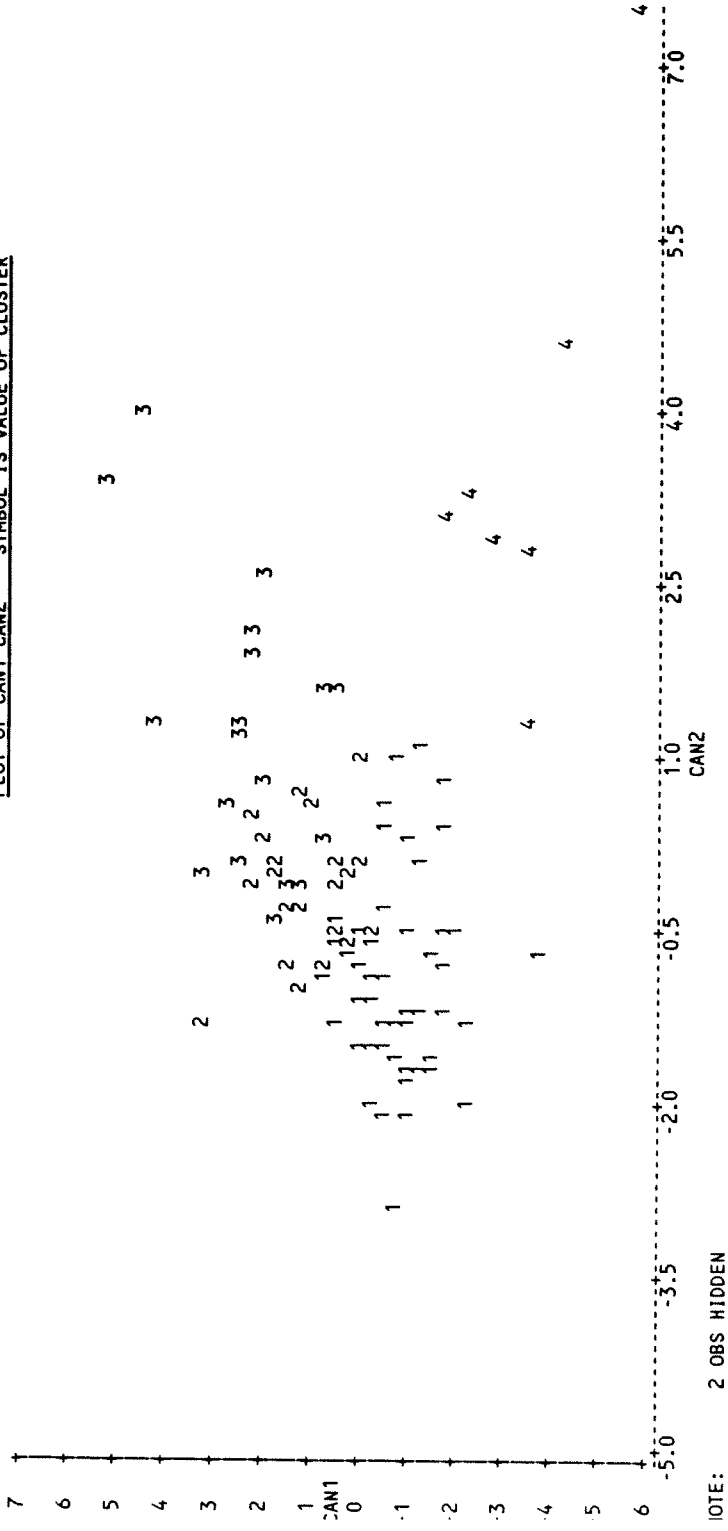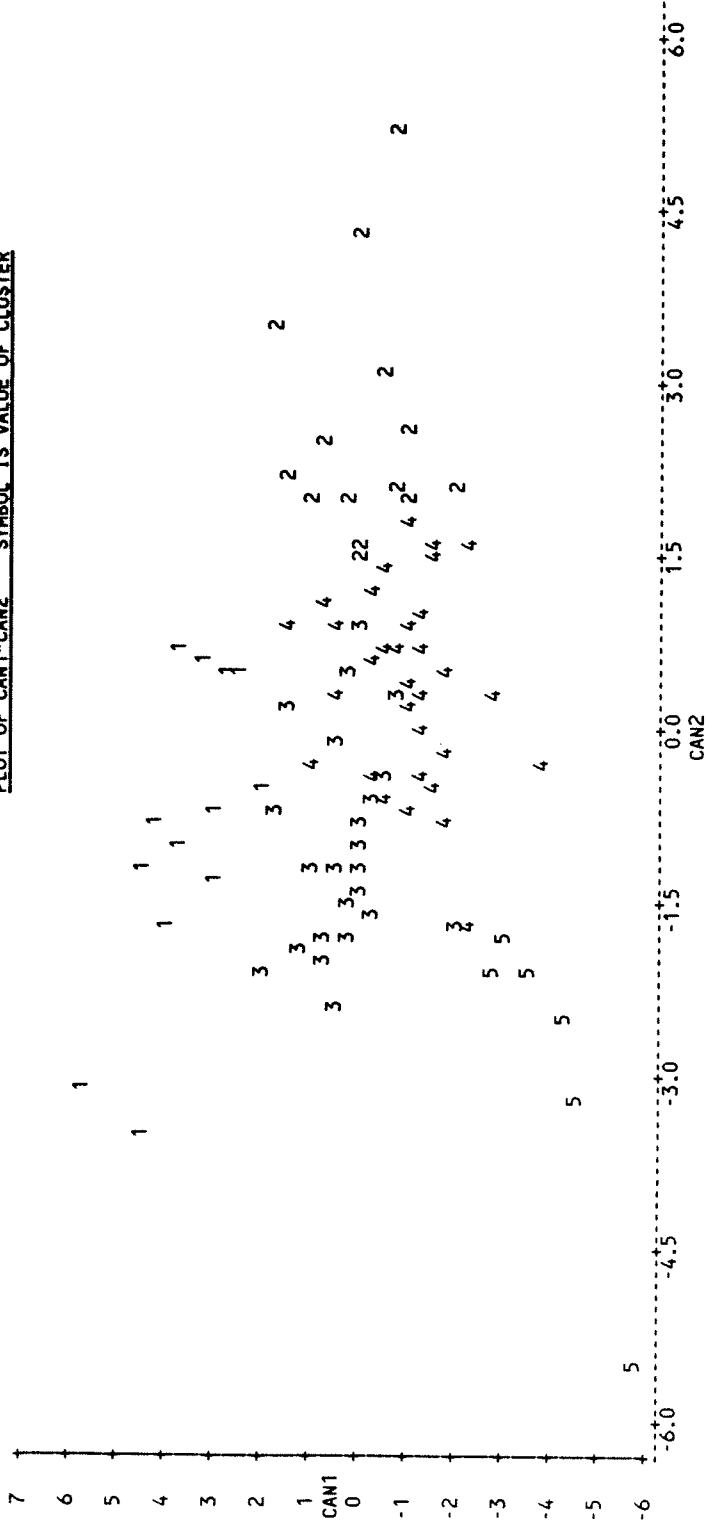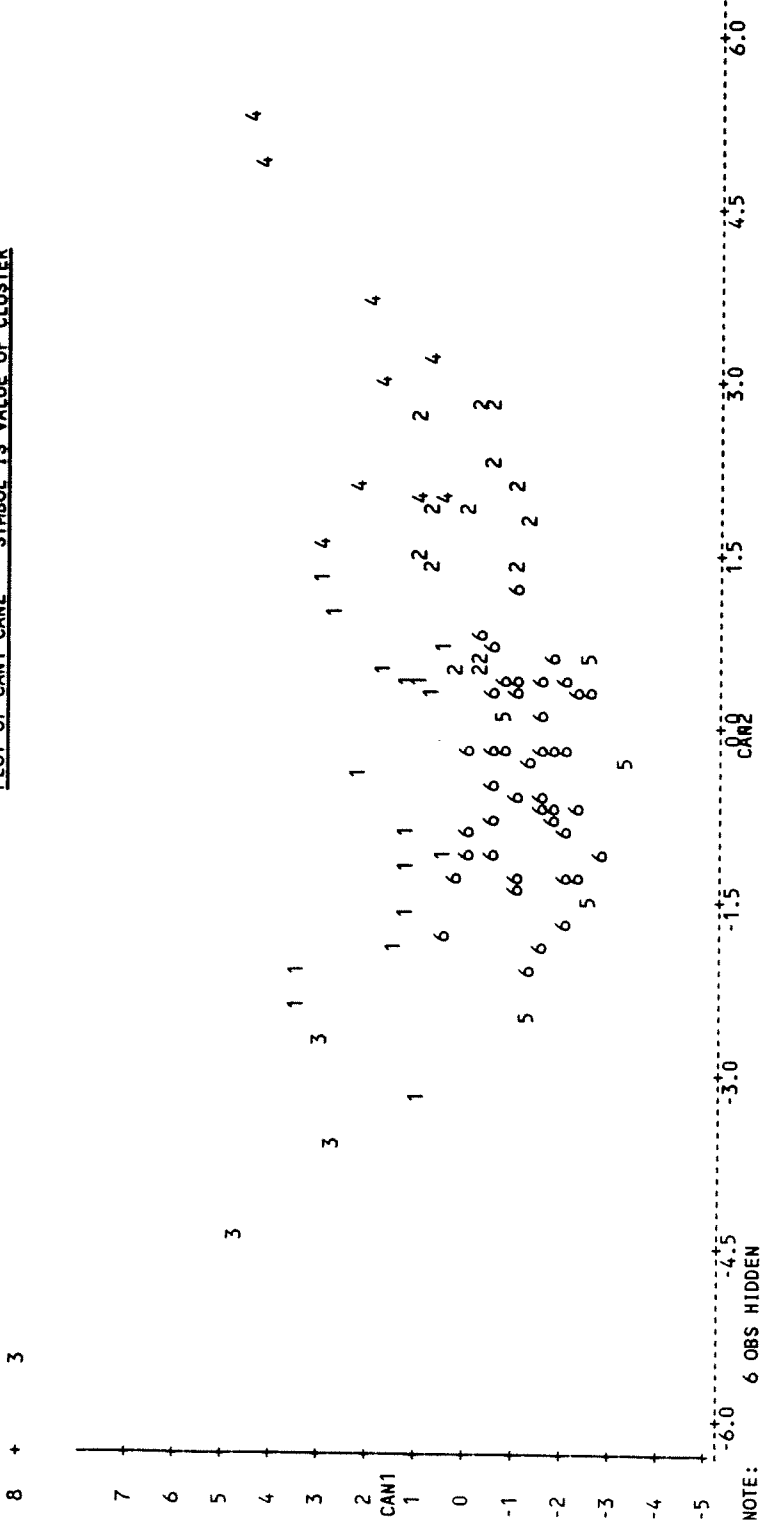**PLOT OF CAN1*CAN2   SYMBOL IS VALUE OF CLUSTER**

CAN1

8 +

7

6

5

4

3

2

1

0

-1

-2

-3

-4

-5

```
   -6.0      -4.5      -3.0      -1.5       0       1.5       3.0       4.5       6.0
                                          CAN2
```

NOTE: 6 OBS HIDDEN

F. Characteristic Profile of Identified Groups

Factor analysis provided distinctive characteristics (factors) in which the scores of the original 14 variables were produced. We derived seven characteristics (six factors defined by two or more variables and a unique factor defined by the proxy for risk variable CV). In the classification achieved by cluster analysis these characteristics can be revisited by examining the values of each variable for the representative firm in each of the three groups, and relatively asses each group's pre-acquisition characteristic profile.

The characteristic profiles of the acquiring firms identified by the three clusters correspond to those which have been expected by the life-cycle model developed in chapter 5.

Cluster 1 contains firms with the following characteristics:

i.   highest leverage position (the largest values of DTE and FCR);

ii.   lowest working capital position (the lowest values of CR and QR);

iii. low dividend payout (low DP and DY);

iv.   the lowest operating efficiency (lowest values of AP, ROA and ROBVE);

v.   the lowest market power (lowest value of MVTOBV);

vi. the highest business risk (largest value of CV); and

vii. the lowest growth rates (negative values of FAG and AG).

The variable that was used as a proxy for the firm's cost of
equity (ROMVE) is very low for this group because 2 out of the 7
firms had losses for the year preceding the acquisition; unless
the market perceives this as a long term trend for these firms,
it will not adjust the equity values significantly.[34] Given the
high leverage position of the firms in this group and their
substantial business risk, the cost of equity for these firms
would normally be the highest among the identified groups.

The characteristic profile of the firms in cluster 1 match very
closely that expected for the decline stage of the firm's life-
cycle. Although the group is relatively underperforming, the
negative growth rates on its capital expenditures show that these
firms have realized that retrenchment or some sort of divestment
could lead them back to the maturity stage. The negative growth
may also indicate that the firm's management does not have the
objective of maximizing growth or size, but rather taking some
measurements to maximize the value of their firm.

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[34] Note that the ROMVE variable could be a better proxy for the
firm's perceived cost of equity under longer periods; when the
firm's performance exhibits erratic fluctuations from year to year
the variable will provide poor estimations.

Cluster 2 contains acquiring firms with the following characteristics:

i.   lowest leverage position (lowest of DTE and FCR);

ii. highest working capital position (largest of CR and QR);

iii. lowest distribution of profits (smallest DY and DP);

iv. highest operating efficiency (largest AP, ROA and ROBVE);

v.   highest market power (largest MVTOBV);

vi. high business risk (high CV);   and

vii. largest growth rate (largest FAG and AG);

The ROMVE variable appropriately measures the cost of equity in this case by indicating a low opportunity cost due to low leverage position in the capital structure of these firms.[35]

The characteristic profile of the acquiring firms in cluster 2 match very closely that expected for the growth stage of the firm's life-cycle model. The magnitude of the variables suggest that management is rational in its policy decisions in a way that maximization of value is achieved; i.e. increase capital expenditures to accommodate demand growth, by financing through predominantly equity capital (retained earnings and new equity from the capital market). This strategy was explained in the life-cycle model as the response of the shareholders to the

---

[35] Modigliani and Miller (1958) show that the opportunity cost of capital to shareholders is an increasing function of the market value ratio of debt to equity.

difference between the internal rate of return and the associated opportunity cost of capital which persists during the growth stage.

Cluster 3 contains acquiring firms with the following characteristics:

i.   moderate leverage position (average to low values of DTE and FCR);

ii.   high working capital position (high CR and QR);

iii. highest distribution of profits (highest DP and DY);

iv.   moderate operating efficiency (average AP, ROA and ROBVE);

v.   moderate market power (average MVTOBV);

vi.   lowest business risk (lowest CV); and

vii. moderate growth rate (average FAG and AG).

The ROMVE closely measures the opportunity cost of equity for the group by finding it a little higher than the one required in the firms of the growth stage. Again the relationship of leverage to the cost of equity is relevant here.

The characteristic profile of the acquiring firms in cluster 3 correspond very closely to the maturity stage predicted by the life-cycle model. The firm at this stage grows at the same rate

as the general economy,[36] finances its capital expenditures
with 25%[37] debt capital and distributes 25% of its profits to
its shareholders.

It is difficult to determine whether the managers of the firms
belonging in this cluster make policy decisions that maximize
shareholders value or some other utility function. Although the
direction of all the characteristics point towards a firm's value
maximization, the magnitude of each variable may not correspond
to the optimal conditions. Moreover, the aggregation of all
mature firms as one representative firm may dissolve firms with
extreme positions.

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[36] Median nominal rate of 7% corresponds closely to Canadian
economy's average nominal growth rate in the 1980-1988 period.

[37] The percentage of debt utilized in the total long-term
capitalization is found as follows:

Total Long-Term Capital = Equity + Debt
                        =   1   + 0.36
            100%   = 75%   + 25%

CHAPTER VIII

PERFORMANCE OF THE ACQUIRING FIRMS

A.   The Data

The data for this study have been derived from a number of

sources. First, the acquiring firms in the 1980-1988 period were

identified from the Merger Register of Consumer and Corporate

Affairs Canada. A screening procedure was followed-up to form the

appropriate sample according to the selection criteria stated in

chapter seven (i.e. trading requirements, size of acquired firm,

industry sector, time listed in the stock market, exclusion of

holding companies). Subsequently the Financial Post history file

for each acquiring firm was consulted to establish the

acquisition date. Lastly, the requirement that each acquiring

firm was included in the Université Laval "data tape" of December

1989 was satisfied.[38]

Following the classification procedure, two firms were dropped

from the 96-acquiring firms sample.[39]   Actual monthly returns

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[38] The University of Laval "data tape" contains prices, returns, and beta information for the majority of securities in the Toronto Stock Exchange, as well as market portfolio average returns, both monthly from January 1963 to December 1989.

[39] The Laval "data tape" did not contain information with respect to Sommerville Belkin Industries and Prefac Enterprises Ltd. The former has been privatized and the latter had insufficient trading activity.

for the remaining 94 firms were extracted from the Laval "data tape" for 73 months, 36 months before the acquisition and 36 months after the acquisition, with month 0 being the acquisition month. The corresponding value-weighted TSE portfolio monthly return was paired with the actual monthly returns of each security.[40]

B.   Methodology

The acquiring firm's performance is tested by utilizing the "market" model along with analysis of the residuals.[41] The technique has been used extensively since its inception by Fama, Fisher, Jensen and Roll (1969), at numerous "event studies" in the field of financial economics.[42]

In the context of mergers and acquisitions the method adjusts the observed market price of participating firms for general market variations during the period when merger information affects their share price; the price change which remains unexplained by

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[40] The monthly returns for each firm are adjusted for dividends and stock splits. The value weighted portfolio return adjusts for skewness problems that may arise to large differences among equity capitalizations of listed companies.

[41] The market model proposes that returns on a firm's security are linearly related to returns on a market portfolio, and it assumes that the slope and the intercept terms are constant over the time period during which the model is fit to the available data.

[42] Event studies are those associated with a major one-time project, arising either endogenously (e.g. internal firm's policies) or exogenously (e.g. change in regulatory policy or the incident of an economic shock).

market variations is that attributable to the merger activity.

Assuming that security returns are distributed multi-variate normal, we may state the market model as follows (tilde ˜ denotes random variable and bar - denotes first moment):[43]

$$\tilde{R}_{jt} = \alpha_j + \beta_j \tilde{R}_{mt} + \tilde{\varepsilon}_{jt} \qquad (8.1)$$

where:

R_{jt} = rate of return of security j over month t ;

R_{mt} = rate of return on a value weighted market portfolio of all securities traded on TSE over month t ;

ε_{jt} = disturbance term of security j at month t and E(ε)=0 ;

$$\alpha_j = E(\tilde{R}_j) - \beta_j E(\tilde{R}_m)$$

$$\beta_j = \frac{cov(\tilde{R}_{jt}, \tilde{R}_{mt})}{var(\tilde{R}_{mt})}$$

The meaning of the intercept term α is not defined and the nature of the acquisition may influence its measurement; if firms that have had excellent and improving performance in managing assets become acquiring firms, their intercept term α_j will be positive and vice-versa. The slope coefficient, β_j, can be interpreted as a measure of the systematic risk of security j. This systematic

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[43] Fama (1976), in <u>Foundations of Finance</u>, Chs. 3 and 4, provides a rigorous review of the market model.

risk of a firm's stock is a weighted average of the risk
associated with all real policy decisions (see chapter 4,
equation 4.4).

The OLS estimate of equation (8.1) is used to create an unbiased
forecast of the "normal" or expected returns to firm j over event
month t, where t is defined relative to the month of the
acquisition date and is outside of the estimation period. The
possibility of risk shifts following the acquisition in the
acquiring firm is addressed by estimating regression coefficients
on data before and after the acquisition date.[44] The pre-
acquisition coefficients were estimated by using data on each
firm's security and market returns from relative months -36 to
-12. The post-acquisition regression coefficients were estimated
by using the corresponding data from relative months +12 to
+36.[45]

We used these regression coefficients with the market returns on
the value-weighted portfolio of TSE for the "window interval"
of -12 to +12 months around the acquisition date to predict the
monthly returns for each acquiring firm in the sample. The pre-
acquisition coefficients were used for the -12 to 0 months (0
month defined as the month of the acquisition) and the post-

---

[44] Mandelker (1973) finds that mergers produce shifts in the
systematic risk of the merger participating firms. See also Blume
(1975) on the stability of betas.

[45] The post-acquisition regression coefficients for the firms
whose acquisition took place in 1987 and 1988 are estimated for the
periods ranging from month relative -12 to -35.

acquisition coefficients were used for the months +1 to +12 accordingly. The abnormal residuals for each acquiring firm for the 25 months around the acquisition date were then calculated by subtracting the predicted returns from the actual returns.

$$\hat{e}_{jt} - R_{jt} - \hat{\alpha}_j - \hat{\beta}_j R_{mt} \tag{8.2}$$

Hence,

these $\hat{e}_{jt}$ are averaged across all firms of the portfolio and in each cluster at month t to yield an average portfolio and cluster residual:

$$\bar{e}_t - \frac{1}{N}\sum_{j=1}^{N} \hat{e}_{jt} \tag{8.3}$$

where N is the number of firms in the cluster at month t. To obtain a measure of the cumulative effect over a period of time of the deviation of stock returns from their normal relationship with the market, the Cumulative Average Residual (CAR) in the relative month t in the 25 month period surrounding the acquisition, for the three cluster portfolios is defined as

$$CAR_{tk} - \sum_{t=-L}^{T} \bar{e}_t \tag{8.4}$$

The CARs for the whole sample portfolio and those for each
cluster portfolio have been estimated to see the impact of
aggregation and the different effect on performance that an
acquisition policy will have on firms found in different life-
cycle groups.

C.   **Empirical Results**

C.1   **The Findings**

The regression coefficients for all acquiring firms in the sample
in their respective clusters are shown in Table 8.1[46] The
average slope coefficient for the mature group (cluster 3) has
increased from .6 to .75, that of the growth group (cluster 2)
decreased from .58 to .51 and that of the decline group (cluster
1) increased from .58 to .75. These shifts indicate that the
systematic risk for the mature and decay group increased after
the acquisition, and that of the growth group decreased
respectively.

The average monthly residuals and cumulative average residuals
that are produced by the foregoing analysis are presented in
Table 8.2. The cumulative average residuals for all the firms and
for each individual life-cycle group are summarized in Figures

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[46] There was insufficient post-acquisition data for Lake
Ontario Cement Ltd.

8.1 to 8.4. The results indicate that the impact of the
acquisitions on the returns to the stockholders of the acquiring
firms is positive. The cumulative average residuals for all the
acquiring firms for the 25 month interval around the acquisition
date is approximately 0.025, or 2.5%. However, when each group
of acquiring firms is treated separately , we observe a clear
distinction in the direction of the respective cumulative
residuals associated with each life-cycle group.

The cumulative average residuals (CARs) for the mature group
(cluster 3) rises from month -10 to month -9, stabilizes for
months -8 and -7 and then rises steadily until month -2, to reach
a value of approximately .055 or 5.5%. Following the acquisition
the group maintains its rising CARs until the month +7. Although
CARs decrease in the subsequent months, the group manages to
obtain an increase during the year after the acquisition,
reaching a total cumulative average residual for the 25 month
interval of .0616 or 6.16%.

The CARs for the growth group (cluster 2) stay positive in the
months -11 to -5 but rather insignificantly. From month -4 to
month + 8 the group's CARs decrease in a see-saw fashion to reach
a value of -0.0766 or -7.66%. In the last four months the group's
CARs increase substantially to reach a total cumulative residual
for the 25 month interval of -0.0328 or -3.28%.

The CARs for the decline group (cluster 1) show a rather erratic

movement.[47] They rise by a whopping 5.5% in the month -10, drop to almost 0 by month -4, increase to 9.5% by month +1, decrease precipitously to -6% by month +7 and then rise back to near 0.7% by the end of the 25th month.

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[47] One of the explanations for the erratic movement of this group's CARs could be the small sample size (only 7 firms) which tends to be sensitive to outliers, e.g. the large increase in relative month -10 is attributed to a large extent to Intermetco Ltd. residual of 0.3012.

Page:

Below.

Table 8.1 (Cont'd)

CLUSTER 3

FIRM NAME	CONSTANT		SLOPE	
	a1	a2	b1	b2
ACKLANDS	0.00138	-0.019	0.07529	0.5544
ATCO	0.00943	0.01818	0.43893	0.59212
BOMBARDIER	0.0178	0.00298	1.45948	-0.04161
BRIGHT T.G.	0.02285	0.00785	0.37572	0.7298
CAN. MANOIR	0.01379	0.01	0.64964	-0.12637
CONTRANS	-0.07317	-0.02151	2.45949	0.75294
CORBY DIST.	0.021905	-0.03525	0.29827	1.4002
CCL IND.	0.01439	0.02374	-0.0837	0.28964
CANRON	-0.0094	0.00544	0.72056	1.0607
CARA	0.02656	0.05445	-0.11	-0.23435
CONSUMERS PCKG	-0.0065	0.01813	0.05486	0.08888
R.L. CRAIN	0.03516	-0.00478	-0.20307	0.95313
DOFASCO	-0.01385	-0.01218	0.51419	0.9593
DOMINION TEXT.	0.00132	-0.00976	0.48418	0.68202
EMCO	-0.01237	-0.05862	0.9369	0.70086
FEDERAL IND.	0.07303	-0.02147	1.2593	0.73315
FINNING	0.00648	0.04012	0.6946	0.12451
GRAFTON GROUP	0.02129	-0.02366	0.51072	0.95189
HARDING CARPETS	-0.02613	0.02583	0.57169	0.63435
HARRIS STEEL	0.00744	-0.00733	1.04246	0.98315
HAYES-DANA	0.02544	-0.00748	0.44926	0.32813
IMASCO	0.00446	0.00434	0.6515	1.01209
IPSCO	0.01449	0.00005	1.1989	1.3912
INTRPRVCL PIPE.	0.00338	-0.00569	0.9759	1.22515
IVACO	0.00165	-0.00292	0.59969	0.65822
JANNOCK	0.01896	-0.00243	0.64369	1.3675
J.LABATT	0.02	-0.00725	0.48173	0.97175
LAKE ONTARIO	0.0132	MISS	0.70772	MISS
LAWSON MARDON	-0.00493	0.00492	0.86616	1.2779
LOBLOW	-0.00699	0.00994	0.90349	0.66206
LOGISTEC	0.03121	0.00169	0.67393	0.35058
MARK'S WORK	-0.01186	0.04951	-0.09355	0.660818
OSHAWA GROUP	0.01239	-0.02844	0.42325	0.86175
PHILIPS CABLES	0.00523	0.01735	-0.05264	0.1734
PRINCIPAL NEO-TECK	0.01407	-0.00704	0.1344	1.13355
RED PATH IND.	0.01557	0.01887	0.28153	1.63954
ROLLAND	0.034	0.01205	0.73852	0.90757
SCHNEIDER	0.01362	0.01603	0.28865	0.29709
SEAGRAM'S	-0.0113	0.01496	0.54294	0.72863
SELKIRK	0.0084	-0.00399	0.4816	0.73462
SHAW IND.	-0.00926	0.0011	1.17296	-0.02635
SILCORP	0.02022	-0.01678	0.4691	1.2321
SHEPHERD IND.	-0.02028	-0.00961	0.62722	1.58125
SLATER IND.	0.00388	-0.01942	1.4522	1.04315
SOUTHAM	-0.02511	-0.00676	0.8908	0.2309
ST.LAWRENCE CEM.	-0.0912	0.04821	0.15502	-0.03653
D.A. STUART	-0.0408	-0.0075	1.1075	0.9603
STRD BROADCASTING	-0.00542	-0.00548	0.55563	0.7379
TOROMONT	0.02231	-0.00319	-0.1229	0.746
V.S. SERVICES	-0.00598	-0.00437	0.4618	0.65373
UAP	-0.01749	0.002419	1.21119	1.03306
WIC	0.00954	-0.0239	0.801	1.3132
WAFERBOARD	0.018	-0.03372	-0.2964	2.0938
GEORGE WESTON	0.02142	0.01573	0.8323	0.57241
MEAN COEFF.	0.003930	0.000265	0.599325	0.746392

Table 8.2

MONTHLY AVERAGE AND CUMULATIVE RESIDUALS

MONTH	ALL FIRMS		CLUSTER 1		CLUSTER 2		CLUSTER 3	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-12	-0.00297	-0.00297	0.002811	0.00047	-0.00926	-0.00926	0.000469	0.00281
-11	-0.00323	-0.00621	-0.02539	-0.01009	0.012065	0.00281	-0.01055	-0.02258
-10	0.018858	0.012640	0.076306	0.00463	0.013514	0.01632	0.014721	0.05373
-9	0.000763	0.013403	-0.01050	0.01914	-0.01740	-0.00109	0.014511	0.04322
-8	0.002827	0.016231	-0.01198	0.02050	0.007977	0.00689	0.001355	0.03124
-7	0.005771	0.022003	-0.00486	0.02005	0.017138	0.02403	-0.00044	0.02637
-6	-0.00454	0.017454	0.000917	0.02451	-0.01902	0.00501	0.004458	0.02729
-5	0.003701	0.021156	0.014997	0.03097	-0.00265	0.00235	0.006460	0.04229
-4	-0.00846	0.012696	-0.04147	0.03561	-0.02132	-0.01897	0.004640	0.00082
-3	0.010430	0.023126	0.051600	0.04323	0.006370	-0.01260	0.007620	0.05242
-2	0.009965	0.033091	-0.01126	0.05733	0.008070	-0.00453	0.014097	0.04115
-1	-0.02030	0.012782	0.023507	0.04741	-0.04451	-0.04904	-0.00991	0.06466
0	0.008938	0.021720	-0.01501	0.05561	0.014815	-0.03423	0.008193	0.04964
1	-0.00398	0.017733	0.046178	0.05339	-0.01659	-0.05083	-0.00221	0.09582
2	0.012866	0.030599	-0.03239	0.07048	0.015757	-0.03507	0.017093	0.06343
3	-0.00946	0.021136	-0.02388	0.06666	-0.01479	-0.04987	-0.00382	0.03955
4	0.000516	0.021653	-0.00759	0.06758	0.001548	-0.04832	0.000922	0.03195
5	0.007306	0.028959	-0.03228	0.08182	0.005116	-0.04320	0.014243	-0.00034
6	0.002828	0.031788	-0.02089	0.07885	0.016024	-0.02718	-0.00297	-0.02123
7	-0.00760	0.024182	-0.03972	0.08535	-0.02173	-0.04891	0.006499	-0.06095
8	-0.01050	0.013675	0.056609	0.07746	-0.02774	-0.07665	-0.00788	-0.00434
9	-0.00150	0.012169	-0.00351	0.06196	0.019284	-0.05737	-0.01549	-0.00786
10	0.008047	0.020216	0.044623	0.06820	0.003361	-0.05401	0.006242	0.03677
11	-0.00502	0.015195	-0.03482	0.05492	0.012981	-0.04103	-0.01328	0.00195
12	0.007201	0.022396	0.005247	0.06169	0.008214	-0.03281	0.006774	0.00719

Figure 8.1
CUMULATIVE AVERAGE RESIDUALS: ALL FIRMS

CUMULATIVE AVERAGE RESIDUALS:ALL FIRMS
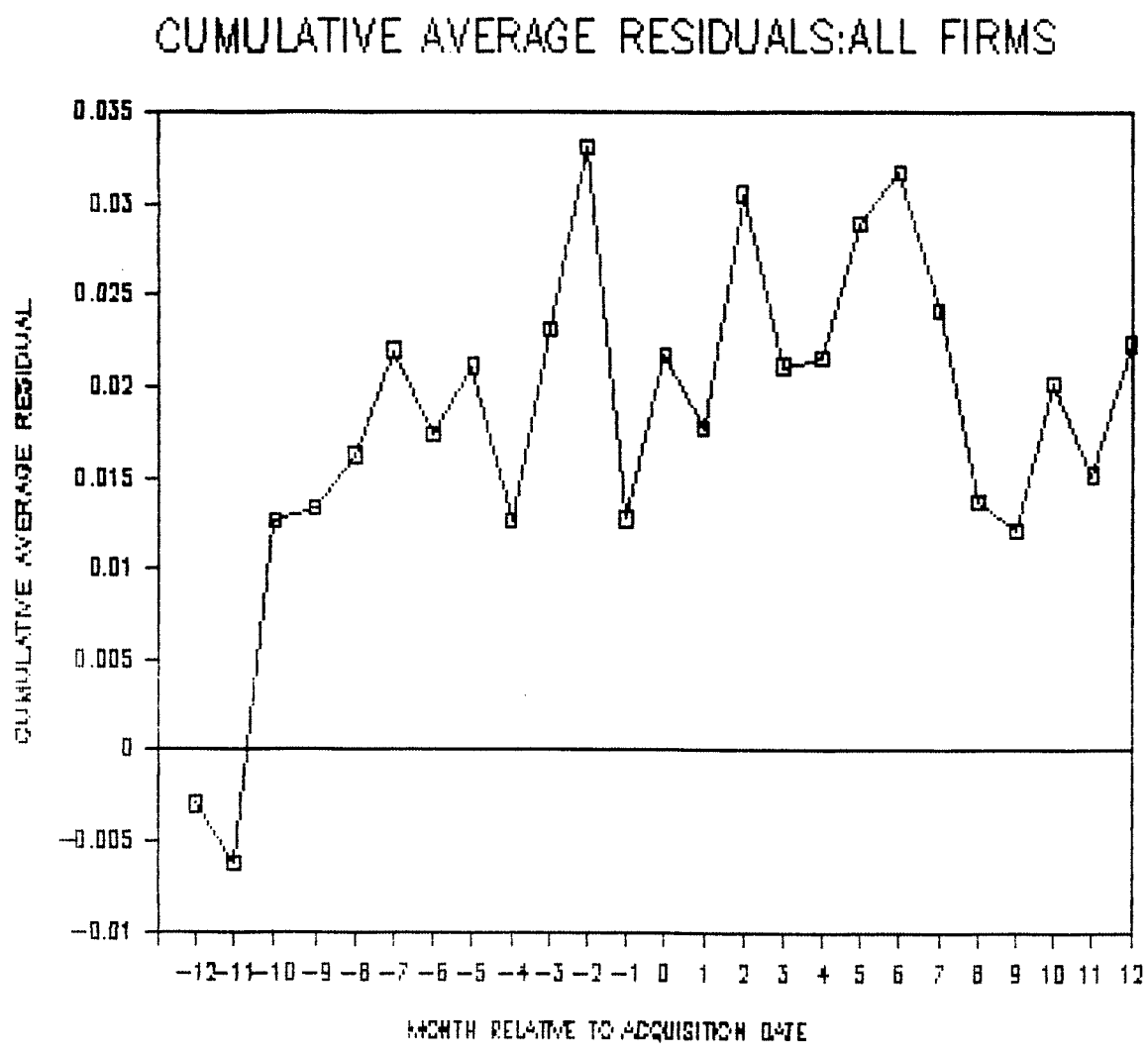
Figure 8.2
CUMULATIVE AVERAGE RESIDUALS: CLUSTER 1

CUMULATIVE AVERAGE RESIDUALS: CLUSTER 1
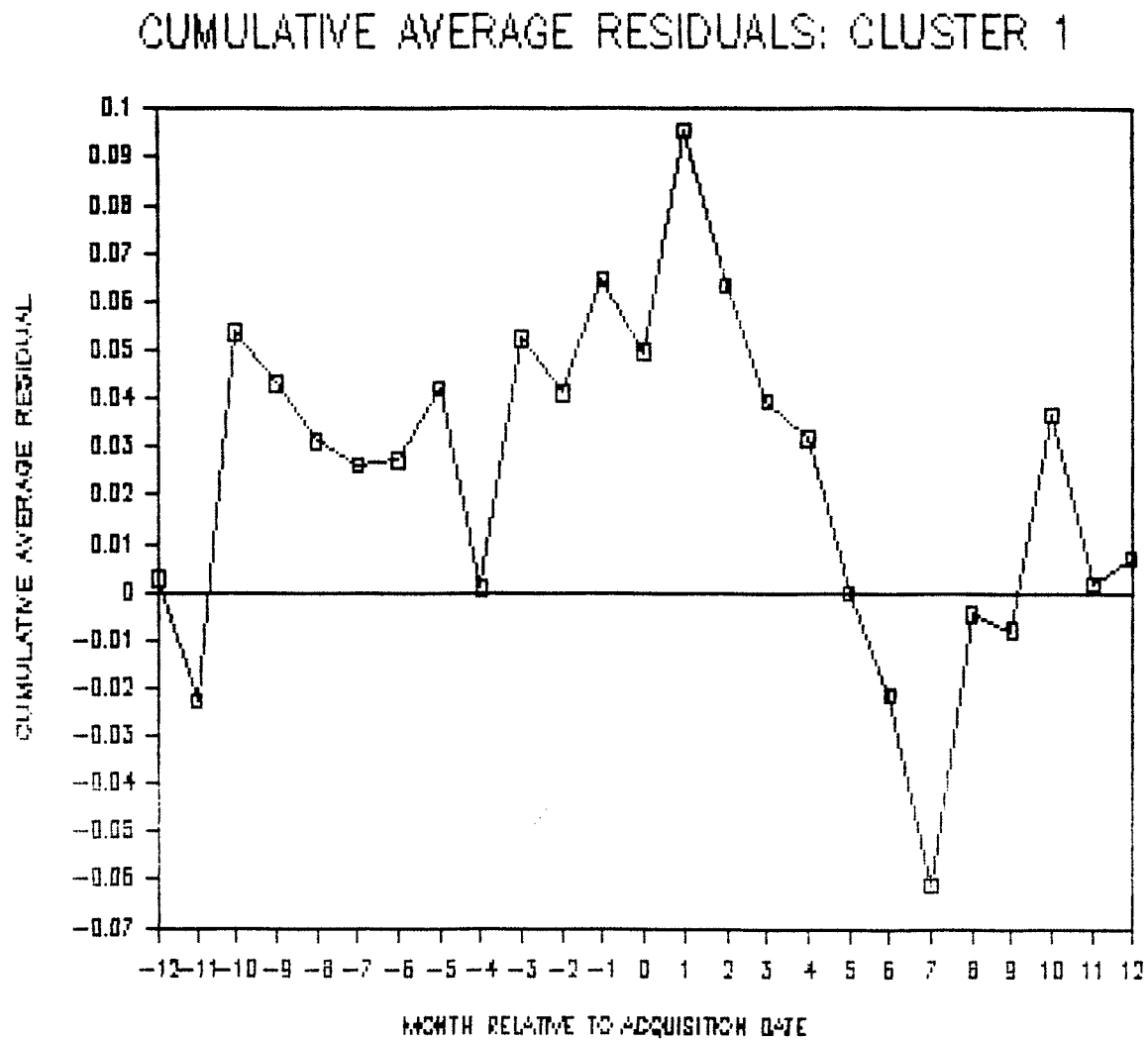
Figure 8.3
CUMULATIVE AVERAGE RESIDUALS: CLUSTER 2

CUMULATIVE AVERAGE RESIDUALS: CLUSTER 2
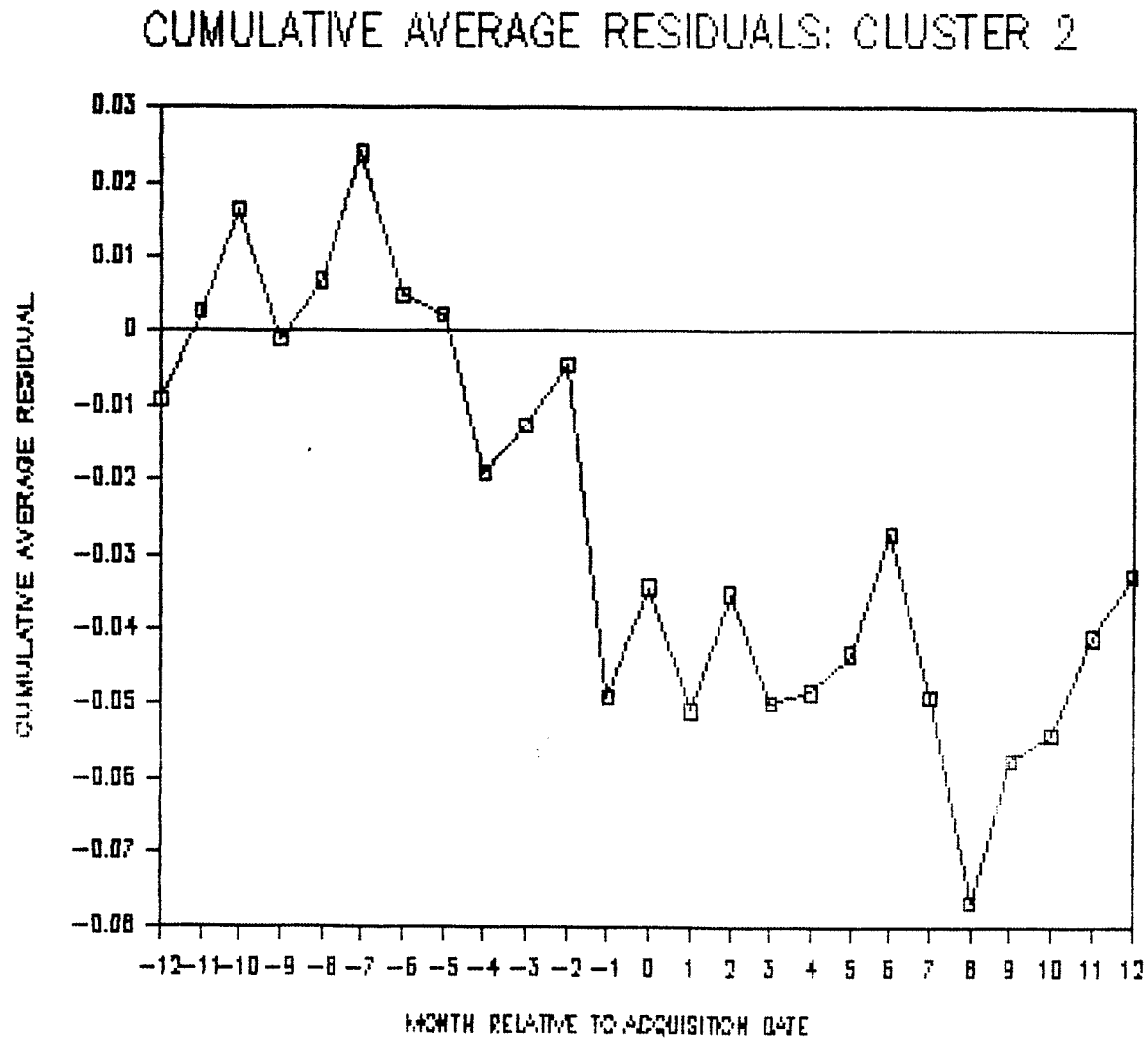
CUMULATIVE AVERAGE RESIDUALS: CLUSTER 3
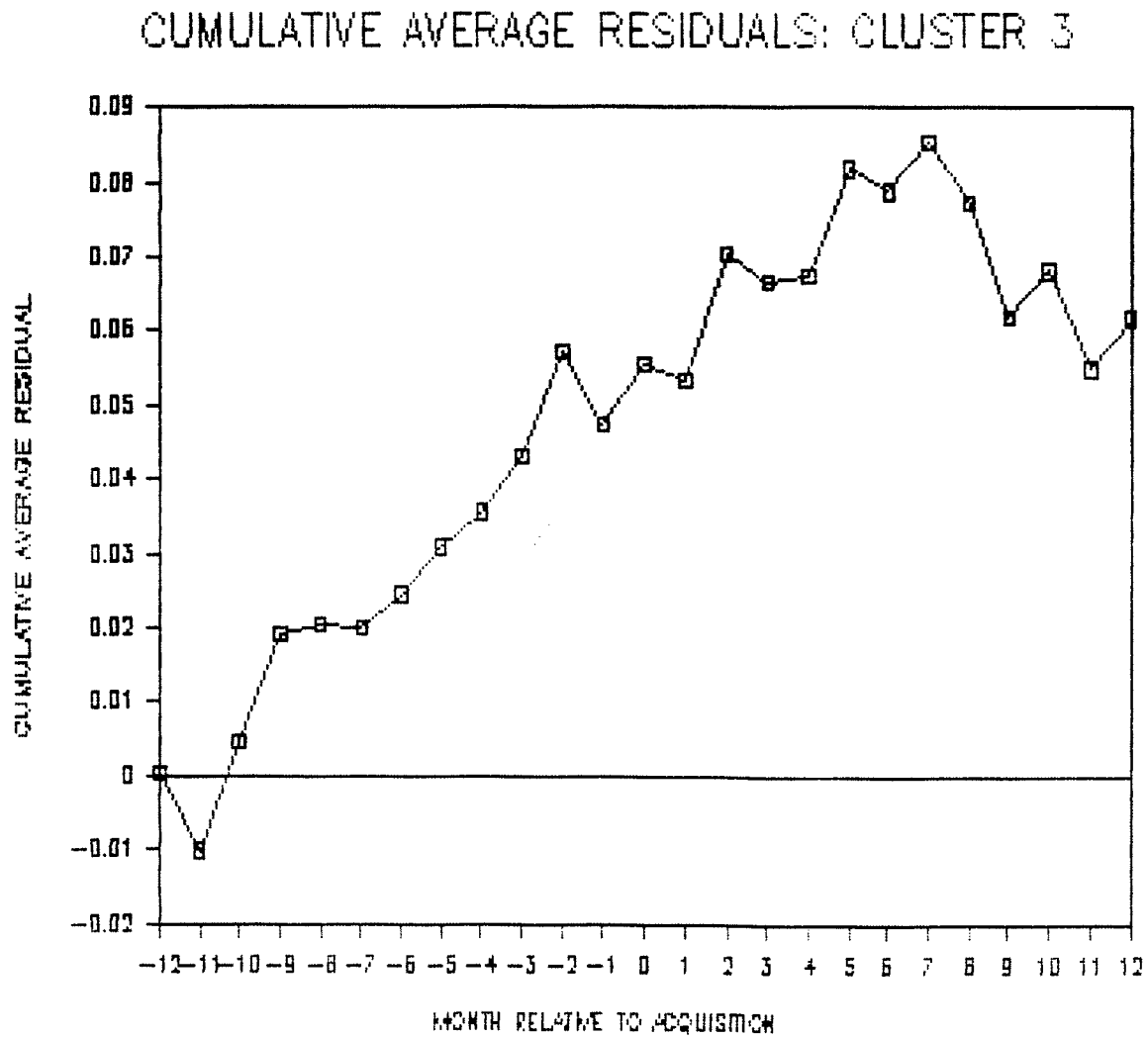
C.2 **Hypotheses Testing**

To test the hypothesis that the acquisition decision produces the same impact on the returns of acquiring firms belonging to the three life-cycle groups identified in this study, we conduct one-way analysis of variance, where the following null hypothesis is tested:

$$\mu_{c1} = \mu_{c2} = \mu_{c3}$$

Where;

μ_{c1}, μ_{c2}, μ_{c3}, denote the means of the CARs for the three cluster groups of acquiring firms.

A correct application of analysis of variance requires that independent samples from normally distributed populations with the same variance must be selected.[48]

The F statistic is approximately 0, indicating that the hypothesis of the three group means being equal should be rejected, see Table 8.4 for detailed findings of the One-way analysis of variance.

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[48] A test for homogeneity of variance for our three life-cycle samples showed that the hypothesis for equal variances could not be rejected (i.e. very large significant levels were found, P=0.248 for the Cochrans C test and 0.405 for the Bartlett-Box F test respectively).

The following <u>multiple comparison tests</u> were conducted to determine which sample means are different from each:[49]

i.   Least significant difference;

ii.   Duncan's multiple range test;

iii. Student-Newman-Keuls test;

iv.   Tukey's alternate test;

v.   Honestly significant difference;

vi.   Modified least significant difference;

vii. Scheffé's test.

"Multiple comparison tests protect against calling too many differences significant. These tests set up more stringent criteria for declaring differences significant than does the usual t-test. That is, the difference between two sample means must be larger to be identified as a true difference".[50]
The first six tests showed that all three groups are different among themselves at the 5% significance level and the Scheffe test showed significant difference only between the mature and growth groups (i.e. cluster #3 and #2). The Scheffe test is conservative for multiple means comparisons and requires larger differences between means than most of the other methods.

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[49] For an elaborate discussion of the various multiple comparisons see Winer(1971).

[50] Direct quote from SPSS/PC+ V2.0 Base Manual, 1988.

The possibility that the CARs of the three life-cycle groups are not normally distributed (they may not come from populations with normal distribution) is addressed by conducting the appropriate non-parametric tests, which are not constrained by the normality properties. The two tests that were found appropriate for our study were the K-independent sample median test and the Kruskal-Wallis test.[51] Both tests found significance levels of 0 value, indicating that the CARs for each group are different.[52] For the detailed findings of the two non-parametric tests see Table 8.4.

C.3 Interpretation of Results

One explanation for the observed shift in the systematic risk that we observed by the change in the slope coefficient could be the implementation of an acquisition policy for mature and declining firms into industries with higher risk/return outlooks, and that of growth firms integrating with the objective of risk diversification. The acknowledgment of the shifts in the risk level into the residual estimation for the post-acquisition year adjusts abnormal return residuals that could be attributed to

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[51] The K-sample median test compares the medians of three or more independent samples. The Kruskal-Wallis test combines and ranks all cases from the k-groups and then calculates a Chi-square statistic based on the sums of the ranks found for each group.

[52] The two non-parametric tests provide a probability value (p) for the k-groups being not different, p ranging between 0 and 1.

risk changes. In this context, if one neglects to take into account an increase of the risk level he will overestimate the abnormal residuals for the firm in concern and vice versa.

The observed pattern of the CARs for the three different cluster groups is in accordance with the predictions of our life-cycle hypothesis presented in this study. We see clearly that an aggregation of all acquiring firms provides only a weak case for the neo-classical hypothesis of mergers, since the CARs for all the firms are positive but rather small. The segregation of the firms into groups with distinctive characteristics, which were assumed to evolve over time, made it possible to test both neo-classical and managerial merger hypotheses. The CAR results for the three groups reinforce the neoclassical hypothesis.

Case I: <u>The Mature Group</u>

Managers in mature firms (which according to managerial school of thought are bound by the agency problem), do take policy decisions with respect to acquisitions in order to increase the value of the firm and not simply to increase its size. The results of this study indicate that mature firms that made acquisitions have done so by acquiring firms which induced a simultaneous increase in expected cash flows and business risk. According to the fundamental principles of firm evaluation these two parameters affect the value of the firm in opposite ways.

Since the CAR's have been consistently positive during the 25-month period around the acquisition the expected increase in the future cash flows outweighs the increase in the firm's opportunity cost of capital. The latter being the result of an increase in its business risk.

Although it is difficult to identify the specific sources for the relative increase of the CARs, it is definite that a certain degree of synergism has accrued by the respective acquisitions. The form of this synergism could be operational, organizational or financial. According to our life-cycle model the firm at the mature stage was proposed to have the organizational and financial capabilities that could be carried-over to potential acquired firms that were operating in highly profitable and riskier markets. In this context, the market expects that the mature firm will exploit profitable investment opportunities in the acquired firm's markets more efficiently than the latter could have done.[53]

The study by Morck, Shleifer and Vishny (1990) finds that acquiring firms which had low pre-acquisition performance, or these that made acquisitions of high growth firms, or these that made acquisitions in unrelated industries, had poorer returns

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[53] We are assuming that the market for corporate control is efficient and that there are no "bargains" in the acquisition market. The argument will still hold even if there are bargains in the market, provided that no particular life-cycle group has privileged information on the target firms.

returns than their opposite counterparts. The results of our study do not contradict these findings. First, the acquiring firms in the mature stage show a very healthy pre-acquisition performance (see Table 7.7), second, the acquisitions during the 1980's in Canada were not in unrelated industries, and third, the premiums paid in Canada to high growth firms may be lower than those in the U.S.

One may suggest that acquisitions by mature firms in Canada during the 1980's have been perceived by the equity market as strategies to increase market power. This motive would prevail if acquisitions were predominantly horizontal in nature (product and market related) and Competition Policy enforcement was very lax.[54] Although an assessment of the acquired firms' industry was not in the scope of this study, it is safe to say that most of the acquisitions in Canada were indented as product or market extensions. As the world was slowly taking down international barriers to trade, the conglomerate structure of the 1960's and 1970's proved to be inefficient and uncompetitive for the 1980's.

A more plausible explanation of why the Canadian capital market has perceived acquisitions of this group as instruments of shareholders' value enhancement, is that acquisitions at this

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[54] There is evidence to suggest that Competition Policy Bureau in Canada has been exercising a well specified policy with respect to mergers and related competition. The Bureau keeps data with respect to the decisions taken during the 1980's for many of the merger cases characterized as lessening the competition level.

stage can allow the redeployment of capital to more growing subsidiaries and convert highly taxed dividends to lower taxed capital gains.

Case II: The Growth Group

The market tends to react counter to growth firms decisions to grow through acquisitions. The acquiring firm's objective at this stage to increase its value through risk reduction by diversifying its operations and through cost reduction by expanding scale of production may be hampered by inherent constraints in its organizational and operational structures. According to our life-cycle model the firm at this stage is growing at a higher rate than that of the general economy, and its internal rate of return exceeds its cost of capital. The market expects the capitalization of these business opportunities. The decision to expand by acquisition provides the market with mixed signals on the firms's business opportunities set. If the firm decides to concurrently keep internal investment at the same rate as the one experienced in the pre-acquisition period the market sees the above mentioned constraints binding. If the firm goes on to reduce the rate of growth by internal investment, then the market would perceive a diminishing investment opportunity set in its existing markets and adjust its evaluation to the new information.

The negative CARs for this group also support the "hubris" hypothesis developed by Roll (1986). The exceptional performance of these firms prior to acquisition (as is reflected in their high market value to book value ratio) leads its management to believe that they can acquire firms which are non-performers, and restore their efficiency as the one at their firm, only to find out that their ability is limited and their capacities constrained.

Case III: The Decline Group

The case of firms found in the decline stage is the most difficult to interpret because of its composition nature (i.e. small sample, larger differences among firms within the group). There is some indication that the market perceives the acquisition decision as a positive strategy, since CARs in the pre-acquisition year remain positive. However, CARs drop precipitously in the post-acquisition year, indicating that the firm in the decline stage does not have the capabilities to create synergies to the merged operations.

In our life-cycle hypothesis, we proposed that the firm at this stage will tend to benefit from the acquisition decision only if the decision is preceded by a successful divestiture program. Considering our decline group sample of seven (7) acquiring firms, we have in this study no information as to the divestiture

program of these firms.

Table 8.3

ANALYSIS OF VARIANCE

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	Prob.
Between Clusters	2	.0687	.0343	39.4554	0.0
Linear Term	1	.0068	.0068	7.7940	.0067
Dev'n from Linear	1	.0619	.0619	71.1168	0.0
Within Clusters	72	.0627	.0009		
Total	74	.1314			

Cluster	Count	Mean	Standard Dev'n	Standard Error	95% Conf Int for Mean		
Clr 1	25	.0238	.0341	.0068	.0097	To	.0379
Clr 2	25	.0255	.0341	.0269	.0054	To	.0144
Clr 3	25	.0471	.0270	.0054	.0360	To	.0582
Total	75	.0151	.0421	.0049	.0054	To	.0248

Fixed Effects Model		.0295	.0034	.0083	To	.0219
Random Effects Model			.0214	.0769	To	.1072

Random Effects Model Estimate of Between Component Variance=.0013

Cluster	Minimum	Maximum
Cluster 1	.0610	.0958
Cluster 2	.0767	.0240
Cluster 3	.0101	.0854
Total	.0767	.0958

Tests for Homogeneity of Variances

Cochrans C = Max. Variance/Sum(Variances) = .4443, P = .248

Bartlett-Box F = .904 , P = .405
Maximum Variance / Minimum Variance = 1.605

Table 8.4

RESULTS OF NON-PARAMETRIC TESTS

A. **Kruskal-Wallis**

CAR by CLUSTER

Mean Rank	Cases	
41.80	25	CLUSTER = 1
17.20	25	CLUSTER = 2
54.92	25	CLUSTER = 3
	75	TOTAL

Corrected for Ties

CASES	Chi-Square	Significance	Chi-Square	Significance
75	38.4234	.0000	38.4234	.0000

B. **Median Test**

CAR by CLUSTER

	CLUSTER		
	1	2	3
Gt Median	15	1	21
Le Median	10	24	4

CAR

CASES	Median	ChiSquare	D.F.	Significance
/5	0	33.7127	2	.0000

CHAPTER IX

CONCLUSIONS, IMPLICATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

A.   Conclusions

This thesis has provided an alternative hypothesis for the acquisition decision on the firm level by advancing a life-cycle model where the firm's policy decisions are proposed to be a function of the financial and operational characteristics identified with each life-cycle stage. Its findings have shown support for the neo-classical theory of the firm, where agents of the corporation in Canada make policy decisions with respect to acquisitions with the objective to increase the value of shareholders wealth. The findings also infer that equity markets evaluate the firm's policy decisions collectively by taking into consideration their interrelationship, and provides the highest value to the firm that manages its resources with the optimal implementation of all its policy decisions.

The study tested the performance of a sample of Canadian acquiring firms during the 1980-1988 period via the market model residual technique and showed that firms in the maturity stage of their life-cycle receive a relatively larger benefit than firms in the growth and decline stages.

B.   Implications

The implications that we may draw from this study are important to both the academic debate over the acquisition decision and to the agents of the firm. Each sector deserves some explanation for the existing mixed findings about the motivations and results of the forgoing acquisitions.

On the academic front, first, we may state that the segregation of acquiring firms with the aid of a firm's life-cycle into more homogeneous groups is very helpful in identifying the impact and interrelationship of the different policy decisions. Second, the acknowledgement of homogenous groups allows us to compare the specific capabilities and resources of the firms comprising it. Thirdly, each industrialized economy should be considered as a separate population for a study such as the one performed here because of the different industry structures, competition levels and capital markets characteristics.

On the agents side, the study shows evidence that the capital markets can evaluate the firm's policy decisions by adjusting both their respective risk and return positions. The positive impact of acquisitions to the mature firms value suggests that investors in Canadian equity markets perceive their firm's management as firm value-maximizers and not necessarily acting on with the objective of increasing the firm's size.

These findings are not congruent with findings of some recent studies in the United States. The difference in the management's motivations could be a function of the governance structure entrenched in each country's corporations. There is evidence to suggest that the equity of the Canadian corporations is more closely held than its American counterpart.[55] In this respect the management of the Canadian corporation has less flexibility as to its strategic policy decision making. This condition itself suggests that the management of the Canadian corporation is encouraged to have an equity stake at their company. This again will reinforce their decision to invest in projects with net positive present value.[56]

The prediction of the life-cycle hypothesis for acquisitions in the growth stage was not necessarily one that would yield negative returns to the acquiring firms. The model stated some types and forms of acquisitions that may not affect the acquiring firm's performance, i.e. acquisition through stock exchange and acquisition without integrating the acquired firm's operations.

An inference of the negative CARs in the growth group could be that these firms pay a substantially higher premium for the acquired firm. This could come as a result of the lack of

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[55] See Eckbo 1986 and Leighton S.R., and D.H. Thain (1990)

[56] According to a study by Lewellen, Loderer and Rosenfeld (1985), the returns of acquiring firms are directly related to the equity position held by its management.

experience in assessing acquisition targets, overestimating the value of their target, and as a necessary condition to obtain the consent of the target (assuming that there are also other larger firms interested in the target).

The negative CARs obtained by the firms in the growth group imply that the Canadian equity market attributes the successful past performance of these firms more to the demand conditions existing in their industries than to the capabilities of their management. In that sense, their ability to enhance efficiency in the acquired firm and at the same time maintain high performance in their own firm is questioned.

The small sample size of the acquiring firms in the decline stage limits our ability to draw implications for the group. In that sense, a more effective assessment of their case could be accomplished by examining each one individually on a case by case study.

The study has certain macroeconomic implications. Acquisitions in Canada during the 1980-1988 period have re-allocated resources from less efficient users to more efficient ones. These results may help Competition Policy makers in Canada in their efforts to institute a more effective merger policy.

On a more practical level, the results of this study can help
policy decision making by indicating to potential acquiring firms
the rewards and/or pitfalls that these decisions could render
under alternative firm life-cycle stages. A firm that would
embark into an acquisition program will do well to assess its
position and acknowledge its strengths and limitations.

C.   Limitations of the Study

Although the study provides a certain confirmation on the
desirability of desegregation of the acquiring firms population
sample, one must acknowledge the subjective element that each of
the classification methods is attached to. The methods utilized
in this study have been used extensively in the field of social
sciences and business administration. The results of these
methods in classifying non-natural objects such as business
organizations should only be used as approximations and not as
absolute measures of comparisons.

The sample of acquiring companies studied in this thesis may not
be the most representative of the whole population of acquiring
firms in Canada. The restrictive nature of the selection process
left out firms which are not listed in the Toronto Stock
Exchange, hence firms that are privately owned and smaller
organizations were not included in the sample. Firms in the

resource sector financial services, management companies, and foreign firms in Canada were also not considered, hence a significant part of the Canadian economy.

The residual technique via the market model applied to many "event studies" in the field of financial economics is based upon the efficiency of the capital markets. Whether Canadian markets are efficient is still one of the controversies within the finance profession. In addition, the one factor model has certain limitations with respect to its strength in explaining and predicting firm returns. Certain studies have attempted to incorporate an industry return to take into consideration the associated industry effects.

Finally, the number of acquiring firms in the decline stage is not sufficient to enable the establishment of conclusions, similar to those drawn for the mature and growth stages.

D.   Suggestions for Future Studies

The study is only the first step in in a comprehensive analysis of the acquisition decision in Canada. Further research in the following areas will contribute to understanding and assessing the implications of this activity.

Considering the life-cycle hypothesis for the firm's policy

decisions, an extension of this study could be implemented by testing the desirability of growth through internal investment mechanism. The study could undertake a similar methodology of classification and testing of performance.

Should one desire to test further the acquisition hypothesis established by this thesis, other industries could be considered within the Canadian or other developed economies. The results of such studies will shed more light into the benefits of desegregation and will provide practitioners with information that will help them redirect their firms resources.

The original data base of the 98 acquiring firms could be utilized to examine the impact of different types of acquisitions, i.e. assess the target's impact on the acquiring firm's returns.

The classification scheme of the acquiring firms in this study could also be utilized to examine whether there are differences in the premiums paid to the acquired firms among the different groups.

Finally, one may like to test whether acquiring firms in the different life-cycle stages perform better than non-acquiring firms by utilizing a control group. The results of such a study could help reinforce those of the one conducted here.

APPENDIX I

THE FINITE - GROWTH VALUATION FORMULA[57]

First, we consider the value of a firm with no debt and taxes.
The value for such a firm is equal to its expected stream of cash
flows discounted to the present by its associate cost of capital.
Hence:

$$V_i(t) = \frac{NOI_i(t+1) - I_i(t+1) + V_i(t+1)}{1 + \rho(t+1)}$$

(1a)

Where:

$NOI_i(t+1)$ = the random future cash flows from operations for the
ith firm in time period, t,

$I_i(t+1)$ = the variable investment outlay for the ith firm in
period t+1,

$\rho(t+1)$ = the market-required rate of return during the time
period t,

$V_i(t+1)$ = the market value of the firm at period t+1.

Assuming a constant discount rate, ρ, equation (1a) can be
extended to an N - period model, and by assuming that the value
of the firm is finite, then under an infinite time horizon,

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[57] The derivation of the valuation formula in this appendix
follows Copeland and Weston (1983). It is intended to serve only as
a guide to the reader and as such many of the intermediate steps
have been overpassed.

equation (1a) can be written as follows:

$$V_0 = \lim_{N \to \infty} \sum_{t=1}^{N} \frac{NOI_t - I_t}{(1+\rho)^t} \qquad (2a)$$

The stream of cashflows for a growing firm can be given as:

$$NOI_N = NOI_1 + \sum_{t=1}^{N-1} r_t I_t - I_N \qquad (3a)$$

where:

r_t = the average rate of return on investment, assumed to be constant.

By substituting (3a) into (2a), rearranging terms and by simplifying the relationship we obtain:

$$V_0 = \frac{NOI_1}{\rho} + \sum_{t=1}^{\infty} \frac{I_t (r_t - \rho)}{\rho (1+\rho)^t} \qquad (4a)$$

Assuming that investment is a constant proportion of cashflows, K, we have:

$$I_t = K(NOI_t) \qquad (5a)$$

By substituting (5a) into (4a) we have:

$$V_0 = \frac{NOI_1}{\rho} + \sum_{t=1}^{\infty} \frac{K(NOI_t)(r-\rho)}{\rho(1+\rho)^t} \qquad (6a)$$

Since the rate of return is assumed to be the same for every project of the firm, we have

$$NOI_t = NOI_{t-1}(1+rK) \qquad (7a)$$

By incorporating (7a) into (6a), and assuming a finite horizon for growth, lasting T years, we can obtain:

$$V_0 = \frac{NOI_1}{\rho}(1 + \frac{(Kr-\rho K)}{(\rho-Kr)}[1 - \frac{(1+Kr)}{1+\rho}]^T) \qquad (8a)$$

As long as **Kr** is approximately equal to the growth rate, g, and T is small, we can approximate the last term as

$$(\frac{1+Kr}{1+\rho})^T = 1 - T(\frac{\rho-Kr}{1+\rho}) \qquad (9a)$$

By substituting (9a) into (8a) and rearranging terms, we get an approximate valuation formula for finite supernormal growth,

$$V_0 = \frac{NOI_1}{\rho} + KNOI_1 T[\frac{r-\rho}{\rho(1+\rho)}] \qquad (10a)$$

Now, by dropping the assumption of an all equity capitalization and by allowing debt in the capital structure and taxes, equation (10a) can be written as follows:

$$V^L = \frac{NOI_1(1-\tau_c)}{\rho} + \tau_c B + K[NOI_1(1-\tau_c)] \, T[\frac{r-\xi}{\xi(1+\xi)}] \quad (11a)$$

Recognizing that

$$\frac{NOI_1(1-\tau_c)}{\rho} + \tau_c B = \frac{NOI_1(1-\tau_c)}{\xi} \quad (12a)$$

Then, equation (10a) becomes

$$V^L = \frac{NOI_1(1-\tau_c)}{\xi} + KNOI_1(1-\tau_c)[\frac{r-\xi}{\xi(1+\xi)}] \quad (13a)$$

APPENDIX II

THE BASIC FACTOR ANALYTIC MODEL[58]

Factor analysis has become the generic term for a variety of procedures developed for the purpose of analyzing the intercorrelations within a set of variables. The different procedures are suitable for different purposes and usually involve different assumptions regarding the nature of the subject's attributes. Some application of factor analysis procedures have the objective of scaling a set of variable scores, others endeavour to reduce the dimensionality of a set of variables by taking advantage of their intercorrelations, and others to identify fundamental and meaningful dimensions of a multivariate set of variables.

The equation for the common factor model is

$$y_{ij} = x_{i1}b_{1i} + x_{i2}b_{2j} + \ldots + x_{iq}b_{qj} + e_{ij} \qquad (14a)$$

where:

y_{ij} is the value of the ith observation on the jth variable,

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[58] The information in this appendix is summarized directly from the SAS User's Guide: Statistics, Version 5 Edition, 1985, pp.337-338.

x_{ik} is the value of the ith observation on the kth common factor,

b_{kj} is the regression coefficient of the common factor for predicting the jth variable ,

e_{ij} is the value of the ith observation on the jth unique factor,

q   is the number of common factors,

and it is assumed for convenience that all variables have a mean of 0 . In matrix terms these equations reduce to

$$\mathbf{Y = XB + E} \tag{15a}$$

In the preceding equation $\mathbf{X}$ is the matrix of factor scores, and $\mathbf{B'}$ is the factor pattern.
There are two critical assumptions:
the unique factors are uncorrelated with each other
the unique factors are uncorrelated with the common factors.

In principal component analysis, the residuals are generally correlated with each other. In common factor analysis, the unique factors play the role of residuals and are defined to be uncorrelated both with each other and with the common factors. Each common factor is assumed to contribute to at least two variables; otherwise, it would be a unique factor.
At the initial stage of factor extraction, it is also assumed

that the common factors are uncorrelated with each other and have unit variance. This assumption implies that the covariance s_{jk} between the j_{th} and k_{th} variables, is given by

$$s_{jk} = b_{1j}b_{ik} + b_{2j}b_{2k} + \ldots + b_{qj}b_{qk}$$

(16a)

or

$$S = B'B + U2$$

(17a)

where S is the covariance matrix of the observed variables and U2 is the diagonal covariance of the unique factors. With a standardized variable set the above matrix will yield correlations instead of covariances. The difference between the correlation predicted by the common factor model and the actual correlation is the residual correlation. The latter show the degree of goodness-of-fit of the common factor model.

The assumption of the factors being uncorrelated means of course that they are not linear combinations of the observed variables. This implies that the common factors scores cannot be computed directly, they can only be estimated.

After the factors have been estimated, it is necessary to interpret them. Interpretation usually means assigning to each common factor a name that reflects the importance of the factor

in predicting each of the observed variables, that is, the coefficients in the pattern matrix corresponding to the factor. Factor interpretation is a subjective process. The interpretation process can become less subjective by rotating the common factors, that is, by applying a nonsingular linear transformation. A rotated pattern matrix in which all the coefficients are close to 0 or plus or minus 1 is easier to interpret than a pattern with many intermediate elements.

If the factors are rotated by an orthogonal transformation, the rotated factors remain still uncorrelated. However, if the factors are rotated by an oblique transformation, the rotated factors become correlated. A consequence of correlated factors is that there is no single unambiguous measure of the importance of a factor in explaining a variable. Thus, for oblique rotations, the pattern matrix does not provide all the necessary information for interpreting the factors; we must also examine the factor structure and the reference structure.

The usual criterion for rotation is that of simple structure, namely, that where each variable loads highly on one and only one factor. This can be achieved by the use of a number of algebraic criteria of which the most widely adopted is the "normal varimax criterion". As the name implies this seeks to maximize the variance of the loadings on each factor, that is to achieve as many high and a many low loadings as possible. Using the varimax

criterion the orthogonality of the original variables is
maintained.

Since all rotations are equally good from a statistical point of
view, the preferred rotation method is usually the one that
yields the best interpretation on the factor pattern matrix. In
this sense, two different rotation methods could allow different
interpretations. The latter does not mean that we have
conflicting interpretations, but rather two different points of
view in the common-factor space.

The number of procedures for factor extraction has being
increasing over time to accommodate the different objectives of
the researchers and the individual properties of their original
data sets. Some of the procedures that have been utilized
extensively in the social sciences area are principal component
analysis, principal factor analysis, maximum-likelihood factor
analysis, alpha factor analysis, and image component analysis.
To aid in comparing these procedures table A1.1 has been
prepared. [59]

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[59] The information in the next table is summarized from R.L
Gorsuch, "Factor Analysis", Second Edition, Lawrence Erlbaum
Associates, Hillsdale, New Jersey, 1983.

Table 1.A
COMPARISON OF EXPLORATORY FACTOR EXTRACTION PROCEDURES

Type of Factor Analysis Scores	Principle of Extraction	Definition of Uniqueness	Communality Estimates
Principal Calculated Components	Maximizes variance	None	None needed
Principal Estimated Factor	Maximizes variance	Specific factors, Random error	Numerous estimation procedures
Maximum Estimated Likelihood	Best estimate of reproduced correlation matrix	Specific factors, Random errors	Iterative
Alpha Calculated	Maximizes gene-ralizability to factors underlying domain variables	Psychometric error	Iterative
Image Calculated	Minimizes residual images	Uncorrelated variable parts	Squared Multiple correlation

APPENDIX III

CLUSTERING METHODS[60]

Techniques for cluster analysis seek to separate a set of data into groups or clusters. Ball (1971) lists seven possible uses of clustering techniques, these being as follows:

1. Finding a true typology,

2. Model fitting,

3. Prediction based on groups,

4. Hypothesis testing,

5. Data exploration,

6. Hypothesis generating,

7. Data reduction.

In this study we have performed data reduction by reducing the information on the whole set of acquiring firms to j groups. Then these groups formed the basis of a classification scheme useful for predicting the life-cycle hypothesis for the acquisition decision.

Cluster analysis techniques may be classified into the following types:

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[60] This section draws heavily from B. Everitt (1980), Cluster Analysis, Heinemann Educational Books, London.

i. <u>Hierarchical techniques</u> - which proceed by a series of successive fusions of the population entities into groups. All hierarchical techniques begin with the computation of a similarity or distance matrix between the entities. A very common similarity coefficient is the product moment correlation coefficient, and the most common distance measure is the Euclidean distance. Differences between methods arise because of the different ways of defining distance (or similarity) between an entity and a group containing several entities, or between two groups of entities. A brief description of some hierarchical techniques is given here.

Average Linkage

It is an unweighed pair-group method and uses arithmetic averages, and it defines distance between groups as the average of the distances between all pairs of entities in the two groups. The method tends to join clusters with small variances and is slightly biased toward producing clusters with the same variance.

Centroid Method

This method depicts groups as lying in Euclidean space, and are replaced on formation by the coordinates of their centroid. The distance between groups is defined as the distance between the group centroids. The centroid method is more robust to outliers than most other methods but in other respects may not perform as well as Ward's method or average linkage.

Single Linkage

Groups initially consisting of single individuals are fused according to the distance between their nearest neighbours. The distance between groups is defined as the distance between their closest members. By imposing no constraints on the shape of clusters, single linkage sacrifices performance in the recovery of compact clusters.

Complete Linkage

This method defines distance between groups as that existing between their most remote pair of entities. Complete linkage is heavily biased toward producing clusters with roughly equal diameters and is often distorted by moderate outliers.

Ward's Minimum Variance method

Ward's method defines the distance between two clusters by the Analysis of Variance (ANOVA) sum of squares between the two clusters added up over all the variables. The method often joins clusters with small number of entities and is heavily biased toward producing clusters with approximately the same number of entities. In addition it is very sensitive to outliers.

ii. <u>Optimization-partitioning techniques</u> - in which the clusters are formed by optimization of a "clustering criterion". The clusters are mutually exclusive, thus forming a partition of the set of entities. Most of the methods assume that the number of

groups has been decided a priori by the researcher. One of the most applied optimizing-partitioning techniques is **FASTCLUS**.[61]

The FASTCLUS procedure combines an effective method for finding initial clusters with a standard iterative algorithm for minimizing the sum of squared distances from the cluster means. The result is an efficient procedure for disjoint clustering of large data sets.

The procedure uses a method called the nearest centroid sorting. A set of points called cluster seeds is selected as a first guess of the means of the clusters. The seeds are then replaced by the means of the temporary clusters and the process is repeated until no further changes occur in the clusters. The clustering is done on the basis of Euclidean distances computed from one or more numeric variables.

The initialization method used by FASTCLUS makes it sensitive to outliers. The method is indented for use with large data sets, usually over 100 entities.

iii Density or mode-seeking techniques - in which clusters are formed by searching for regions containing a relatively dense concentration of entities. These methods have their origins in

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[61] The FASTCLUS procedure is thoroughly described in SAS User's Guide: Statistics, Version 5 Edition, 1985, pp. 377-401.

single linkage cluster analysis and arose in an attempt to overcome the main problem of that technique, namely chaining. Clusters are formed initially in away similar to that of the single linkage method, but criteria are adopted for judging when additions to clusters should be stopped. These methods assume that the data set is multivariate normal.

In this study we have utilized clustering methods from all three techniques. The methods in the hierarchical and density mode seeking categories were conducted in order to identify the potential number of clusters in the data set. The optimizing partitioning technique of FASTCLUS was conducted in order to obtain distinctive and mutually exclusive clusters.

APPENDIX IV

SAMPLE OF CANADIAN ACQUISITIONS DURING 1980 - 1988

	ACQUIRING COMPANY	ACQUIRED COMPANY	DATE
1.	Acklands Ltd	Cdn Performance Ltd	01/12/1986
2.	Atco Ltd	Cdn Utilities Ltd	19/06/1980
3.	Baton Broadcasting Inc	CJOH - TV	31/08/1986
4.	Bombardier Inc	Canadair Ltd	23/12/1986
5.	Bright T.G.& Co Ltd	J&S Cellars Ltd	25/06/1986
6.	Cdn Marconi Co	World Circuits Inc	15/06/1982
7.	Cdn Manoir Ind. Inc	Holyote Inc	01/01/1980
8.	Charan Ind. Inc	Cooper Cda Ltd	31/05/1986
9.	CHUM Ltd	Maisonneve Brdcsg Ltd	31/08/1985
10.	Contrans Corp.	Lyon Van Lines Inc	30/09/1986
11.	Corby Distilleres Inc	McGuinness Dstllrs Ltd	31/12/1987
12.	CCL Industries Inc	Continental Cda Inc	31/12/1982
13.	Canron Inc	Mannville Cda Ltd	14/02/1986
14.	Cara ltd	Swiss Chalet B.B.Q. Inc	31/03/1982
15.	Cineplex Corp.	Walter Reade Inc	15/06/1987
16.	Comtech Group Itl Ltd	CMI Cda Inc	15/10/1985
17.	Comterm Inc	Extraordinateur Inc	15/08/1983
18.	Consumers Pckg Inc	Brockway Imco Inc	10/10/1984
19.	R.L. Crain Ltd	The Label House Ltd	31/08/1981
20.	Develcon Elctrncs Ltd	Omnitec Data Inc	30/09/1983
21.	Devtec Corp.	Interfast Inc (50%)	05/02/1988

22.	Dofasco Ltd	Whittar Steel Inc	31/12/1986
23.	Dominion Textile Inc	Wabbasso Inc(portion)	15/03/1985
24.	Dylex Ltd	Foxmoor Inc	29/03/1985
25.	EMCO Ltd	Western Supplies Ltd	15/04/1986
26.	Federal Industries	Drummond McCall Inc	01/01/1987
27.	Finning Ltd	Bowmaker Ltd	01/07/1983
28.	Fleet Aerospace Corp.	Aeronca Inc	01/07/1986
29.	Fraser Inc	Paper Mills Ltd (50%)	04/02/1983
30.	GSW Inc	Wood Mnfg Ltd	17/04/1984
31.	Galtaco Inc	Johnston Ind. Inc	25/05/1984
32.	Gandalf Inc	OCRA Communications Ltd	15/03/1985
33.	Grafton Group Ltd	Nabour Stores Ltd	14/01/1986
34.	Haley Ind. Inc	Presto Castings Ltd	01/04/1984
35.	Harding Carpets Ltd	Laing Intl Products Ltd	01/01/1982
36.	Harris Steel Group Inc	Courtise Steel Ltd	12/02/1986
37.	Hayes-Dana Inc	Wix Inc (59%)	28/11/1984
38.	Imasco Ltd	Burger Chef Systems Inc	10/03/1982
39.	Innopac Inc	Strout Plastics Inc	30/09/1985
40.	IPSCO Inc	Ram Steel Inc	02/12/1983
41.	Intermetco Ltd	Koffman Foods Ltd	26/02/1983
42.	Intrpvcl Pipeline Ltd	Home Oil Co Ltd	05/12/1986
43.	Ivaco Inc	Canron Ltd	17/01/1986
44.	Jannock Ltd	Richtex Corp.	23/09/1986
45.	John Labatt Ltd	Omstead Foods Ltd	15/09/1984
46.	Laidlaw Trans. Ltd	GSX Corp.	15/07/1986
47.	Lake Ontario Cement Ltd	Universal Concrete Ltd	29/01/1986

48.	Lawson Mardon Group Ltd	C.B. Henschel Mnfg Co	01/02/1988
49.	Loblow Cos Ltd	Mr Grocer Inc	03.02/1987
50.	Logistec Corp.	Wolfe Stevedores Ltd	10/09/1985
51.	Lumonics Inc	Photon Sources Inc	31/12/1985
52.	MDS Health Group Ltd	Genessee Lab Inc	31/12/1983
53.	Maclean Hunter Ltd	Toronto Sun Corp (50%)	27/04 1982
54.	Mark's Work Wrhse Ltd	Turner Automotive Ltd	16/05/1983
55.	National Sea Prdcts Inc	Brook & Fisher Boy Ltd	15/06/1986
56.	Noma Industries Ltd	Danbel Ind. Inc (78%)	14/06/1985
57.	The Oshawa Group Ltd	Cda Safeway (22 stores)	31/08/1985
58.	PCL Industries Ltd	Heintsman Ltd	19/01/1981
59.	Peerless Carpet Corp.	Iro Sales Corp	07/12/1984
60.	Phillips Cables Ltd	Power Cable Inc	14/02/1980
61.	Provigo Inc	Dominion Stores (Quebec)	15/06/1981
62.	Prefac Enterpr. Inc	Collmac Lumber Ltd	27/08/1986
63.	Principal Neo-Tech Inc	Neo-Tech&Neo-Seis Inc	01/04/1984
64.	Quebecor Inc	Semline Inc	07/11/1986
65.	Red Path Ind. Ltd	Donlee Mnfg Ltd	02/01/1985
66.	Rolland Inc	Technographics Paper Inc	24/07/1986
67.	SHL Systemhouse Inc	Capital Systems Inc	30/04/1986
68.	Schneider Corp.	F.G. Bradley Co Ltd	23/02/1981
69.	Scintrex Ltd	Urtec Ltd	31/10/1985
70.	Scott's Hospitality Inc	Black Photo Corp.	23/05/1985
71.	The Seagram's Co Ltd	Martell S.A.	01/04/1988
72.	Selkirk Cmmnctns Ltd	Ottawa Cablevision Ltd	15/07/1985
73.	Shaw Cablesystems Ltd	Western Cable T.V. Ltd	10/11/1986

74.	Shaw Industries Ltd	Western Pipe Prtctn Ltd	14/10/1983
75.	Shepherd Products Ltd	Eastern Plastic Ind.Inc	31/07/1982
76.	Sico Inc	Sterling Cda Inc	14/02/1987
77.	Silcorp Ltd	Convenience Srvces Ltd	03/01/1986
78.	Slater Ind. Inc	Renown Steel Inc	31/01/1986
79.	Sommerville Ind. Inc	Capital Plastics Inc	16/04/1984
80.	Southam Inc	Dittler Bros Inc	15/10/1983
81.	Spar Aerospace Ltd	North-Way Gestalt Corp.	13/03/1980
82.	St. Lawrence Cement Inc	Lone Star Inc (a plant)	15/08/1985
83.	Standard Brcstg Corp.	St Catherines Std Ltd	15/09/1981
84.	D.A. Stuart Ltd	Ironsides Co Ltd	01/07/1980
85.	Thomson Newspapers Ltd	The Express (Penslva)	06/01/1984
86.	Toromont Inc	Pamco Cda Ltd	01/06/1988
87.	The Toronto Sun Corp	Houston Post	02/12/1983
88.	Trimac Ltd	Liquid Transporters Ltd	30/09/1980
89.	V.S. Services Ltd	Parnell Foods Ltd	01/10/1984
90.	Varity Corp.	Dayton Walter Corp.	31/12/1986
91.	Vulcan Packaging Inc	T&S Plastics Inc	01/02/1987
92.	UAP Inc	Handy-Andy Auto Inc	31/06/1984
93.	Unican Sty Systems Inc	Taylor Lock Co	24/06/1986
94.	WIC Ltd	CFGM & CILQ-FM	01/11/1985
95.	Waferboard Corp. Ltd	Abitibi-Price(pulp mill)	01/12/1986
96.	Warrington Inc	Santana Inc	12/07/1984
97.	George Weston Ltd	Kroger Co (26 stores)	31/12/1986
98.	Whonnock Ind. Ltd	Pitt Meadows plant	01/03/1984

APPENDIX V

FASTCLUS THREE-CLUSTER COMPANIES GROUPING

CLUSTER 1

1. Fraser Inc.
2. Intermetco Ltd.
3. Galtaco Ltd.
4. Varity Corp. Ltd.
5. National Sea Products Ltd.
6. Whonnock Industries Ltd.
7. Warrington Inc.

CLUSTER 2

1. Quebecor Inc.
2. Canadian Marconi Ltd.
3. Fleet Aerospace Corp.
4. Scintrex Ltd.
5. PCL Industries
6. Scotts Hospitality Inc.
7. Innopac Inc.
8. Spar Aerospace Ltd.
9. Devtek Inc.
10. The Toronto Sun & Publishing Corp.
11. Vulcan Packaging Inc.
12. GSW Inc.
13. Unican Security Systems Ltd.
14. Shaw Cable Systems Ltd.
15. MDS Health Group Ltd.
16. CHUM Ltd.
17. Baton Broadcasting Ltd.
18. Charan Industries Inc.
19. Trimac Ltd.
20. Dylex Ltd.
21. Provigo Inc.
22. Thompson Newspapers Inc.
23. Comtech Group Ltd.
24. Cineplex Corp. Ltd.
25. Laidlaw Transportation Ltd.
26. Gandalf Inc.
27. Maclean Hunder Ltd.
28. Peerless Carpet Ltd.
29. Noma Industries Ltd.
30. SICO Inc.
31. Haley Industries Ltd.
32. SHL Systemhouse Inc.

33. Develcon Inc.
34. Lumonics Inc.

CLUSTER 3

1.   Rolland Industries Inc.
2.   Selkirk Communications Ltd.
3.   Schneider Corp. Ltd.
4.   Hayes-Dana Inc.
5.   UAP Inc.
6.   Emco Ltd.
7.   Ackland's Ltd.
8.   Slater Industries Inc.
9.   The Oshawa Group Ltd.
10. John Labbat Inc.
11. Bombardier Inc.
12. Shepherd Products Ltd.
13. Shaw Industries Ltd.
14. Contrans Corp. Ltd.
15. Dominion Textile Ltd.
16. Grafton Group Ltd.
17. V.S. Services Ltd.
18. Dofasco Ltd.
19. Federal Industries Ltd.
20. Finning Ltd.
21. Southam Inc.
22. Canron Inc.
23. Waferboard Corp. Ltd.
24. George Weston Ltd.
25. Toromont Inc.
26. D.A. Stuart Ltd.
27. Logistic Corp. Ltd.
28. Ivaco Inc.
29. Consumers Packaging Inc.
30. Joseph Seagrams & Sons Inc.
31. Bright, T. G. & Co. Ltd.
32. WIC Ltd.
33. Standard Broadcasting Corp. Ltd.
34. Jannock Ltd.
35. CCL Industries Ltd.
36. Interprovincial Pipelines Ltd.
37. Lawson Mardon Group Ltd.
38. Silcorp. Ltd.
39. Loblaw Companies Ltd.
40. Imasco Ltd.
41. Lake Ontario Cement Ltd.
42. Cara Corp. Ltd.
43. Corby Distilleries Inc.
44. ATCO Ltd.
45. Canadian Manoir Industries Ltd.

46. Harris Steel Group Inc.
47. IPSCO Inc.
48. Philips Cables Ltd.
49. Red Path Industries Ltd.

50. Harding Carpets Inc.
51. Marks Work Wearhouse Ltd.

52. R.L. Crain Ltd.
53. Principal Neo-Technology Inc.
54. St. Lawrence Cement Inc.
55. Sommerville Belkin Industries Ltd.

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