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Domestic And Foreign Take-overs Of Canadian Business Corporations, 1962-1973

Udayan Purushottama Rege

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DOMESTIC AND FOREIGN TAKE-OVERS

OF CANADIAN BUSINESS CORPORATIONS

1962-1973

by

Udayan Purushottama Rege

School of Business Administration

Submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
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ABSTRACT

The purpose of this study is to investigate the determinants of the levels and targets of domestic take-overs and foreign take-overs as well as foreign relative to total take-overs in Canada, consistent with a conceptual framework developed in this study.

A take-over occurs when the present value of the taken-over firm to the management of the taking-over firm is larger than the present value of the same firm to the management of the taken-over firm. The present value of the firm, according to the theory of capital budgeting, is determined by two theoretical variables, the marginal cost of capital and anticipated net cash flows. It was postulated that the entrepreneurial perception of these theoretical variables is affected by either the domestic economic conditions, the advantages enjoyed by foreign entrepreneurs or the financial characteristics of the taken-over firm. These three factors are useful in explaining the levels domestic and foreign take-overs, predicting foreign relative to total take-overs and locating domestic, foreign and domestic relative to foreign take-over targets respectively.

The results obtained by using quarterly Canadian macro data from 1962 to 1973 indicate that the level of domestic take-overs in Canada is related to the levels of the rate
of interest, corporate net cash flows and the stock market index. It was further found that the level of foreign take-overs in Canada during the same period was also related to the same economic conditions. The cross-sectional data was used to explain the foreign relative to total take-over activity. It was found that foreign relative to total control in an industry at the beginning of the period can be used to predict future foreign relative to total take-overs in that industry. The multiple discriminant analysis conducted in this study, with the help of micro data, does not provide statistical support that taken-over firms, particularly foreign ones, are less liquid, highly levered, more active and profitable and pay more dividends.

In conclusion the study has attempted to develop a conceptual framework and consistently applied it to explain the levels of domestic and foreign take-overs, predict foreign relative to domestic take-overs and locate the targets of domestic, foreign and foreign relative to domestic take-overs in Canada during the period 1962 to 1973.
ACKNOWLEDGEMENTS

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This study is dedicated to Aai and Baba, my parents who waited long, but not long enough, to witness its completion. My wife, Kanchan, and son, Ojas, shared the moments of joy and frustrations with me during every phase of my graduate work. Without their encouragement, support and understanding this work would have never been completed. I have no words to thank them. I wish to express my gratitude to Professor and Mrs. M. L. Balse who treated me like a son during my stay in London, showed interest in my work and helped me in every respect.
TABLE OF CONTENTS

CERTIFICATE OF EXAMINATION ........................................... II
ABSTRACT ........................................................................ III
ACKNOWLEDGEMENTS ....................................................... V
TABLE OF CONTENTS ....................................................... VII
LIST OF TABLES ............................................................. XII
LIST OF FIGURES ........................................................... XIV

CHAPTER 1 : INTRODUCTION ............................................. 1
  1.1 The Purpose of the Study ........................................... 1
  1.2 The Need for Research ............................................. 4
  1.3 Research Outline ................................................... 9

CHAPTER 2 : THE DETERMINANTS OF THE LEVEL OF
DOMESTIC TAKE-OVERS ............................................. 11
  2.1 Development of Research Hypothesis ......................... 11
    2.1.1 Introduction .................................................. 11
    2.1.2 Review of Previous Work .................................. 13
    2.1.3 Take-Over as a Capital Budgeting Decision .......... 19
    2.1.4 Conceptual Framework for Domestic
        Take-Overs ....................................................... 22

VII
2.2 Statement of Research Hypotheses .................. 28
  2.2.1 The Credit Effect .................................. 28
  2.2.2 The Funds Effect .................................... 31
  2.2.3 The Expectations Effect .............................. 34
  2.2.4 The Determinants of the Level of Domestic
         Take-Overs ($H_{la}$) .............................. 36

2.3 Statistical Testing ..................................... 39
  2.3.1 The Database ........................................ 39
  2.3.2 The Results for the Domestic Model ............... 43
  2.3.3 Implications of the Multiple Regression
         Technique ............................................. 46
  2.3.4 The Analysis of Residuals ........................... 51
  2.3.5 The Summary of the Findings ....................... 59

APPENDIX 2A Testing for Lags in the Domestic Model .... 62

CHAPTER 3: THE DETERMINANTS OF THE LEVEL OF FOREIGN
         TAKE-OVERS ........................................... 64

  3.1 Development of Research Hypotheses .................. 64
  3.1.1 Introduction ........................................ 64
  3.1.2 Review of Previous Work ............................ 66
  3.1.3 Capital Budgeting Theory Extended .................. 71
  3.1.4 Conceptual Framework for Foreign
         Take-Overs .......................................... 73
3.2 Statement of Research Hypotheses ...................... 76
3.2.1 The Domestication Hypothesis ($H_{2a}$) .......... 76
3.2.2 The Spillover Hypothesis ($H_{2b}$) ................. 80
3.2.3 The Differential Hypothesis ($H_{2c}$) ............... 81
3.2.4 The Mixed Hypothesis ($H_{2d}$) ..................... 83
3.3 Statistical Testing ..................................... 86
3.3.1 The Data Base .................................. 86
3.3.2 Multiple Regression for Foreign Models .......... 87
3.3.3 Implications of the Multiple Regression Technique ................................................. 89
3.3.4 The Analysis of Residuals .......................... 94
3.3.5 The Summary of the Findings ........................ 100
APPENDIX 3A Testing for Lags in the Foreign Model .. 102

CHAPTER 4: THE INTER-INDUSTRY DOMESTIC AND FOREIGN TAKE-OVERS .................................... 104
4.1 Development of Research Hypotheses .................. 104
4.1.1 Introduction ..................................... 104
4.1.2 Review of Previous work .......................... 107
4.1.3 Relation to the Capital Budgeting Theory ........ 111
4.1.4 Conceptual Framework for Relative Take-Overs 113
4.2 Statement of Research Hypotheses .................... 116
4.2.1 The Industry Advantage ......................... 116
4.2.2 The Common Advantage ........................... 119
4.2.3 The Inter-Industry Relative Take-Over Hypothesis ($H_{3a}$) ...................................... 120
CHAPTER 5 : THE FINANCIAL CHARACTERISTICS OF TAKEN-OVER FIRMS

5.1 Development of Research Hypotheses

5.1.1 Introduction

5.1.2 Review of Previous work

5.1.3 Conceptual Framework for Financial Characteristics

5.2 The Financial Characteristics

5.2.1 Liquidity

5.2.2 Leverage

5.2.3 Payout

5.2.4 Activity

5.2.5 Profitability

5.3 Multiple Discriminant Analysis

5.3.1 The Availability of Data

5.3.2 The Three Discriminant Hypotheses

5.3.3 The Requirements of MDA

5.3.4 The Advantages of MDA

5.3.5 The Classification Procedure
5.4 Development of Methodology and Results .......... 154
  5.4.1 Statistical Significance of the Results .... 154
  5.4.2 Homogeneity of Variance ...................... 157
  5.4.3 Normality of Z Distribution ..................... 158
  5.4.4 Univariate Ranking of Variables ................. 160
  5.4.5 Multivariate Ranking of Variables .............. 163
  5.4.6 The Summary of the Findings .................... 166
APPENDIX 5A The Wilcoxon Test ......................... 168

CHAPTER 6: THE SUMMARY AND IMPLICATIONS OF THE
RESULTS .................................................. 170
  6.1 Introduction ....................................... 170
  6.2 The Process of Take-Over ........................... 171
  6.3 The Level of Domestic Take-Overs .................. 177
  6.4 The Level of Foreign Take-Overs ................... 179
  6.5 Foreign Relative to Total Take-Overs ............. 181
  6.6 Locating Take-Over Targets ........................ 184

REFERENCES ............................................. 186

VITA ..................................................... 191
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Domestic Taken-Over Firms</td>
<td>42</td>
</tr>
<tr>
<td>2.2</td>
<td>Regression Results for the Domestic Model</td>
<td>43</td>
</tr>
<tr>
<td>2.3</td>
<td>Analysis of Variance for the Domestic Model</td>
<td>44</td>
</tr>
<tr>
<td>2.4</td>
<td>Coefficient of Determination Test for the Domestic Model</td>
<td>44</td>
</tr>
<tr>
<td>2.5</td>
<td>Covariance for the Domestic Model</td>
<td>49</td>
</tr>
<tr>
<td>2.6</td>
<td>$R^2$ Changes in Stepwise Regression for the Domestic Model</td>
<td>49</td>
</tr>
<tr>
<td>2.7</td>
<td>Regression of Residuals in the Domestic Model ($H_{1a}$)</td>
<td>57</td>
</tr>
<tr>
<td>3.1</td>
<td>Foreign (U.S.) Taken-Over Firms</td>
<td>86</td>
</tr>
<tr>
<td>3.2</td>
<td>Analysis of Variance for Foreign Models</td>
<td>88</td>
</tr>
<tr>
<td>3.3</td>
<td>Covariances for Foreign Models</td>
<td>91</td>
</tr>
<tr>
<td>3.4</td>
<td>$R^2$ Changes in Stepwise Regressions for Foreign Models</td>
<td>92</td>
</tr>
<tr>
<td>3.5</td>
<td>Regression of Residuals in the Foreign Model ($H_{2a}$)</td>
<td>99</td>
</tr>
<tr>
<td>4.1</td>
<td>Statistical Results for the Cross-sectional Model</td>
<td>124</td>
</tr>
<tr>
<td>5.1</td>
<td>Standardized Items of Financial Information</td>
<td>146</td>
</tr>
<tr>
<td>5.2</td>
<td>Results for the Discriminant Functions</td>
<td>154</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5.3</td>
<td>Significance Tests for MDA</td>
<td>156</td>
</tr>
<tr>
<td>5.4</td>
<td>Test Results for Homogeneity</td>
<td>158</td>
</tr>
<tr>
<td>5.5</td>
<td>Goodness of Fit Tests</td>
<td>160</td>
</tr>
<tr>
<td>5.6</td>
<td>Univariate Test Results for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discriminant Variables</td>
<td>162</td>
</tr>
<tr>
<td>5.7</td>
<td>Multivariate Test Results for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discriminant Variables</td>
<td>164</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Model for Domestic Take-Overs</td>
<td>27</td>
</tr>
<tr>
<td>2.2</td>
<td>Scattergram for Predicted Values in Domestic Model (H1_2_0)</td>
<td>53</td>
</tr>
<tr>
<td>2.3</td>
<td>Scattergram for Rate of Interest in Domestic Model (H1_2_0)</td>
<td>54</td>
</tr>
<tr>
<td>2.4</td>
<td>Scattergram for Corporate Net Cash Flows in Domestic Model (H1_2_0)</td>
<td>55</td>
</tr>
<tr>
<td>2.5</td>
<td>Scattergram for Stock Market Index in Domestic Model (H1_2_0)</td>
<td>56</td>
</tr>
<tr>
<td>3.1</td>
<td>Model for Foreign Take-Overs</td>
<td>75</td>
</tr>
<tr>
<td>3.2</td>
<td>Scattergram for Predicted Values in Foreign Model (H2_2_0)</td>
<td>95</td>
</tr>
<tr>
<td>3.3</td>
<td>Scattergram for Rate of Interest in Foreign Model (H2_2_0)</td>
<td>96</td>
</tr>
<tr>
<td>3.4</td>
<td>Scattergram for Corporate Net Cash Flows in Foreign Model (H2_2_0)</td>
<td>97</td>
</tr>
<tr>
<td>3.5</td>
<td>Scattergram for Stock Market Index in Foreign Model (H2_2_0)</td>
<td>98</td>
</tr>
<tr>
<td>4.1</td>
<td>Model for Relative Take-Overs</td>
<td>114</td>
</tr>
<tr>
<td>5.1</td>
<td>Model for Financial Characteristics of Taken-Over Firms</td>
<td>136</td>
</tr>
<tr>
<td>6.1</td>
<td>Model for Take-Overs</td>
<td>176</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1 The Purpose of the Study

Foreign direct investment is one of the major issues attracting public interest and generating discussion in Canada. Foreign investment involves the inflow of foreign capital into Canada and can be classified into short term and long term funds. Short term funds cross international boundaries to take advantage of fluctuations in the rate of exchange and to undertake arbitrage operations between interest rate structures in different countries. On the other hand, long term funds are attracted by long term investment opportunities in various countries. This study considers foreign investment that involves inflow of long term foreign capital into Canada.

Long term foreign investment can take the form of either portfolio investment or direct investment. Portfolio investment includes investment in bonds and minority holdings of equity. Since it does not involve legal control of the issuing corporation, it is foreign investment without foreign control. Direct investment, however, causes
concern to most Canadians because it means foreign ownership and control of Canadian economic activity. This study, therefore, addresses itself to the direct investment aspect of the long term foreign investment.

Foreign direct investment takes two basic forms. It can be either an internal expansion or an external take-over. When a foreign firm sets up a plant in Canada or expands its operations by creating new assets, it is an internal expansion. On the other hand, when a foreign company or its subsidiary assumes control of a going concern in Canada, it is a take-over. This study is primarily concerned with foreign take-overs of Canadian firms.

At this stage, it is necessary to explain what is meant by 'control'. Reuber-Roseman study\(^1\) considered the question of control and decided to leave the decision to the taking-over corporation. While they found only nine cases where the taken-over firms held less than 50 per cent ownership, there was not a single case where majority ownership was not considered to constitute control. Hence for the purpose of this study more than 50 per cent ownership was used as the control criterion. This made it possible to use take-over data collected by Statistics Canada that uses the 50% plus ownership definition of control.

It is asserted that a take-over occurs when the expected value of a firm to an entrepreneur who does not own the firm is greater than the value of the same firm to its owner. The present study expounds this concept consistent with the theory of capital budgeting and empirically tests the following with Canadian data for the period 1962 to 1973.

1. What economic conditions affect the level of domestic take-overs in Canada and to what extent are they different from the conditions that affect the level of foreign take-overs in this country?

2. What determines the current foreign, relative to total take-over activity in Canada? Is the existing level of foreign control in an industry an indication of future take-over activity in the industry?

3. Is it possible to locate the targets of foreign as well as domestic take-overs on the basis of their financial characteristics?

The purpose of this study, therefore can be summarized as an effort to find the determinants of the levels and targets of foreign take-overs, domestic take-overs and foreign relative to total corporate take-overs in this country.
1.2 The Need for Research

The Reuber and Roseman\textsuperscript{2} study of the take-over of Canadian firms that explored relationships between the number of foreign take-overs and macroeconomic factors serves as a basis for this study. They studied take-overs from 1945 to 1961, while this study covers the period from 1962 to 1973. They related foreign take-overs to 28 different macroeconomic variables and finally selected three variables that provided the best statistical and intuitive results. However when these variables were applied to domestic take-overs the statistical results were not as good and hence they proceeded to select two other variables to explain the level of domestic take-over activity in Canada.

This study begins with the application of the theory of capital budgeting to the domestic take-over activity. It develops theoretical variables with plausible explanation of why domestic take-overs occur. It tests only those economic variables that appear reasonable proxies for the theoretical variables. After obtaining satisfactory results, it uses the same variables to explain the foreign take-over activity in Canada.

\textsuperscript{2} Ibid.
At this stage, it should be noted that Reuber and Roseman used annual time series data, while the present study uses quarterly time series data. The rationale for this departure is explained in detail in section 2.3.1. Moreover Reuber and Roseman were able to obtain their data by sending questionnaires with the backing of the Department of Consumer and Corporate Affairs. This could not be done for this study due to the lack of resources.

After exploring the relationships between foreign and domestic take-overs on the one hand and macroeconomic variables on the other, Reuber and Roseman used cross-sectional data to measure advantages enjoyed by foreign entrepreneurs in various Canadian industries. This study tests their hypotheses for another period and obtains slightly better results. However an attempt is also made to relate these hypotheses to the theory of capital budgeting to maintain consistency in developing a theoretical framework.

Reuber and Roseman studied the financial characteristics of taken-over firms. They analyzed the characteristics with the help of graphic presentation of the data. This study too examines the financial characteristics of taken-over firms. However the characteristics are obtained by the review of literature and tested by using the powerful statistical technique of multiple discriminant analysis.

The Federal task force headed by the Melville Watkins found that the availability of information was a crucial
factor in arriving at meaningful conclusions regarding foreign ownership of Canadian businesses. Their report\textsuperscript{3}, therefore, recommends setting up an agency to collect and disseminate information and, among other things conduct research. The other measures suggested by the report were aimed at correcting the balance between domestic and foreign investment in Canada, rather than at understanding the forces that lead to bids by foreign entrepreneurs to take over domestic firms.

The Gray report\textsuperscript{4} analyzed the existing state of foreign control of Canadian industries and came up with policy recommendations for setting up a review agency. One of the important tasks of the agency, the report suggested, should be to develop a policy based on 'benefits to Canada'. Though the report did not deal in detail with the determinants of the levels and targets of foreign take overs of Canadian firms, it has recognized the need for research in this area and urged that the review agency should undertake the task.

Under the Foreign Investment Review Act of 1973, Foreign Investment Review Agency (FIRA) is empowered to encourage and conduct research pertaining to take-over activity in Canada. The research conducted by FIRA is


mainly confined to reviewing take-over applications and ascertaining that they are 'beneficial to Canada'. The research undertaken by FIRA is immediately applicable to the problem it is faced with. However there is a need for fundamental research for understanding the influences of economic factors on take-overs, the industry differences and the financial characteristics of taken-over firms.

In the field of finance, empirical work in the take-over area is confined to testing the theories of merger waves, economic disturbances and conglomerate mergers. Attempts have been made to compare financial characteristics of taken-over firms with those of non-taken-over firms. However a comparison between foreign taken-over and domestic taken-over firms was not attempted.

The present study develops a model that is consistent with the theory of capital budgeting. It explains the relationship between take-overs and macroeconomic variables. It can be applied to domestic as well as foreign take-overs. It can be extended to explain foreign relative to total take-overs on an industry by industry basis. It also tests the financial characteristics of the taken-over firms in an attempt to distinguish foreign, domestic and non-taken-over firms from each other.

5. These terms are explained in greater detail with reference to particular works in section 2.1.2.
6. These attempts are described in detail in section 5.1.2.
The empirical testing of the model is done with the help of Canadian data for 12 years from 1962 to 1973 inclusive. This period was chosen because the period prior to 1962 has been researched by Reuber and Roseman and the period after 1973 is somewhat distorted by the emergence of FIRA.
1.3 Research Outline

To recapitulate, the study neither covers the entire spectrum of foreign investment in Canada nor addresses itself to the much larger problem of the merger movement in Canada. It studies only the determinants of the levels and targets of foreign, domestic and foreign relative to total take-over activity in this country. The issues are complex and related to each other. The study is, therefore, divided into six chapters including the present introduction.

Chapter two reviews the literature pertaining to the determinants of domestic take-overs. It then establishes a relationship between the theory of capital budgeting, entrepreneurial perceptions that cause differences in valuations of the firm, levels of economic activity that affect valuation differences and the levels of take-over activity. Empirically the relationships are tested by using Canadian quarterly data from the first quarter of 1962 to the last quarter of 1973.

Chapter three makes use of the theoretical framework developed in chapter two and applies it to the level of foreign take-overs in Canada. It tests the hypotheses with quarterly data from 1962-73 applicable to the Canadian as well as the U.S. economy.

Chapter four postulates that an index of foreign control in an industry at the beginning of the period is
related to the index for foreign take-overs during the period. This relationship is tested with the help of cross-sectional data to find whether foreign entrepreneurs enjoy an advantage that is either common among industries or related to industry characteristics.

Chapter five focuses attention on the financial characteristics of the taken-over firm. Which financial characteristics of a firm make it a target for either a domestic or foreign take-over? Are the characteristics different between domestic and foreign taken-over as well as non-taken-over firms?

Chapter six not only summarizes the results, but also explains the levels of foreign and domestic take-overs as functions of macro economic variables in the Canadian economy as well as foreign, relative to total take-overs as a function of foreign control on a cross-sectional basis. The model of take-overs developed in this study is consistent with the theory of capital budgeting and indicates that entrepreneurial perception in a take-over situation depends on macro economic variables, industry advantages, but not on the financial characteristics obtained from historical accounting data.
CHAPTER 2

THE DETERMINANTS OF THE LEVEL OF DOMESTIC TAKE-OVERS

2.1 Development of Research Hypotheses

2.1.1 Introduction

The basic reason why a take-over may occur is that the valuations of the firm by its buyers and sellers differ. Both of them expect to gain from the take-over transaction because the buyer may purchase the firm below his estimate of its value and the seller may sell above his estimate of its value. This gives rise to the following three important questions:

First, what is the rationale behind the process of valuation? This chapter explains the rationale in accordance with the theory of capital budgeting. It emphasizes two theoretical variables, anticipated net cash flows and marginal cost of capital that play an important part in the valuation process.

Second, why do valuations by the buyers differ from those of the sellers? This chapter maintains that since the two theoretical variables are ex-ante concepts, entrepreneurial perception is important. The entrepreneur sizes up the internal situation of the corporation such as its
financial strength, product lines and management competence. He also evaluates the external environment in terms of such factors as the health of the economy or industry and major demographic and other trends. Based on this internal and external size-up he identifies the opportunities and decides whether or not to make a take-over bid. Since the above process differs from one entrepreneur to another, their valuations of the firm are also different.

Third, when entrepreneurs size-up internal situations and the external environment what economic factors affect their perceptions and thereby the level of take-over activity in the economy? This chapter asserts that the entrepreneur's perception depends very much on the credit conditions prevailing in capital markets, the availability of internally generated corporate funds and the general level of expectations in the economy. Changes in levels of these economic conditions affect entrepreneurial perceptions and thereby cause the level of take-over activity to fluctuate from period to period in an economy.

To sum up, the chapter establishes a relationship between the theory of capital budgeting, entrepreneurial perceptions that cause differences in valuations of the firm, levels of economic activity that affect valuation differences and thereby the levels of take-over activity. Empirically the relationships are tested by using Canadian quarterly data from the first quarter of 1962 to the last quarter of 1973.
2.1.2 Review of Previous Work

The relevant literature in this area can be divided into two categories, descriptive and empirical. The authors that preceded Markham have produced mostly descriptive works. Markham has aptly observed, "Researchers having no set of hypotheses as a point of departure, have relied principally upon the act of description and enumeration." However the descriptive works are important and have provided ideas for setting up hypotheses for empirical testing by others who have succeeded Markham. The following is a brief summary of the relevant literature.

Thorp contended that take-overs vary directly with business cycles. He gave two reasons why take-overs occur. First, a take-over is quicker and less risky to undertake than new investment. Second, take-overs are likely to result in oligopolies and monopolies and thereby enhance the possibilities of increased prices and resultant higher profits. Thorp's contribution is important, because he emphasized external economic conditions and entrepreneurial motivation as the important considerations for take-over activity over the conventional wisdom of economies of scale.

that had provided an explanation for vertical and horizontal take-overs. Reuber and Roseman\(^3\) observed that economies of scale were not an important consideration in explaining take-over activity.

Markham's study emphasized the relationship between security prices and take-over activity. During a period of rising security prices, a firm can issue more securities at higher prices and this according to him, can stimulate take-over activity. However Markham concluded by stating that "admittedly there is much that still is not known about mergers, but if findings reveal anything, they show that the causes and consequences of mergers are complex and diverse."\(^4\)

The Markham survey provided an important economic variable to the Maule\(^5\) study. Maule used an index of stock prices in an attempt to explain take-overs. His Canadian data for the period 1900 to 1963 indicated that though upturns in take-over activity took place when stock prices were rising, statistically the relationship between stock prices and take-over activity did not appear significant. This indicated that there must be some other variables that should be included in the model to explain the take-over activity. Therefore, he concluded that though rising stock prices may be a necessary condition for increased take-over activity, it is not a sufficient condition.

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3. Reuber and Roseman, op. cit., p.28.
4. Markham, op. cit., p.143
The Thorp reasoning regarding entrepreneurial motives pertaining to monopoly and oligopoly were further studied by Stigler.6 He suggested that variations in economic conditions change the underlying attitudes and motivations of the U.S. entrepreneurs who engage in take-over activities both in the U.S. and internationally. This study once again reaffirmed the connection between economic conditions, entrepreneurial motivation and take-over activity. However the logical links were not developed at this stage.

Nelson7 developed a theory of 'merger waves' by observing upswings and downswings in take-over activity in the U.S. during the period 1895 to 1956. The important contribution by Nelson to the present study is that he asserted that some entrepreneurs will have favourable expectations about the future before others and the former may decide to start expanding earlier than the latter and by acquiring them. The theory of 'merger waves' was tested by Maule8 with Canadian data. He found that during the period 1900 to 1948 there were three merger waves from 1908 to 1912, 1925 to 1930 and 1943 to 1946 and these were

also the periods when stock prices rose. However during the period 1932 to 1937, though stock prices rose, take-overs declined. This indicates that other factors should be considered along with the stock prices to explain take-over activity.

Thorp⁹, while explaining the relationship between business cycles and take-over activity, indicated that favourable conditions in the money market help to increase take-over activity during the upswing of the business cycle. A reasonable indicator of the money market conditions would be the level of interest rates. Reuber and Roseman¹⁰ used the U.S. treasury bill rate and noted the relationship between money market conditions in the U.S. on the foreign take-over activity in Canada. This provides another important economic variable to the present study. However in order to explain domestic take-overs, they¹¹ tested a number of variables and arrived at a conclusion that approximately 89 per cent of the variation in the number of take-overs can be explained by variations in Canadian stock market prices and the supply of internally generated funds in Canadian corporations. Both these variables are used in the present study as well.

¹¹. Ibid., p. 153
Globerman\textsuperscript{12} indicates that "the theory relating mergers to stock price changes has an important omission; namely it does not indicate why valuation gaps should increase when stock market prices are moving upward and not when they are moving downward as well." One of the possible explanations he says is the "differences between managers in the ability to cope with rapid economic expansion." This provides a basis for the present study to explore other variables that affect the ability of managers to take-over. One such variable is considered by Mueller.

Mueller\textsuperscript{13} attempted to develop a theory of conglomerate mergers consistent with the objective of maximization of shareholder wealth. Even in the absence of synergistic effects, take-overs do occur because the value of a firm will be higher to a growth maximizing management. The difference in valuation according to Mueller is due to the differential in cost of capital to the taking-over and taken-over firms. The significant contribution by Mueller to this study is that he established a link between the theory of capital budgeting and developed the concept of non-synergistic valuation differential as a motive for take-over.

\begin{itemize}
\item [12.] Globerman, Steven. \textit{Merger and Acquisitions in Canada: A Background Report}. Royal Commission on Corporate Concentration, Study No. 34. Ottawa: Supply and Services, Canada, 1977, p. 27.
\end{itemize}
Gort\textsuperscript{14} promoted the idea of valuation differentials in an attempt to develop the 'economic disturbance' theory of take-overs. By economic disturbance he implied a change in economic conditions over which the entrepreneur has no control. He contended that "economic disturbances generate discrepancies in valuation of the type needed to produce mergers. They do so principally in two ways. First, they alter randomly the ordering of expectations of individuals, with the result that some non-owners move to the right of current owners on the value scale." Hence they perceive higher value for the firm. "Second, economic disturbances render the future less predictable, with the result that variance in valuation increases." However the explanation offered by Gort is not sufficient to explain why a disturbance of a lesser magnitude would cause less take-overs and vice versa. In order to explain this phenomenon it is necessary to consider the entrepreneurial motivation and attitudes that are susceptible to changes in economic conditions.

In summary, a review of the take-over literature suggests that take-overs appear related to stock prices, interest rates and available corporate funds. These factors seem related to take-overs through such conceptual frameworks as valuation of the firm and entrepreneurial perception. The next several sections attempt to pull these various notions together into a logical framework for attempting to explain take-overs.

2.1.3 Take-Over as a Capital Budgeting Decision

The theory of capital budgeting assists the firm in evaluating investment proposals. This is done by computing the present value (PV) of the anticipated net cash flows \( c_t \) from the proposal in the \( t \)th period and discounting these at the firm's cost of capital \( k \) over the economic life \( n \) of the proposal. Hence:

\[
PV = \sum_{t=1}^{n} \frac{c_t}{(1+k)^t} \quad \ldots \ldots \ldots (2.1)
\]

The PV then is compared to the initial cost or the purchase price \( P \) of the investment proposal. If PV is greater than or equal to \( P \), the proposal is accepted. Otherwise it is rejected.

In an internal growth situation where the firm acquires new assets and creates new markets for the products, \( c \) is determined by considering anticipated factor costs and product prices. The resultant \( c_t \) are then discounted at the firm's cost of capital over the economic life of the proposal to find the present value.

In an external growth situation the firm takes over assets and markets of an existing firm. Such a

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15. Reuber and Roseman, op. cit., p. 133, give reasons why the management may prefer to grow externally rather than internally. Furthermore two reasons obtained from their questionnaire are speed and assured market.
transaction gives rise to two present values. First, the present value of the taken-over firm as perceived by the entrepreneur of the domestic taking-over firm (PV_{db}). Second, the present value of the taken-over firm as perceived by the entrepreneur of the taken-over firm (PV_{s}). In a take-over transaction, therefore, PV_{db} is the maximum price the buyer is willing to pay, PV_{s} is the minimum price the seller is willing to accept.

If the above transaction is to take place, obviously both the buyer (the domestic taking-over firm) and the seller (the taken-over firm) must gain. The gain to the buyer is (PV_{db} - P) where P is the actual price paid by the buyer and the gain to the seller is (P - PV_{s}). If both gain from the transaction, the following condition must apply:

\[
PV_{db} \gg P \gg PV_{s} \quad \text{.........(2.2)}
\]

In the present study PV_{db} - PV_{s} will be referred to as the 'domestic valuation gap'. It is postulated that the domestic valuation gap arises because \( c_T \) and \( k \) differ between entrepreneurs. This happens because all entrepreneurs have different perceptions of the opportunities and obstacles to growth\(^{16}\), along with different abilities to take advantage of those opportunities. Hence different firms grow at different rates. Although there is a constant push toward growth,

\[\text{---}\]

planned or unplanned, levels of economic activity affect differences in entrepreneurial perceptions of \( k \) and \( c \), thus leading to widening disparities and thereby greater take-over activity. The differences in entrepreneurial perceptions of PV may arise because the buyer may be financially more mobile than the seller. As a result he may experience a higher \( c \) resulting in a greater PV. 17

The concept of risk can be incorporated in the present analysis in two ways. First, we can view the buyer, the seller and the new firm after take-over as belonging to different risk classes, each having a different cost of capital. This would be the adjusted rate of discount approach to risk. Second, we can view PV as a random variable with a probability distribution. In this case the valuation gap would be the difference between the maximum price the buyer is willing to pay and the minimum price the seller is willing to accept, both considering their preferences regarding risk and return dictated by their perceived probability distributions of PVs. However for the purpose of the present study, it is proposed to use the first approach that incorporates differential rates of discount in arriving at valuation gaps.

2.1.4 Conceptual Framework for Domestic Take-Overs

As reviewed earlier\(^\text{18}\), Thorp emphasized the relationship between economic conditions and take-over activity. Though he stated that entrepreneurial motivation is also important, the logical link between economic conditions on the one hand and take-over activity on the other was not well developed. Stigler extended the logic by suggesting that variations in economic conditions change the underlying attitudes and motivations of entrepreneurs. However even at this stage, why some entrepreneurs behave differently than others in response to different levels of economic activity was not explained. Penrose added one more dimension to the logic. She argued that some entrepreneurs can comprehend economic conditions better, identify opportunities and are prepared to act. Nelson's empirical work supports this viewpoint. He observed that some entrepreneurs have favourable expectations about the future before others and the former may decide to start expanding earlier than the latter and by acquiring them.

The above four studies establish a logical link between economic conditions, entrepreneurial motivation, differences in entrepreneurial responses to levels of economic activity and the levels of economic activity. This study provides a further link in an attempt to explain the process of take-over. With the help of the theory of capital budgeting, the present study asserts that economic conditions affect entrepreneurial

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18. See Section 2.1.2.
perception of the value of the firm by bringing about changes in cost of capital and anticipated net cash flows.

It is now necessary to consider what economic conditions affect entrepreneurial perception of PV. This process involves going back to the basic condition \( PV_{db} > PV_s \), deriving the theoretical variables therefrom, relating these variables to the entrepreneurial perception and finding suitable economic variables that can explain changes in the perceived PV.

Equation 2.1 gives two important theoretical variables, i.e., cost of capital \((k)\) and the anticipated net cash flows \((c)\) that affect the computation of PV. Both these variables are responsive to the internal situation and external environment and it is at this stage the entrepreneurial perception becomes important.

The anticipated net cash flows \((c)\) depend on the gross cash inflows and gross cash outflows. The inflows are subject to various internal considerations. The buyer, by combining his existing firm with the new firm he plans to take over, may be able to increase the market power of the taking-over firm. After the take-over, if the taken-over firm can sell more units at the same price, the same number of units at a higher price or more units at a higher price, the gross cash inflows will be increased and \( PV_{db} \) will be larger than \( PV_s \).
Similarly the buyer may be in a position to supply raw materials or buy finished products of the taken-over firm. He may have plans to improve the management of the taken-over firm. All these internal measures increase $PV_{db}$ and thereby widen the valuation gap.

Gross cash outflows are subject to economies of scale, the level of technology and managerial competence available to the firm. The taking-over firm may be able to gain from economies of scale by combining the business of the taken-over firms with its existing operation and may use more sophisticated technology, both physical and managerial, to reduce the gross outflows and thereby increase $PV_{db}$.

The external environment affects c through the level of expectations in the economy. If the economy is expected to perform well, the entrepreneur also expects his firm to perform well. This increases the c and hence the PV goes up. Since some entrepreneurs, as pointed out earlier, have more favourable expectations about future than others the valuation gaps widen and the take-over activity increases.

The cost of capital (k) has internal and external implications as well. If the taking-over firm, because of its size and diversification is able to reduce risk associated with its over-all operations, it would reduce $k_{db}$ and thereby increase $PV_{db}$. Moreover a taking-over firm having access to productive opportunities may have plans and want to use the cash flow of the taken-over firm more
profitably, if it is already not doing so, and this would reduce $k_{db}$. Externally the taking-over firm may have access to outside sources of funds and may be able to tap them if the taken-over firm is utilizing its funds efficiently and has a need for additional funds. Hence internal and external considerations may result in a lower $k_{db}$ and consequently a higher $PV_{db}$.

From the above discussion it is evident that the anticipated net cash flows ($c$) and the cost of capital ($k$) that determine $PV$ are likely to be different for buyers and sellers of the firm. This explains why a buyer believes that a firm is worth more than it is to the seller. The difference in perceived valuation provides a basis for trade namely a take-over to occur.

Since internal situation and external environment affect both $c$ and $k$, it is necessary to find out which macroeconomic conditions affect these theoretical variables. This study postulates that availability of credit is an important economic condition that affects the external environment aspect of cost of capital. The level of expectations in the economy is another economic condition that influences the external considerations for anticipated net cash flows and the generation of corporate internal funds affect the internal implications of both the cost of capital and the anticipated net cash flows. The above three economic conditions are called credit, expectations and funds effect. They are explained in detail in the following three sections and the conceptual model described in this
section is illustrated in Figure 2.1.
FIGURE 2.1
MODEL FOR DOMESTIC TAKE OVERS

Basic Condition:

Theoretical Variables:

Entrepreneurial Perception:

Economic Effects:

Economic Variables:

Proxies:

Signs:
2.2 Statement of Research Hypotheses

2.2.1 The Credit Effect

The level of interest rates is an indication of the demand for and supply of funds within an economy. Either a reduction in supply or an increase in demand for funds would lead to higher interest rates and vice versa. The effect of the level of interest rates on the perception of the entrepreneur is called the 'credit effect'. This sub-section postulates that entrepreneurial responses to the levels of interest rates are different between entrepreneurs. This affects the valuation gaps and thereby the level of take-over activity.

Consider an increase in the rate of interest. Since this is an indication of either a tightening of credit in the money market or an increase in demand for funds, it would affect the cost of capital for different entrepreneurs. The availability of external funds would be reduced and the cost of obtaining the funds would go up. However, the credit effect postulates that some entrepreneurs can comprehend the situation. They have already planned for such an eventuality by negotiating lines of credit and making arrangements for obtaining external funds from other sources, thus ensuring enough financial mobility. These entrepreneurs are much better off than those who are financially less mobile. Obviously the latter would be facing a relatively higher marginal cost of capital than
the one experienced by the former. This would decrease $PV_g$ more than it would reduce $PV_{db}$. This would lead to increase in valuation gaps and the financially more mobile entrepreneurs would take over the firms of less mobile ones.

Consider a fall in the rate of interest. Since this indicates easier access to external funds, the credit effect would work in the reverse direction. External funds are now relatively easily available to all entrepreneurs. This enables them to use the funds for whatever internal projects they may have contemplated earlier. They become more reluctant to sell their firms because the difference between $k_g$ and $k_{db}$ narrows and as a result $PV_g$ approaches $PV_{db}$. Hence the valuation gaps are reduced and a decline in the level if take-over activity is registered.

Reuber and Roseman\textsuperscript{19} viewed rate of interest as an economic variable indicating credit conditions. They used treasury bill rates, both in Canada and the U.S. as well as the differential between the two as proxies for rate of interest. They found that the U.S. treasury bill rate was negatively associated with foreign take-overs in Canada, but the Canadian treasury bill rate and the differential, when added separately to the equation were not statistically significant. The absence of statistical relationship

\textsuperscript{19} Reuber and Roseman, op. cit., p.151.
between the Canadian treasury bill rate and the domestic take-overs in Canada could be due to the fact that the dependent variable was computed on an yearly basis while the independent variable is a quarterly indicator.

The credit effect, therefore, postulates that the level of rate of interest is one of the determinants of the level of domestic take-overs in Canada. An increase in rate of interest would increase the level of domestic take-overs and vice versa.
2.2.2 The Funds Effect

The availability of internally generated corporate funds is also an important determinant of the level of domestic take-overs in Canada. The growth of the firm can be financed either out of internally generated funds or by obtaining funds externally. The effect of external funds on take-over activity was considered under the credit effect in the preceding sub-section. This sub-section considers the effect of internally generated funds on the level of take-overs.

When corporate net cash flows in Canada decline, this provides an indication that funds are less readily available to domestic firms. Some entrepreneurs can comprehend the situation. They have planned ahead of time and therefore, they may not feel the effects of decline in internal funds as much as some of the other entrepreneurs. Thus \( k_{db} \) for the first type of entrepreneurs becomes relatively lower than \( k_s \) for the second type of entrepreneurs. This increases the valuation gaps. In other words, though \( PV_{db} \) as well as \( PV_s \) may decline due to the unavailability of internal funds, the decline in \( PV_s \) is relatively more, providing a basis for take-over. This view has been described in detail by Duesenberry\(^{20}\) when he discusses the

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effects of internal funds on both the potential domestic buyers and sellers of domestic firms.

When the corporate net cash flows within an economy increase, this means that the firms have more funds and this affects the potential seller who may not want to sell his firm because he can use the excess funds that are readily available to him internally for whatever projects he has in mind. This reduces the differential between $k_{db}$ and $k_s$ and thereby $PV_{db}$ approaches $PV_s$, the valuation gaps are narrowed and the level of take-over activity is reduced.

It should be noted that the funds effect is not only related to the cost of capital ($k$) as explained above, but it also affects the perception by the entrepreneur of the expected Net Cash Flows ($c$). The availability of internal funds makes entrepreneurs more optimistic. For the potential seller $c_s$ increases and hence $PV_s$ rises. On the other hand, the availability of funds is one of the several inputs a potential buyer would consider in his planning process and therefore his response to an increase in internal funds would not increase $c_{db}$ to the same extent as the increase in $c_s$. This of course would reduce the valuation gaps and the general direction of this effect is the same as the one under the cost of capital variable.

On the basis of the above discussion, it is, therefore,
postulated that the funds effect represented by the internally generated corporate funds is one of the determinants of the level of domestic take-over activity in Canada. An increase in the internally generated corporate funds would reduce the level of take-over activity and vice versa.
2.2.3 The Expectations Effect

The expected net cash flow \((c)\) depends a great deal on the expectations of the entrepreneur regarding the future cash generating capacity of the firm. The funds effect considered the availability of internally generated corporate funds as an internal input for future expectations regarding \(c\) and \(k\). The expectations effect considers the effect of the external environment on the perception of the entrepreneur.

It has been argued that stock prices serve as a proxy for business expectations about the future level of economic activity. Various other studies have suggested that there is a relationship between stock prices and take-over activity. Nelson indicated that take-overs require buoyant conditions in the capital market and the market index is an indicator of those conditions. Weston suggested that during a period of rising security prices, an entrepreneur can issue more securities against the assets of his company because the valuation of his enterprise is enhanced by the increased discounted value of his anticipated earnings. Butters, Lintner and Cary argued

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that rising security prices make it easier for the entrepreneur to issue equity, the proceeds from which can be used for taking over other firms. It can also be argued that as stock prices rise, some entrepreneurs who experience high prices for the securities of their firms avail themselves of the opportunity to trade their shares for those firms that are not looked upon as favourably by the market due to the lack of ability of their management to locate productive opportunities.

The above arguments support the theory underlying equation 2.1. The expected net cash flow (c) increases with brighter expectations. This leads to the increase in $PV_{db}$ as well as $PV_s$. However, when business expectations are rising, some entrepreneurs comprehend the change. They have planned for such a contingency and consistent with their growth strategy, they embark upon taking over other firms. There are others who do not comprehend the new economic environment quickly. Even if they do comprehend it, they cannot identify growth opportunities and even if they do identify them, they are not prepared to act upon them. As a result, their expectations regarding $c_s$ are lower than $c_{db}$. Therefore $PV_{db}$ becomes relatively larger than $PV_s$ and the valuation gaps increase and hence an increase in the level of take-over activity is noticed. Hence it is hypothesized that expectations, a proxy for which is level of a stock market index is one of the determinants of domestic take-over activity in Canada. An increase in the index would increase take-overs and vice versa.
2.2.4 The Determinants of the Level of Domestic Take-overs (H1a)

The hypothesis (H1a), considering the credit, funds and expectations effects explained above, can be stated in the following form:

THE LEVEL OF DOMESTIC TAKE-OVER ACTIVITY IN CANADA DEPENDS ON THE LEVELS OF RATE OF INTEREST, CORPORATE NET CASH FLOWS AND STOCK MARKET INDEX IN CANADA.

\[ \text{DTO}_t = \alpha_0 + \alpha_1 \text{CRI}_t + \alpha_2 \text{CCF}_t + \alpha_3 \text{CSI}_t \]

\[ \ldots \ldots \ldots \ldots (2.4) \]

Where:

- \( \text{DTO}_t \) = The Number of Domestic Take-Overs in Period \( t \)
- \( \text{CRI} \) = The Canadian 91 Day Treasury Bill Rate
- \( \text{CCF} \) = The Canadian Corporate Net Cash Flows/Corporate Total Assets
- \( \text{CSI} \) = The Investor's 114 Index in Canada
- \( \alpha_0, \ldots, \alpha_3 \) = The Parameters to be Estimated

The dependent variable is represented by the number of domestic take-overs in Canada. This variable is selected because it is believed that each take-over involves an act of entrepreneurial decision-making and hence the number of taken-over firms would be a better proxy than, for example, either the number of taking-over firms or the total value of taken-over firms.

The intercept term \( \alpha_0 \) in the equation indicates
that some take-over activity in Canada would take place irrespective of the economic conditions prevailing in the country at a particular time. This would happen for two main reasons. First, there would always be some entrepreneurs in the economy who would be actively taking-over other firms consistent with their growth strategy. Second, there are always other economic variables as well as some imperfections that may lead to some take-over activity. It is therefore, expected that $\alpha_0$ would have a positive sign.

The proxy for the rate of interest is the Canadian 91 day Treasury Bill rate. As explained earlier, in sub-section 2.2.1, Reuber and Roseman also used the same proxy. The reason for using this rate is that it is free from both the term and risk structures associated with other rates of interest. Since an increase in the treasury bill rate is expected to increase the number of take-overs, $\alpha_1$ is expected to have a positive sign.

Internally generated corporate cash flow is represented by the sum of three series, i.e., the undistributed corporate profits, inventory valuation adjustments not involving flow of cash and the capital consumption allowances representing depreciation. This is divided by the total corporate assets to normalize for increase in cash flow with time. Since an increase in the level of the funds is expected to result in a decline in the level of domestic take-overs according to the funds effect explained in
section 2.2.2, \( \alpha_2 \) is expected to have a negative sign.

The level of the stock market index is represented by Statistics Canada's 'Investors Total 114 Stocks' Index that includes industrials as well as utilities and financial companies. The base for the index is 1961. Since the expectations effect in section 2.2.3 stipulates that an increase in the level of the index would result in an increase in the level of take-overs, \( \alpha_3 \) is expected to have a positive sign.
2.3 Statistical Testing

2.3.1 The Data Base

The information regarding take-over activity in Canada was obtained from the Merger Register maintained by the Merger Division of the Monopoly and Merger Branch under the Combines Investigation Act administered by the Department of Consumer and Corporate Affairs. The register contains the following information:

1. The names of taking-over and taken-over firms. All the firms are classified according to the two digit industrial classification that divides all firms in 25 major industries. Each classification includes operations that produce goods and services that are closely related to each other, e.g., mining of all types of metals is grouped together with oil exploration in one category.

2. The register also indicates whether a take-over is a foreign or domestic take-over. A domestic take-over is where a domestic firm\(^{25}\) takes over either a domestic or a foreign firm and a foreign take-over is where a foreign firm takes over either a domestic or a foreign firm.

3. The register also contains the source from which the information was obtained and the date on which the information was published. The information was collected from the major financial news media, including daily and other periodic financial newspapers, trade journals, business magazines in Canada, the United States and the United Kingdom.

\(^{25}\) In case of a domestic firm, the decision-making nucleus is within the political boundaries of Canada. For a foreign firm it is outside Canada.
For the purpose of testing hypotheses $H_{1a}$ regarding domestic take-over activity, the number of take-overs per quarter were required. Since the period covered in the present study is from 1962 to 1973, annual data would have given 12 observations. Hence in order to increase the number of observations, quarterly data were collected giving 48 observations. The period from 1962 to 1973 was selected because the period 1945 to 1961 is covered by the Reuber-Roseman study and the period after 1973 has witnessed the emergence of Foreign Investment Review Agency (FIRA).

In order to collect the data, take-overs had to be classified according to quarters. Since the merger register gives the date of publication and not the date of take-over, the latter was found by scrutinizing the Financial Post data cards, financial statements of the companies and CanFil microfilms. However out of a total of 2,592 take-overs during the period, 401 (15.47%) had to be dropped because no quarterly information could be obtained. The conversion of annual data into quarterly data introduced a slight bias. Table 2.1 would indicate that more firms in the earlier years had to be dropped than in the latter years because of unavailability of additional information.

In order to tackle the problem of bias in the quarterly data, the sample was divided between two periods, i.e., 1962 to 1967 and 1968 to 1973. The first period represents
a greater loss of firms than the second period. Hypothesis H1a was tested with both the samples. It was observed that the parameters associated with different independent variables in both the samples had the same signs and were not significantly different from each other at the 95% confidence level.

A further division of the data on a monthly basis was considered, but was not implemented for three basic reasons. First, it would involve further loss of firms that can be classified quarterly, but not monthly. Second, one month was considered as too short a period for judging the effects of economic conditions on take-over activity. Third, some time series used as independent variables were available on a quarterly, but not a monthly basis.
### TABLE 2.1
**Domestic Taken-Over Firms**

<table>
<thead>
<tr>
<th>Year</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>N.Q.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>21</td>
<td>27</td>
<td>12</td>
<td>11</td>
<td>39</td>
<td>110</td>
</tr>
<tr>
<td>1963</td>
<td>11</td>
<td>8</td>
<td>23</td>
<td>13</td>
<td>37</td>
<td>92</td>
</tr>
<tr>
<td>1964</td>
<td>26</td>
<td>29</td>
<td>13</td>
<td>29</td>
<td>36</td>
<td>133</td>
</tr>
<tr>
<td>1965</td>
<td>38</td>
<td>32</td>
<td>19</td>
<td>43</td>
<td>46</td>
<td>178</td>
</tr>
<tr>
<td>1966</td>
<td>34</td>
<td>16</td>
<td>28</td>
<td>28</td>
<td>29</td>
<td>135</td>
</tr>
<tr>
<td>1967</td>
<td>33</td>
<td>25</td>
<td>18</td>
<td>25</td>
<td>54</td>
<td>155</td>
</tr>
<tr>
<td>1968</td>
<td>33</td>
<td>54</td>
<td>61</td>
<td>86</td>
<td>20</td>
<td>254</td>
</tr>
<tr>
<td>1969</td>
<td>105</td>
<td>56</td>
<td>64</td>
<td>68</td>
<td>76</td>
<td>368</td>
</tr>
<tr>
<td>1970</td>
<td>86</td>
<td>61</td>
<td>63</td>
<td>43</td>
<td>36</td>
<td>286</td>
</tr>
<tr>
<td>1971</td>
<td>63</td>
<td>67</td>
<td>50</td>
<td>67</td>
<td>13</td>
<td>260</td>
</tr>
<tr>
<td>1972</td>
<td>67</td>
<td>94</td>
<td>61</td>
<td>94</td>
<td>13</td>
<td>329</td>
</tr>
<tr>
<td>1973</td>
<td>92</td>
<td>57</td>
<td>67</td>
<td>74</td>
<td>2</td>
<td>292</td>
</tr>
</tbody>
</table>

**Source:** Merger Register

**Q:** Quarterly

**N.Q.:** NO Quarterly Information available.
2.3.2 The Results for Domestic Model

The multiple regression technique was used for the purpose of testing hypothesis \( H_1 \). The primary statistical objective of a regression model is to find the frequency distribution of one variable when another is held constant. When more than one variables are held constant to find the frequency distribution of a single variable, we have a multiple regression model.

Using Version 6.50 of the Statistical Package for the Social Sciences (SPSS) the following results were obtained:

**TABLE 2.2**

*Regression Results for the Domestic Model*

\[
\text{DTO} = -5.28 + 3.74 \text{ CRI} - 2.81 \text{ CCF} + 0.97 \text{ CSI}
\]

\[
(-0.18) \quad (2.28) \quad (-2.84) \quad (8.89)
\]

\[
R = 0.85 \quad \text{S.E.} = 14.32 \quad \text{D.W.} = 1.53
\]

The figures in the parentheses represent the \( t \) statistic for the respective \( \beta \). \( R \) is the coefficient of correlation. S.E. denotes the standard error of the estimate and D.W. stands for the Durbin Watson Statistic. The analysis of variance of the regression residual gave the following results:
TABLE 2.3
Analysis of Variance for the Domestic Model

<table>
<thead>
<tr>
<th>D.F.</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>23711.64751</td>
<td>7903.88250</td>
</tr>
<tr>
<td>44</td>
<td>9023.83166</td>
<td>205.08708</td>
</tr>
</tbody>
</table>

\[ F(\text{d.f. 3,44}) = 38.54 \]

The test for the F statistic stipulates that if 38.54 is less than \( F(\text{d.f. 3,44}) \) at 99% confidence level, the multiple regression does not provide a statistical basis for hypothesizing about the relationships between dependent and independent variables. However \( F_{.99}(\text{d.f. 3,44}) \) is 4.31, hence the relationships for \( H_{1a} \) are statistically significant.

However, another test can use the coefficient of determination by setting up confidence limits to find out whether \( R^2 \), the sample coefficient of determination is in fact the population coefficient of determination \( \rho^2 \) at 99% confidence.

TABLE 2.4
Coefficient of Determination Test for the Domestic Model

\[ H_0 : \rho^2 = 0, \text{ if} \]
\[ -R^2_{.99(d.f. n-2)} < \rho^2 < R^2_{.99(d.f. n-2)} \]
\[ \therefore -0.343 < 0.724 < 0.343 \]

Hence \( \rho^2 \) is significantly greater than zero for \( H_{1a} \).
In the interests of facilitating research by others at this institution and elsewhere, I hereby grant a licence to:

THE UNIVERSITY OF WESTERN ONTARIO
to make copies of my thesis

DOMESTIC AND FOREIGN TAKE-OVER S OF CANADIAN BUSINESS CORPORATION

1962-1973

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establishes a causal relationship. Hence it is argued that the rationale for dropping e.g., the independent variable representing the interest rate (CRI) in the domestic model (H1_a) is rather dubious. Moreover as shown in Table 2.6 it also contributes to the explanatory power of the equation and has the correct sign as postulated. Hence the variable is retained in the model for structural and predictive, as well as statistical (at 95% confidence) reasons.
2.3.3 Implications of the Multiple Regression Technique

The implications of the multiple regression technique, can be grouped into three categories namely, statistical, structural and predictive.

Statistically the analysis tries to find the point estimates for \( \alpha \) and sets up tests to find out which of the \( \alpha \) are statistically significant and which ones are not. These tests are set up with the help of \( H_0: \alpha = 0 \) for a certain level of type I error. For this purpose the \( t \)-distribution\(^{27} \) is used. The degrees of freedom are \( (n-2) \). The \( t \) values (d.f.40) at 0.99 and 0.95 confidence level are 2.423 and 1.684 respectively. At those values \( \alpha_1 \), \( \alpha_2 \) and \( \alpha_3 \) are statistically significant at 0.95 level, but \( \alpha_0 \) is not. However at 0.99 level \( \alpha_2 \) and \( \alpha_3 \) are significant but \( \alpha_0 \) and \( \alpha_1 \) are not.

Now let us consider the structural implications for the model. Structurally speaking the signs of the coefficients and the collinearity between the independent variable assume importance.

The signs of all the coefficients except \( \alpha_0 \) in model H1 are as expected. However model H1 considers the levels and since the levels are never expected to be equal to or less than zero, a negative sign for \( \alpha_0 \) does not pose a

\(^{27}\) Ibid, Table A-5.
serious problem. Moreover the t statistic for $<_{0}$ indicates that the hypothesis that $<_{0} = 0$ cannot be rejected. Hence using this as a one tail test, we can conclude that $<_{0} \neq 0$.

If some or all the independent variables are highly correlated with one another, it poses a problem of multicollinearity. If multicollinearity is serious, the estimated parameters have an unsatisfactory low degree of precision. The unreliability of the estimated regression coefficients in case of high multicollinearity between independent variables can be observed from the formula for the standard error ($S < 1$) of the regression coefficient. For the sake of simplicity consider a two variable case:

$$S < 1 = \frac{S_{y.1 \cdot 2}}{\sqrt{\sum X_{1}^{2}} (1 - R_{1 \cdot 2}^{2})}$$

where $R_{1 \cdot 2}$ is the correlation coefficient between $X_{1}$ and $X_{2}$ and $S_{y.1 \cdot 2}$ is the standard error of the estimate.

It can be observed that when $R_{1 \cdot 2}$ is zero, the standard error would be the smallest. On the other hand, as $R_{1 \cdot 2}$ approaches one, the denominator of the equation approaches zero and this would make the standard error very large and thereby reduce the t value of the coefficient.

The above argument also dictates that where $X_{1}$ and $X_{2}$ are collinear, it is difficult to distinguish their separate effects on the dependent variable. This means
that though multicollinearity affects the reliability of the estimates of individual coefficients and may result in the loss of a dimension in multi-dimensional space, it may not alter the predictive power of the total regression equation.

The multicollinearity between independent variables can be detected by observing the standardized covariances between the variables. Table 2.5 gives covariances for the domestic model. Though covariances between CRI - CSI and CRI - CCF are low, the covariance between CCF - CSI is fairly high. This means that the standard errors for $\alpha_2$ and $\alpha_3$ are large, thereby reducing their $t$ values. However the $t$ values for both these parameters are significant at 0.99 confidence level and hence the seriousness of this phenomenon is considerably reduced. Furthermore Table 2.6 indicates that even though CCF and CSI are multicollinear, in a stepwise regression CCF does explain additional unexplained variation.

The third type of implication relates to the predictibility of the model or its usefulness. In the present case it can also be referred to as the 'economic' aspect. This has a bearing on the causal relationship between the dependent and an independent variable which is a candidate for elimination. The statistical significance as it is applied to the significance of a coefficient of an independent variable in a regression model, by no means,
### TABLE 2.5

**Covariances for the Domestic Model**

<table>
<thead>
<tr>
<th></th>
<th>DTO</th>
<th>CRI</th>
<th>CCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRI</td>
<td>0.36869</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCF</td>
<td>0.32914</td>
<td>0.06497</td>
<td></td>
</tr>
<tr>
<td>CSI</td>
<td>0.79514</td>
<td>0.21368</td>
<td>0.64785</td>
</tr>
</tbody>
</table>

### TABLE 2.6

**\( R^2 \) Changes in Stepwise Regression for the Domestic Model**

<table>
<thead>
<tr>
<th></th>
<th>( R^2 ) Changes</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSI</td>
<td>0.63224</td>
<td>0.63224</td>
</tr>
<tr>
<td>CCF</td>
<td>0.05961</td>
<td>0.69185</td>
</tr>
<tr>
<td>CRI</td>
<td>0.03249</td>
<td>0.72434</td>
</tr>
</tbody>
</table>

*Multicollinearity at \((n-2)\) degrees of freedom at 99% confidence where:  
\[ R^2 \geq 0.343 \]  
i.e.,  
\[ R \geq 0.58566 \]
establishes a causal relationship. Hence it is argued that the rationale for dropping e.g., the independent variable representing the interest rate (CRI) in the domestic model (H_l_a) is rather dubious. Moreover as shown in Table 2.6 it also contributes to the explanatory power of the equation and has the correct sign as postulated. Hence the variable is retained in the model for structural and predictive, as well as statistical (at 95% confidence) reasons.
2.3.4 The Analysis of Residuals

Spurr and Bonini\textsuperscript{28} outline the basic assumptions of regression formulae in making inferences. These assumptions are based on residuals $E = Y - \hat{Y}$ where $Y$ is the observed value of the dependent variable and $\hat{Y}$ is its estimated value.

One of the assumptions emphasizes statistical independence of the residual terms. Since time series are used, we should ensure that there is no serial correlation. Hence $E_t$ should not be correlated to $E_{t-1}$ where $t$ represents a particular time period. Statistically the presence of serial correlation can be detected by the Durbin - Watson Test. Depending on the number of observations (48) and the regressors (3) excluding the constant, the test sets up upper ($D_u$) and lower limits ($D_l$) to test $\rho = 0$ versus $\rho > 0$ at a certain ($\alpha$) level of significance. If $D$ is below $D_l$ the hypothesis is rejected. This indicates the presence of serial correlation. If $D$ is between $D_l$ and $D_u$, the test is inconclusive.

and if it is above $D_u$, then the hypothesis is accepted meaning that there is no statistical evidence of serial correlation. In the $H_{1a}$ model $D$ was 1.53 and $D_l$ and $D_u$ from Table 29 were 1.22 and 1.48 respectively. This indicates the absence of serial correlation.

In addition to the above assumption of the statistical independence of the $E$ values, Spurr and Bonini emphasize assumptions of linearity, homoscedasticity and normality pertaining to the $E$ values. They issue a note of caution that "if the assumptions are not valid, conclusions from multiple regression analysis may be misleading. Yet they are often overlooked." They suggest a method by which the residuals can be plotted against each independent variable and can then be visually checked for the above assumptions.

In order to plot the residuals against each variable and obtain the regression results, the scattergram sub-routine from SPSS Version 6.50 was used. Figures 2.3 to 2.6 show the scattergrams for model $H_{1a}$ and Table 2.5 summarizes the statistical results.

The assumption of linearity indicates that $E$ values are clustered around a rectilinear plane. Note that since the analysis uses a linear model, the planes in

---


30. Spurr and Bonini, op. cit., p. 609.
FIGURE 2.2
Scattergram for Predicted Values in Domestic Model (Hla)

Residuals

Predicted Values for Domestic Take-overs
FIGURE 2.3
Scattergram for Rate of Interest in Domestic Model (H1A)

Canadian Rate of Interest
### Scattergram for Corporate Net Cash Flow

<table>
<thead>
<tr>
<th>Canadian Corporate Net Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.00</td>
</tr>
<tr>
<td>30.00</td>
</tr>
<tr>
<td>40.00</td>
</tr>
<tr>
<td>50.00</td>
</tr>
<tr>
<td>60.00</td>
</tr>
<tr>
<td>70.00</td>
</tr>
</tbody>
</table>

### Residuals

- 12.40
- 7.00
- 1.20
- -0.60
- -10.40
- -16.20
- -22.00
FIGURE 2.5
Scattergram for Stock Market Index in Domestic Model (Hla)

Residuals
multidimensional space are rectilinear and not curved. Hence the absence of any curved pattern in the scattergrams supports the assumption of linearity in the multi-dimensional space.

The assumption of homoscedasticity stipulates that the scatter of E around the rectilinear plane should be uniform and should not change according to the value of the variable. Note that in this case the value of the variable is important and not its sequence as in the case of serial correlation. The above scattergrams do not indicate any apparent tendency for heteroscedasticity.

The assumption of normality stipulates that E values should be normally distributed in the multidimensional space. This is rather difficult to visualize in the scattergrams that consider only the two dimensional space. However the absence of any pattern in the scatter indicates that the distribution is fairly normal.

**TABLE 2.7**

Regression of Residuals in Domestic Model (H1a)

<table>
<thead>
<tr>
<th></th>
<th>( R^2 )</th>
<th>B</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted Value</td>
<td>0.00</td>
<td>-0.00</td>
<td>13.95</td>
</tr>
<tr>
<td>Rate of Interest</td>
<td>0.00</td>
<td>-0.01</td>
<td>13.95</td>
</tr>
<tr>
<td>Corporate Net Cash Flow</td>
<td>0.00</td>
<td>0.11</td>
<td>13.94</td>
</tr>
<tr>
<td>Stock Market Index</td>
<td>0.00</td>
<td>-0.00</td>
<td>13.95</td>
</tr>
</tbody>
</table>
The above table indicates that when the residuals are regressed against the predicted value as well as each of the independent variables, under each of the cases the coefficient of determination $R^2$ is zero, slope of the regression line $B$ is negligible and the standard error remains practically unchanged. This indicates the absence of any relationship between the variables and residuals. The absence of any patterns in the scattergram also justify the above assertion and satisfy the basic assumptions as laid down by Spurr and Bonini.
2.3.5 The Summary of the Findings

The model for domestic take-overs considered two theoretical variables, k and c that affect the entrepreneurial perception of PV. It was postulated that the level of domestic take-over activity is influenced by the credit, funds and expectations effects. These three effects were derived from the two theoretical variables and were represented by three macroeconomic variables, i.e., rate of interest, corporate net cash flows and stock market index. It was further postulated that the first and the third variables would have positive signs and the second would have a negative sign. The results, explained earlier, were statistically significant and had the expected signs. The following discussion considers each macroeconomic variable and compares the results of this study with those of others.

The rate of interest was found to be one of the important economic variables affecting domestic take-overs in Canada during the period 1962 to 1973. However Reuber and Roseman did not find that the same relationship was significant between period 1945 to 1961. It should be noted that though both the studies used 91 day treasury bill rate in Canada as the independent variable, this study used quarterly take-overs as the dependent variable, while Reuber and Roseman used yearly take-overs for the same purpose. The
absence of relationship between take-overs and rate of interest in the Reuber and Roseman study could be due to the fact that the dependent variable was computed on an yearly basis, while the independent variable is a quarterly indicator of money market conditions.

Availability of funds was also an important consideration in explaining domestic take-over activity in Canada during the period 1962 to 1973. A similar relationship was also found by Reuber and Roseman for the period 1945 to 1961. However it should be noted that while Reuber and Roseman used internally generated corporate funds in Canada as a proxy for the funds effect, this study deflated the variable by total corporate assets to separate the growth of corporate cash flows over time from the funds effect.

A significantly high level of correlation was noticed between the stock market index and the domestic take-over activity during the period 1962 to 1973. This is consistent not only with the findings of Reuber and Roseman, but also of several other authors quoted in section 2.1.2. The stock market index represents the barometer for the level of expectations within an economy. Hence the high level of index, indicative of higher expectations, would result in a higher level of domestic take-over activity.

The chapter, in general, confirms the belief that domestic economic conditions play an important part in determining the level of domestic take-over activity. The
present model is consistent with the theory of capital budgeting and the varying degrees of influences on different entrepreneurs that are supported by the findings of other studies quoted earlier in this chapter. The findings of chapter two encouraged the author to explore whether the same theoretical framework can also be applied to foreign take-overs. Chapter three does this.
APPENDIX 2A

Testing for Lags in the Domestic Model

In Chapter 2 it was argued that domestic take-overs in Canada are affected by economic conditions prevailing during the same period. On the other hand, it can also be argued that a time period can elapse between the time the decision to take-over is made and the time that take-over occurs. Hence proxies representing economic conditions for a prior period may be better choices for explaining domestic take-overs. This Appendix, therefore, out of curiosity, has tested the following seven regressions to find whether there is any relationship between domestic take-overs and economic conditions lagged by one period:

1. \[ \text{DTO} = -21.87 + 4.73 \text{CRY}_{t-1} - 2.36 \text{CCF}_t + 0.94 \text{CSI}_t \]
   \[ (-0.70) (2.85)** (-2.30)* (8.70)** \]
   \[ R = 0.85 \quad \text{S.E.} = 14.19 \quad \text{D.W.} = 1.52 \]

2. \[ \text{DTO} = -22.50 + 4.17 \text{CRY}_t - 2.19 \text{CCF}_{t-1} + 0.92 \text{CSI}_t \]
   \[ (-0.72) (2.40)* (-2.07)* (8.18)** \]
   \[ R = 0.84 \quad \text{S.E.} = 15.01 \quad \text{D.W.} = 1.50 \]

3. \[ \text{DTO} = 12.20 + 1.89 \text{CRY}_t - 3.16 \text{CCF}_t + 1.01 \text{CSI}_{t-1} \]
   \[ (0.34) (0.97) (-2.59)** (7.34)** \]
   \[ R = 0.81 \quad \text{S.E.} = 16.02 \quad \text{D.W.} = 1.78 \]

4. \[ \text{DTO} = -27.26 + 2.79 \text{CRY}_t - 1.67 \text{CCF}_t + 0.88 \text{CSI}_{t-1} \]
   \[ (-0.78) (1.39) (-1.41) (6.65)** \]
   \[ R = 0.79 \quad \text{S.E.} = 16.85 \quad \text{D.W.} = 1.23 \]

5. \[ \text{DTO} = -4.62 + 3.74 \text{CRY}_{t-1} - 2.81 \text{CCF}_t + 0.98 \text{CSI}_{t-1} \]
   \[ (-0.13) (2.01)* (-2.36)* (7.53)** \]
   \[ R = 0.82 \quad \text{S.E.} = 15.49 \quad \text{D.W.} = 1.21 \]

* Significant at 95% level of confidence.
** Significant at 95% and 99% level of confidence.
6. \[ DTO = -32.54 + 5.24 \text{ CRI}_{t-1} + 2.03 \text{ CCF}_{t-1} + 0.91 \text{ CSI}_t \]
\[ (-1.08) (3.17)^{**} (-1.99)^* (8.54)^{**} \]
\[ R = 0.85 \quad \text{S.E.} = 14.39 \quad \text{D.W.} = 1.61 \]

7. \[ DTO = -39.39 + 4.60 \text{ CRI}_{t-1} - 1.53 \text{ CCF}_{t-1} + 0.87 \text{ CSI}_{t-1} \]
\[ (-1.16) (2.46)^{**} (-1.34) (7.02)^{**} \]
\[ R = 0.81 \quad \text{S.E.} = 16.13 \quad \text{D.W.} = 1.30 \]

The above results indicate that under none of the seven cases \( R \) has improved over that reported in Chapter 2. The covariances between different variables reported below indicate that the collinearity between CCF and CSI does not improve by lagging them by one period.

<table>
<thead>
<tr>
<th>DTO</th>
<th>CRI</th>
<th>CRI(_{t-1})</th>
<th>CCF</th>
<th>CCF(_{t-1})</th>
<th>CSI</th>
</tr>
</thead>
</table>
| CRI | 0.35
| CRI\(_{t-1}\) | 0.36 | 0.89
| CCF | 0.32 | 0.02 | -0.38
| CCF\(_{t-1}\) | 0.35 | 0.09 | 0.01 | 0.48
| CSI | 0.79 | 0.19 | 0.12 | 0.64 | 0.63
| CSI\(_{t-1}\) | 0.76 | 0.28 | 0.17 | 0.68 | 0.62 | 0.96

The results support the belief that the prevailing rather than historical economic conditions provide better proxies for the determinants of the domestic take-over activity.
CHAPTER 3

THE DETERMINANTS OF THE LEVEL OF FOREIGN TAKE-OVERS

3.1 Development of Research Hypotheses

3.1.1 Introduction

The level of domestic take-overs, it was shown in chapter two, is related to domestic economic conditions. The economic conditions were derived by the use of capital budgeting theory and the review of the literature. According to the rationale developed, it was argued that economic conditions, specifically availability of external credit and internal funds as well as economic expectations, affect entrepreneurial perceptions of the marginal cost of capital and anticipated net cash flows. This affects valuation gaps and ultimately the domestic take-over activity.

Chapter three extends the rationale of chapter two to apply the theory of capital budgeting to foreign take-overs. It is argued that domestic economic conditions also affect foreign take-overs. Foreign entrepreneurs respond to the domestic economic conditions the same way as domestic entrepreneurs would. However due to the differences in perceptions if a foreign entrepreneur happens to have a greater valuation for a domestic firm, a foreign take-over would occur. This study subscribes to the view that domestic economic conditions affect the level of foreign take-overs in the domestic
country. Their effect on the valuation of the firm is called the 'domestication effect'. Section 3.2.1 discusses this in detail.

The review of the literature, as shown later, indicates that there are other widely held beliefs regarding foreign take-overs in Canada. Some assert that the foreign entrepreneur's perception about the firm in Canada is affected by the economic conditions in his home country. This is referred to as the 'spillover effect' in section 3.2.2. Some others hold the view that the difference in economic conditions between Canada and a foreign country determines the level of foreign take-overs in Canada. This is the 'differential effect' as discussed in section 3.2.3.

After considering the three effects it was decided to combine the most significant variables from the three models to consider their combined effect on the take-over activity. This approach is called the 'mixed effect' in section 3.2.4.

The present chapter reviews the relevant literature and applies the capital budgeting theory to test the statistical validity of the above four effects. However, consistent with the rationale developed in this chapter, the domestication effect is the most important of all.

Since more than two thirds of the foreign take-overs in Canada during the period 1962-73 considered by the present study, are by the U.S. firms and their
subsidiaries, only the U.S. take-overs are considered along with the economic conditions in the U.S. economy. Hence for the purpose of this chapter only, the foreign take-overs are defined as take-overs of firms in Canada, both the Canadian and foreign owned, by the U.S. entrepreneurs.

3.1.2 Review of Previous Work

The relevant literature analyzing the determinants of foreign take-overs in Canada is mostly descriptive with the exception of the Reuber and Roseman study. Most of the descriptive literature has been generated by reports prepared for the Federal Government in Canada. These descriptive works are important because they provide ideas for setting-up hypotheses for statistical testing.

The belief that the U.S. entrepreneurs are more responsive to the economic conditions in Canada was emphasized by Johnson who suggested that one effect of credit restraint is to make "domestic assets cheap for foreigners to acquire." This view is also supported, to some extent,

1. Reuber and Roseman, op. cit.
by the Gray Report that noted that the foreign controlled firms "have been making extensive use of Canadian bond and stock markets." ¹³ If this is true, we can expect the foreign entrepreneur to be more responsive to Canadian economic conditions than those in his home country. This supports the domestication effect as stated earlier.

The Watkins Report, among other things, emphasizes that the foreign entrepreneurs "because of their higher degree of integration, or because of substantial capital or better access to credit, may be in a better position to undertake some risky investments." ¹⁴ This has an important implication for the present study because this indicates that the economic conditions in the foreign country enable the foreign entrepreneur to invest in Canada. Moreover the report observed that the Canadian capital market "has been in existence for a long time, is large and sophisticated and has played an important role in Canada's economic development. At the same time, it has developed very much in the shadow of the New York capital market." ¹⁵

This indicates that the economic environment in the U.S. capital market may be more important than the Canadian one, for determining the level of foreign take-overs in Canada. This supports the spillover effect.

The differential effect has been proposed by other authors. Levitt noted: "The inability to close the gap between American and Canadian interest rates results in a choice between undesirable monetary expansion and resulting rising prices and a reduction in government spending." This creates an unfavourable economic environment for Canadian entrepreneurs to expand their businesses. Maule observed the increasingly restrictive Canadian monetary policy after 1958 and noted that "American monetary policy also became more restrictive at this time, but less so than in Canada. Conditions were, therefore, favourable to buy up Canadian assets after 1958." However he did not test the hypothesis statistically. Reuber and Roseman, also recognizing the importance of the differential, tested the effect of the differentials in the rates of interest and the stock market indices on the level of foreign take-overs in Canada. However they found that the statistical relationships were not significant for the period 1945-61.

Reuber and Roseman also considered a mixed model where the variables from the U.S. as well as the Canadian economy were used to explain the foreign take-overs. The model was built by the trial and error method where they considered a number of variables and found that some variables explained the take-overs better than the others. However their approach provides a basis for the mixed model in the present study.

At this stage it should be noted that the Reuber and Roseman approach to take-overs in Canada was explanatory in nature. They tested a number of macro economic variables and found that the U.S. mergers, Canadian business failures and internally generated corporate funds in Canada were the important determinants of foreign take-overs in Canada. However when they used the same variables to explain the domestic take-overs, the parameters associated with the last two of their three variables were not statistically significant. Again resorting to the trial and error method they found that Canadian stock market index and internally generated corporate funds in Canada can explain the domestic take-overs in Canada.

The present study has rejected the trial and error approach and built a model that is consistent with the generally accepted theory of capital budgeting. In this process it has accepted the two variables that Reuber and Roseman had used in their domestic model. However it has
added a third variable, the rate of interest to make the model more complete as well as more consistent with the theory. Chapter 2 tested these variables and obtained statistically significant results. Chapter 3 uses the same variables, but different proxies to test which of the four effects discussed in the literature, can explain the level of foreign take-over activity in Canada.
3.1.3 Capital Budgeting Theory Applied

Section 2.1.3 stipulates that when $\text{PV}_{db} > \text{PV}_s$, a domestic take-over would occur. When a foreign buyer is introduced in the model, the above argument can be extended to include the perception of the foreign buyer regarding the present value of the taken-over firm ($\text{PV}_{fb}$). Hence the necessary condition for the foreign take-over would be as follows:

$$\text{PV}_{fb} > \text{PV}_s \quad \text{..................... \ (3.1)}$$

The above condition stipulates that a foreign take-over would take place, if the present value of the taken-over firm as perceived by the foreign buyer is greater than that perceived by the seller. Under these circumstances ($\text{PV}_{fb} - \text{PV}_s$) will be referred to as the 'foreign valuation gap'. Economic conditions affect foreign valuation gaps and thereby change the level of foreign take-over activity. However, the presence of the domestic buyer probably increases the gain for the domestic seller because the foreign buyer is forced to pay a price that is at least higher than $\text{PV}_{db}$.

In a foreign take-over model, in addition to the risk of operating the taken-over firm, the foreign buyer undertakes the risk of operating in an environment that is different from his own. However, this risk is minimal for the U.S. entrepreneur operating in Canada because of many political, economic, social and technological similarities between the two countries. Yet the U.S. entrepreneur has an
advantage of diversifying on an international scale. Agman and Lessard⁹ have observed that multinational corporations can diversify internationally at a lower cost than portfolio investors. This enables the foreign buyer to have a lower cost of capital \( (k_{fb}) \).

3.1.4 Conceptual Framework for Foreign Take-Overs

In the domestic model, the entrepreneur's perception of the present value of the taken-over firm depends on the two theoretical variables, the marginal cost of capital \((k)\) and the anticipated net cash flows \((c)\). The entrepreneur sizes up the internal situation and external environment pertaining to these variables. The external effect on \(k\) was identified as the credit effect. The internal effects on both \(k\) and \(c\) were identified as funds effect and the external effect on \(c\) was identified as the expectations effect. Since the buyer's response to the economic conditions that create the above three effects is different from the seller's, it affects valuation gap and thereby provides a basis for take-over.

When the above model is applied to foreign take-overs, instead of the domestic buyer, we consider the foreign buyer. His perception of the present value of the taken-over firm also depends on the marginal cost of capital \((k_{fb})\) and the anticipated net cash flows \((c_{fb})\). If during and after the take-over he relies on the Canadian capital markets for the supply of external funds, the level of the rate of interest in Canada would have a significant effect on \(k_{fb}\). The availability of internal funds enables domestic entrepreneurs to withstand pressure for take-over by affecting their \(k_s\) and \(c_s\). The higher level of internally generated corporate funds, therefore would reduce foreign take-overs. The economic expectations affect foreign buyer the same way they
affect the domestic buyer. In the foreign model $c_{fb}$ would be more susceptible to the expectations effect than $c_s$. The above discussion indicates that the domestication model for foreign take-overs is consistent with the rationale developed in chapter two.

The spillover effect indicates that the credit conditions, the corporate net cash flows and the level of expectations in the U.S. determine take-overs in the U.S. and its effect is felt in Canada when the U.S. entrepreneurs take-over Canadian firms. The differential effect postulates that the differentials in the above economic conditions affect $PV_{fb}$ and thereby encourage or discourage the U.S. entrepreneurs to take-over firms in Canada. The mixed effect considers the Canadian credit conditions, the differential funds effect and the U.S. expectations as the three economic variables affecting foreign take-overs in Canada.

The conceptual model, together with the four sets of variables for the four effects is illustrated in Figure 3.1.
FIGURE 3.1
MODEL FOR FOREIGN TAKE-OVERS

Basic Condition

Theoretical Variables

Entrepreneurial Perception

Economic Conditions

Economic Variables

Domestication

Spillover

Differential

Mixed

Proxies
CRI CCF CSI URI UCF USI DRI DCF DSI CRI DCF USI

Signs
+ - + + - + + - - + - +
3.2 Statement of Research Hypotheses

3.2.1 The Domestication Hypothesis (H2_a)

The domestication hypothesis (H2_a) that considers the credit, funds and expectations effects can be stated in the following form:

THE LEVEL OF THE UNITED STATES TAKE-OVERS IN CANADA DEPENDS ON THE LEVELS OF THE RATE OF INTEREST, CORPORATE NET CASH FLOWS AND THE STOCK MARKET INDEX IN CANADA.

\[ FTO_t = \beta_0 + \beta_1 CRI_t + \beta_2 CCF_t + \beta_3 CSI_t \quad \ldots. (3.3) \]

Where:

- \( FTO_t \) = The Number of the U.S. Take-Overs in Canada in Period \( t \)
- CRI = The Canadian 91 Day Treasury Bill Rate
- CCF = The Canadian Corporate Net Cash Flow / Corporate Total Assets
- CSI = The Investor's 114 Index in Canada
- \( \beta_0, \ldots, \beta_3 \) = The Parameters to Be Estimated
The dependent variable is common to this and the three other hypotheses that follow this one. The proxy for the variable is the number of the U. S. take-overs in Canada over the time period from the first quarter of 1962 to the last quarter of 1973. This variable was chosen for the same reasons explained in section 2.2.4 in describing the proxy for the dependent variable in the domestic model.

The existence of $\beta_0$, the intercept term for this equation can be explained by the presence of aggressive entrepreneurs in the U. S. This was referred to as the higher level of entrepreneurial capital as explained earlier with reference to the Watkins report. The Gray report emphasizes another factor, the openness of the Canadian economy, in the following words: "Canada has provided fertile ground for the sale of products of United States origin. United States based firms have seen Canada as a logical extension of their market, given the cultural and social similarities, political stability, physical proximity, benefits of advertising spill-over and the increasing ease of access as communications and transportation improve. While the Canadian 'openness' has been reduced to some extent by tariff barriers, these did not preclude the profitable extension of the United States based firms into Canada by direct investment."\(^{12}\) If these

\(^{12}\) Gray, op. cit., p. 35.
conditions persist during the period 1962-73 covered by the study, we can expect that $\beta_0$ would have a positive sign.

Under the credit effect an increase in the rate of interest in Canada increases $k$ for the Canadian entrepreneur. However the U.S. entrepreneur having better access to external funds can be expected to have a lower $k$. As a result, $PV_s$ is reduced and the foreign valuation gaps widen and the U.S. take-overs in Canada increase. Hence $\beta_1$ is expected to have a positive sign.

The funds effect affects the entrepreneurial perceptions of both $k$ and $c$. The greater flow of corporate net cash flows reduces valuation gaps and the level of take-overs declines. In the domestication model, an increase in the corporate net cash flow in Canada reduces $k$ and increases $c$ for the Canadian entrepreneur. This happens because greater internal cash flow enables Canadian entrepreneurs to undertake new projects and hence they take a more optimistic view of the future. This results in higher $PV_s$ and it reduces foreign valuation gaps and thereby curtails the U.S. take-overs in Canada. $\beta_2$, therefore, can be expected to have a negative sign.

When expectations rise in Canada, they are reflected in an increase in the level of the stock market index in
Canada. The U.S. entrepreneur operating in Canada, perceives a higher value for c and this increases $PV_{fb}$. This results in the higher foreign valuation gaps and the number of foreign take-overs in Canada increase. Hence $\beta_3$ is expected to have a positive sign.
3.2.2 The Spillover Hypothesis ($H_{2b}$)

The spillover hypothesis ($H_{2b}$) also considers the credit, funds and expectations effects and can be stated as follows:

THE LEVEL OF THE UNITED STATES TAKE-OVERS IN CANADA DEPENDS ON THE LEVELS OF THE RATE OF INTEREST, CORPORATE NET CASH FLOW AND STOCK MARKET INDEX, ALL IN THE UNITED STATES.

$$F_{TO_t} = \beta_0 + \beta_1 URI_t + \beta_2 UCF_t + \beta_3 USI_t \quad \ldots \ldots (3.4)$$

Where:

$F_{TO_t}$ = The Number of U.S. Take-Overs In Canada in period $t$

$URI_t$ = The U.S. 91 Day Treasury Bill Rate

$UCF_t$ = The U.S. Corporate Net Cash Flow/Corporate Total Assets

$USI_t$ = The Standard and Poor's Industrials 425 Index In the U.S.

$\beta_0, \ldots, \beta_3$ = The Parameters to Be Estimated

The interpretations for the dependent variable and $\beta_0$ are the same as in the domestication hypothesis.

The credit effect stipulates that an increase in the rate of interest would increase $k$ for the seller in the U.S. and as a result reduce their perception of the present value $PV_{f_s}$. This would create a valuation gap between his perception and that of the buyer and result in the
increased take-over activity in the U.S. A high level of interest rates in the U.S. would, therefore, lead to increased take-over activity in the U.S. and the spillover effect of that would be felt in Canada. Hence \( \beta_1 \) is expected to have a positive sign.

The funds effect stipulates that an increase in the corporate net cash flows reduces the take-over activity. If this happens in the U.S., the spillover effect would be felt in Canada, where the take-over activity by the U.S. firms would decline. Hence \( \beta_2 \) is expected to have a negative sign.

An increase in the stock market index makes buyers and sellers more optimistic. The expectations effect dictates that though the present values for both increase, rise in \( \hat{P}W_{fb} \) is greater than \( \hat{P}W_{fs} \). This would result in an increase in take-over activity. If this happens in the U.S., its spillover effect in Canada would be the increased take-over activity by the U.S. firms. This would dictate that \( \beta_3 \) would have a positive sign.

3.2.3 The Differential Hypothesis (\( a2_C \))

The differential hypothesis (\( a2_C \)) summarizes the differential credit, funds and expectations effects in the following form:
THE LEVEL OF FOREIGN TAKE-OVERS IN CANADA DEPENDS ON THE LEVELS OF DIFFERENTIALS BETWEEN THE CANADIAN AND THE UNITED STATES RATES OF INTEREST, CORPORATE NET CASH FLOWS AND STOCK MARKET INDICES.

\[ FTO_t = \beta_0 + \beta_1 DRI_t + \beta_2 DCF_t + \beta_3 DSI_t \quad \ldots (3.5) \]

Where:

- \( FTO_t \) = The Number of the U. S. Take-Overs In Canada In Period \( t \)
- \( DRI = CRI - URI \)
- \( DCF = CCF - UCF \)
- \( DSI = CSI - USI \)

\( \beta_0, \cdots, \beta_3 \) = The Parameters to Be Estimated

The explanations regarding the dependent variable and \( \beta_0 \) are the same as in hypothesis \( H2_a \).

The differential between the Canadian and the U. S. rates of interest increases, when either the Canadian rate rises and the U. S. rate falls, the rise in the Canadian rate is more than the rise in the U. S. rate or the fall in the U. S. rate is more than the fall in the Canadian rate. Under all these circumstances \( k \) as perceived by the Canadian entrepreneur would increase more than \( k \) perceived by the U. S. entrepreneur and consequently the decline in \( PV_s \) will be more than the decline in \( PV_{fb} \). Hence the foreign valuation gaps would increase, leading to the larger number of the U. S. take-overs of Canadian firms.
and vice versa. Hence $\beta_1$ is expected to have a positive sign.

When the differential between the Canadian and the U. S. corporate net cash flows relative to total assets increases, for domestic entrepreneurs $k$ declines and $R$ increases relative to the values of the same variables for the U. S. entrepreneur. This leads to an increase in $P_{Vs}$ relative to $P_{Vfb}$ and consequently the narrowing of the foreign valuation gaps and a decline in the U. S. take-overs in Canada and vice versa. Hence $\beta_2$ is expected to have a negative sign.

When the difference between the Canadian and the U. S. stock market indices increase, it is a sign of brighter expectations in Canada relative to the U. S. This would affect $c$ and $P_{Vs}$ relative to $P_{Vfb}$ would increase. This would reduce the foreign valuation gaps and thereby curtail the U. S. take-overs in Canada and vice versa. $\beta_3$ is, therefore, expected to have a negative sign.

### 3.2.4 The Mixed Hypothesis ($H2_d$)

The mixed hypothesis ($H2_d$) covering the Canadian credit, the differential funds and the U. S. expectations effects can be stated in the following form:

\[ FTO_t = \beta_0 + \beta_1 CRI_t + \beta_2 DCF_t + \beta_3 USI_t \quad \ldots (3.6) \]

Where:

- \( FTO_t \) = The Number of the U. S. Take-Overs In Canada In Period \( t \).
- \( CRI \) = The Canadian 91 Day Treasury Bill Rate
- \( DCF \) = The Canadian Corporate Net Cash Flow Relative to Total Assets - The U. S. Corporate Net Cash Flow Relative to total Assets
- \( USI \) = The Standard and Poor's Industrials 425 Index In the U. S.
- \( \beta_0, \ldots, \beta_3 \) = The Parameters to Be Estimated

The explanations regarding the dependent variable and \( \beta_0 \) are the same as in hypothesis \( H2_a \).

This hypothesis is primarily set-up to combine the most significant variables from the previous three models to consider their combined effect on the dependent variable.

The Canadian rate of interest is chosen because of the widely held belief that foreign firms in Canada obtain funds from the Canadian banks and bond and stock markets.
The sign associated with \( \beta_1 \), as in the domestication hypothesis will be positive.

The differential cash flow effect is considered because it has a bearing on both the domestic and foreign entrepreneurs' perceptions of the theoretical variables \( k \) and \( c \). The negative sign for \( \beta_2 \) is based on the same logic developed in the differential hypothesis pertaining to the variable.

The U. S. stock market index is chosen because many capital market analysts consider the Canadian market as an extension of the U. S. market. Hence the U. S. index would be a better proxy for the expectations of the buyers of the taken-over firm. Hence \( \beta_3 \), the coefficient associated with this variable will have a positive sign for the same reasons explained for the variable in the spillover hypothesis.
3.3 Statistical Testing

3.3.1 The Data Base

The data for this chapter covers 48 quarters from the first quarter of 1962 to the last quarter of 1973. The data for the dependent variable was obtained from the merger register described in detail in section 2.3.1. The data for the independent variables was obtained from CANSIM.

<table>
<thead>
<tr>
<th>Year</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>N.Q. Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>22</td>
<td>6</td>
<td>17</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>1963</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>1964</td>
<td>12</td>
<td>17</td>
<td>14</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>1965</td>
<td>18</td>
<td>11</td>
<td>12</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>1966</td>
<td>19</td>
<td>20</td>
<td>9</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>1967</td>
<td>19</td>
<td>9</td>
<td>15</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td>1968</td>
<td>20</td>
<td>41</td>
<td>38</td>
<td>48</td>
<td>8</td>
</tr>
<tr>
<td>1969</td>
<td>39</td>
<td>22</td>
<td>31</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>1970</td>
<td>40</td>
<td>35</td>
<td>40</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>1971</td>
<td>22</td>
<td>30</td>
<td>23</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>1972</td>
<td>26</td>
<td>20</td>
<td>24</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>1973</td>
<td>20</td>
<td>10</td>
<td>14</td>
<td>25</td>
<td>1</td>
</tr>
</tbody>
</table>

Source : Merger Register

Q : Quarterly

N.Q. : No Quarterly Information Available.
In the present sample there were 93 foreign take-overs for which a definite quarter could not be found. out of a total of 1,084 take-overs these cases amounted to 8.58 percent and were eliminated for testing all the H2 hypotheses. The data pertaining to the dependent variable is given in Table 3.1.

3.3.2 Multiple Regression for Foreign Models

Multiple regression technique was used for testing the three foreign take-over models. Version 6.50 of the Statistical Package for Social Sciences (SPSS) was used and the following results were obtained:

The Domestication Model (H2a):

\[
FTO = 12.02 + 4.64 \times CRI - 1.07 \times CCF + 0.18 \times CSI
\]

\[
(0.72) \quad (4.89) \quad (-1.88) \quad (2.83)
\]

\[
R = 0.69 \quad S.E. = 14.32 \quad D.W. = 1.53
\]

The Spillover Model (H2b):

\[
FTO = 8.09 + 2.65 \times URI - 0.30 \times UCF + 0.08 \times USI
\]

\[
(0.64) \quad (2.08) \quad (-1.61) \quad (0.89)
\]

\[
R = 0.63 \quad S.E. = 8.93 \quad D.W. = 1.02
\]

The Differential Model (H2c):

\[
FTO = 21.58 + 3.52 \times DRI + 0.86 \times DCF - 0.21 \times DSI
\]

\[
(2.86) \quad (1.49) \quad (4.76) \quad (-1.05)
\]

\[
R = 0.60 \quad S.E. = 9.31 \quad D.W. = 1.34
\]

*Significant at 95% level of confidence.
**Significant at 95% and 99% level of confidence.
The **Mixed Model** (H2d) :

\[ \text{FTG} = -16.12 + 4.29 \text{CRI} + 0.17 \text{DCF} + 0.15 \text{USI} \]

\[ (-1.78^* \, 4.36^{**} \, 1.10 \, 1.77^*) \]

R = 0.71  S.E. = 8.12  D.W. = 1.22

The figures in the parentheses are the \textit{t} statistics for the respective \( \beta \)s. R, S.E. and D.W. are the coefficients of correlation, standard error of the estimate and the Durbin Watson statistic respectively. The analysis of variance for the regression residuals for the four models is as follows :

**TABLE 3.2**

Analysis of Variance for Foreign Models

<table>
<thead>
<tr>
<th>Model</th>
<th>D.F.</th>
<th>Sum of Squares</th>
<th>Mean squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestication</td>
<td>3</td>
<td>2761.86005</td>
<td>920.62002</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>3013.11912</td>
<td>68.47998</td>
</tr>
<tr>
<td>* * F (d.f. 3,44) = 13.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spillover</td>
<td>3</td>
<td>2266.05668</td>
<td>755.35223</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>3508.92249</td>
<td>79.74824</td>
</tr>
<tr>
<td>* * F (d.f. 3,44) = 9.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential</td>
<td>3</td>
<td>2103.91180</td>
<td>701.30393</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>3671.06737</td>
<td>83.43335</td>
</tr>
<tr>
<td>* * F (d.f. 3,44) = 8.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>3</td>
<td>2872.39738</td>
<td>957.46579</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>2902.58178</td>
<td>65.96777</td>
</tr>
<tr>
<td>* * F (d.f. 3,44) = 14.51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Since $F_{.99}(d.f. 3,44)$ is 4.31, there is a statistical basis for hypothesizing about the relationships between the dependent and the independent variables.

The test for $R^2$ described in section 2.3.2 earlier gives the limits of -0.343 to 0.343, if $\rho^2$ is zero. The $R^2$s for the four models are 0.478, 0.392, 0.364 and 0.497 respectively. This indicates that statistically, there is a reason to believe that the sample coefficients of determination $R^2$s in all the above four cases are in fact the population coefficients of determination $\rho^2$ at the 99% confidence level for the respective models.

3.3.3 Implications of the Multiple Regression Technique

The implications of the technique as explained in section 2.3.3 are statistical, structural and predictive. Statistically the point estimates of $\beta$'s at (n-2), i.e., 46 degrees of freedom should be tested to determine their significance. The $t$ values (d.f. 40) at 0.99 and 0.95 confidence level are 2.423 and 1.684 respectively. Testing $\beta$'s for these values indicates that in the domestication model all variables are significant at the 0.95 level and CRI and CSI are significant even at the 0.99 level. In the spillover model none of the variables are significantly different from zero at the 0.99 level. However only URI is significant at the 0.95 level. In
the differential model only DCF is significant at the 0.95 as well as the 0.99 levels, but neither of the other two variables is significant at those levels. In the mixed model CRI and USI are significant at the 0.95 level and only CRI is significant at the 0.99 level. Judging from the above results, statistically the domestication model is superior to the other three models.

Structurally, the signs associated with the constant and all the independent variables in the domestication and spillover models are according to expectations. In the differential model, sign for DCF, the only significant variable, is reversed. In the mixed model the signs for the constant as well as DCF are reversed. Judging from the signs, therefore, the domestication and spillover models are structurally superior to the other two models.

A further implication of the structural validity of the model is the absence of multicollinearity between the independent variables. Table 3.3 gives the covariances for the four foreign models. Table 3.4 gives the stepwise regression results for the same models.

In the domestication model there is multicollinearity between CCF and CSI. Both these variables have significant t-values. Hence the problem is not as serious here as in case of some of the other models. Moreover after the contribution of CSI to $R^2$, CCF also makes some contribution. Hence the structural validity of the model is not impaired.
## TABLE 3.3
Covariances for Foreign Models

### The Domestication Model (H2_a):

<table>
<thead>
<tr>
<th></th>
<th>FTO</th>
<th>CRI</th>
<th>CCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRI</td>
<td>0.61882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCF</td>
<td>0.03551</td>
<td>0.06497</td>
<td></td>
</tr>
<tr>
<td>CSI</td>
<td>0.35832</td>
<td>0.21368</td>
<td>0.64785*</td>
</tr>
</tbody>
</table>

### The Spillover Model (H2_b):

<table>
<thead>
<tr>
<th></th>
<th>FTO</th>
<th>URI</th>
<th>UCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>URI</td>
<td>0.57781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UCF</td>
<td>-0.54005</td>
<td>-0.64715*</td>
<td></td>
</tr>
<tr>
<td>USI</td>
<td>0.44364</td>
<td>0.54997</td>
<td>-0.49677</td>
</tr>
</tbody>
</table>

### The Differential Model (H2_c):

<table>
<thead>
<tr>
<th></th>
<th>FTO</th>
<th>DRI</th>
<th>DCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRI</td>
<td>-0.02090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCF</td>
<td>0.50002</td>
<td>-0.56094</td>
<td></td>
</tr>
<tr>
<td>DSi</td>
<td>0.14510</td>
<td>-0.73971*</td>
<td>0.69950*</td>
</tr>
</tbody>
</table>

### The Mixed Model (H2_d):

<table>
<thead>
<tr>
<th></th>
<th>FTO</th>
<th>CRI</th>
<th>DCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRI</td>
<td>0.61882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCF</td>
<td>0.50002</td>
<td>0.39067</td>
<td></td>
</tr>
<tr>
<td>USI</td>
<td>0.44364</td>
<td>0.21628</td>
<td>0.60941*</td>
</tr>
</tbody>
</table>

* Multicollinearity at (n-2) degrees of freedom at 99% confidence where:
  \[ R^2 \geq 0.343 \]
  i.e., \[ R \geq 0.58566 \]
### Table 3.4

\( R^2 \) Changes in Stepwise Regressions for Foreign Models

<table>
<thead>
<tr>
<th></th>
<th>( R^2 ) Change</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Domestication Model (H2a)</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRI</td>
<td>0.38293</td>
<td>0.38293</td>
</tr>
<tr>
<td>CSI</td>
<td>0.05356</td>
<td>0.43650</td>
</tr>
<tr>
<td>CCF</td>
<td>0.04175</td>
<td>0.47825</td>
</tr>
<tr>
<td><strong>The Spillover Model (H2b)</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>URI</td>
<td>0.33386</td>
<td>0.33386</td>
</tr>
<tr>
<td>UCF</td>
<td>0.04748</td>
<td>0.38135</td>
</tr>
<tr>
<td>USI</td>
<td>0.01105</td>
<td>0.39239</td>
</tr>
<tr>
<td><strong>The Differential Model (H2c)</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCF</td>
<td>0.25002</td>
<td>0.25002</td>
</tr>
<tr>
<td>DRI</td>
<td>0.09832</td>
<td>0.34834</td>
</tr>
<tr>
<td>DSI</td>
<td>0.01597</td>
<td>0.36432</td>
</tr>
<tr>
<td><strong>The Mixed Model (H2d)</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRI</td>
<td>0.38293</td>
<td>0.38293</td>
</tr>
<tr>
<td>USI</td>
<td>0.10069</td>
<td>0.48362</td>
</tr>
<tr>
<td>DCF</td>
<td>0.01377</td>
<td>0.49739</td>
</tr>
</tbody>
</table>
In the spillover model, URI and UCF are multicollinear. URI has a significant t value, but UCF does not. The contribution of URI to $R^2$ is substantial, while that of the UCF is very little. In this case the problem of multicollinearity makes it difficult to segregate the effects of UCF from URI on FTO and hence the model is structurally weak.

In the differential model, there is evidence of multicollinearity between two pairs, DRI-DSI and DCF-DSI. The only significant variable is DCF. Hence the model is structurally weaker than both the domestication and the spillover models.

In the mixed model, multicollinearity exists between DCF and USI. USI has a significant t value, but DCF does not. Hence it is difficult to separate the effects of these variables on the dependent variable. Hence structurally this model is also weak.

Predictive implications indicate that the domestication and mixed models have lower standard errors than the other two models and hence they are superior.

To sum up, statistical, structural as well as predictive examination of the models suggest that the domestication model is the best of all. It has significant F statistic and $R^2$. All the $\beta$'s have significant t values with expected signs. The multicollinearity is not serious and has a low standard error. Hence the domestication hypothesis is accepted for further statistical scrutiny.
3.3.4 The Analysis of Residuals

The analysis of residuals for the foreign model ($H^2_a$) was conducted on the same lines as for the domestic model ($H^1_a$) explained in section 2.3.4.

The Durbin-Watson statistic as explained in section 2.3.4 gives the limits of 1.22 and 1.48. Below the first value serial correlation is indicated and above the second value the absence of serial correlation is presumed. D. W. statistic for the domestication model is 1.26. This falls within the two limits and hence no definite statement can be made either way.

Linearity, homoscedasticity and normality in a multiple regression can be examined by viewing the scattergrams for the predicted values as well as each of the independent variables in the model against the residuals for that model. The scattergrams are given in Figures 3.2 to 3.5. Table 3.5 summarizes the statistical results obtained by regressing the residuals in the domestication model against the predicted values and each of the independent variables.

It is evident from Table 3.5 that in each of the cases, the coefficient of determination is zero, the slope of the regression line is negligible and the standard error of the estimate is unchanged. The absence of the relationships in Table 3.5 as well as the scattergrams meet the different conditions laid down by Spurr and Bonini and explained in section 2.3.4.
FIGURE 3.2

Scattergram for Predicted Values in Foreign Model (H2a)

Residuals
FIGURE 3.3

Scattergram for Rate of Interest in Foreign Model (H2a)

Residuals

[Graph showing scattergram with axes labeled and data points plotted]
FIGURE 3.5

Scattergram for Stock Market Index in Foreign Model (H2a)

Residuals

Canadian Stock Market Index

Scattergram of (Deviation) of Real Exchange Rate towards Foreign Models on (Population) GSL
TABLE 3.5
Regression of Residuals in Foreign Model ($H^2_a$)

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>B</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted value</td>
<td>0.00</td>
<td>-0.01</td>
<td>8.06</td>
</tr>
<tr>
<td>Rate of Interest</td>
<td>0.00</td>
<td>-0.05</td>
<td>8.06</td>
</tr>
<tr>
<td>Corporate Net Cash Flow</td>
<td>0.00</td>
<td>0.03</td>
<td>8.06</td>
</tr>
<tr>
<td>Stock Market Index</td>
<td>0.00</td>
<td>0.00</td>
<td>8.06</td>
</tr>
</tbody>
</table>
3.3.5 The Summary of the Findings

The foreign model described and tested in this chapter is consistent with the theory of capital budgeting and the credit, funds and expectations effects described in chapter two. However, four different versions of the model, dependent upon four sets of proxies for the economic conditions were tested for statistical validity. The spillover, differential and mixed versions of the model gave statistically less significant results than those obtained for the domestication version. Hence the domestication effect was accepted.

According to the domestication hypothesis, the Canadian rate of interest, the corporate net cash flows in Canada and the Canadian stock market index are the significant determinants of the U.S. take-overs in Canada. This is consistent with the belief that when the U.S. entrepreneurs invest in Canada, they are more responsive to the Canadian economic conditions than conditions in their own country.

The results obtained in chapters two and three indicate that the same economic variables determine the levels of domestic as well as foreign take-overs in Canada. The approach followed in this study was based on the theory of capital budgeting. The theory provided two theoretical variables and an attempt was made to obtain three economic conditions that explain these variables. Hence the results obtained for foreign take-overs are consistent with those for domestic take-overs in Canada. Reuber and Roseman approach, on the other hand, was rather trial and error
type. They found three variables that explained foreign take-overs. But the same variables did not give satisfactory results for domestic take-overs and hence they found two others, again by trial and error method, that did give them the results they wanted. This approach however was rejected in the present study in preference to the approach consistent with the theory of capital budgeting.

The above results give rise to another question. If the same economic conditions create domestic as well as foreign valuation gaps that result in domestic and foreign take-over activities in Canada, what determines the current foreign relative to total take-over activities in Canada? This coupled with the fact that foreign control varies between industries has made the author wonder whether the existing control in an industry is an indication of future take-over activity? Chapter four, therefore, undertakes a cross-sectional study of foreign relative to total take-overs in an attempt to answer these questions.
APPENDIX 3A

Testing for Lags in the Foreign Model

As explained in Appendix 2A, there may be a lag relationship between the dependent variable on the one hand and one or more of the independent variables on the other. To test these relationships for the foreign model, the following seven regressions were run:

1. \[ \text{FTO} = -7.98 + 5.60 \text{CRI}_{t-1} - 5.58 \text{CCF}_t + 0.16 \text{CSI}_t \]
   \[ \begin{align*}
   &(-0.49) \quad (5.44)** \quad (-1.07) \quad (2.90)** \\
   &R = 0.77 \quad \text{S.E.} = 7.43 \quad \text{D.W.} = 1.42
   \end{align*} \]

2. \[ \text{FTO} = 5.44 + 4.99 \text{CRI}_t - 0.92 \text{CCF}_{t-1} + 0.17 \text{CSI}_t \]
   \[ \begin{align*}
   &(0.32) \quad (5.24)** \quad (-1.59) \quad (2.81)** \\
   &R = 0.70 \quad \text{S.E.} = 8.23 \quad \text{D.W.} = 1.13
   \end{align*} \]

3. \[ \text{FTO} = 4.29 + 4.73 \text{CRI}_t - 0.72 \text{CCF}_t + 0.14 \text{CSI}_{t-1} \]
   \[ \begin{align*}
   &(0.23) \quad (4.52)** \quad (-1.19) \quad (4.52)** \\
   &R = 0.67 \quad \text{S.E.} = 8.58 \quad \text{D.W.} = 1.14
   \end{align*} \]

4. \[ \text{FTO} = 1.51 + 4.89 \text{CRI}_t - 0.62 \text{CCF}_{t-1} + 0.13 \text{CSI}_{t-1} \]
   \[ \begin{align*}
   &(0.08) \quad (4.78)** \quad (-1.02) \quad (1.90)* \\
   &R = 0.67 \quad \text{S.E.} = 8.61 \quad \text{D.W.} = 1.14
   \end{align*} \]

5. \[ \text{FTO} = -7.80 + 5.53 \text{CRI}_{t-1} - 0.49 \text{CCF}_t + 0.15 \text{CSI}_{t-1} \]
   \[ \begin{align*}
   &(-0.45) \quad (6.01)** \quad (-0.83) \quad (2.26)* \\
   &R = 0.75 \quad \text{S.E.} = 7.69 \quad \text{D.W.} = 1.38
   \end{align*} \]

6. \[ \text{FTO} = -3.54 + 5.69 \text{CRI}_{t-1} - 0.76 \text{CCF}_{t-1} + 0.14 \text{CSI}_t \]
   \[ \begin{align*}
   &(-0.23) \quad (6.73)** \quad (-1.46) \quad (3.20)** \\
   &R = 0.77 \quad \text{S.E.} = 7.35 \quad \text{D.W.} = 1.42
   \end{align*} \]

7. \[ \text{FTO} = -6.59 + 5.63 \text{CRI}_{t-1} - 0.54 \text{CCF}_{t-1} + 0.14 \text{CSI}_{t-1} \]
   \[ \begin{align*}
   &(-0.41) \quad (6.33)** \quad (-1.00) \quad (2.46)** \\
   &R = 0.75 \quad \text{S.E.} = 7.66 \quad \text{D.W.} = 1.37
   \end{align*} \]

Though in some cases the above results give slightly better Rs than the one reported in Chapter 3, the t statistics for all the coefficients of CCF\(_t\) and CCF\(_{t-1}\) are not large enough to meet the 95% confidence level. This makes
the results rather weak on the structural grounds. The covariances for the independent variables are the same as those reported in Appendix 2A.

The above results indicate that the present rather than past economic conditions are better proxies for the determinants of the foreign take-over activity in Canada.

* Significant at 95% level of confidence.
** Significant at 95% and 99% level of Confidence.
CHAPTER 4

THE INTER-INDUSTRY DOMESTIC AND FOREIGN TAKE-OVERS

4.1 Development of Research Hypotheses

4.1.1 Introduction

The levels of domestic as well as foreign take-overs, as found in chapters two and three, depend on domestic economic conditions. The logical link between take-over activity and economic conditions was attributed to differences in entrepreneurial perceptions of the marginal cost of capital (k) and the anticipated net cash flows (c) that determine the present value of the firm. An attempt was made to derive the economic conditions from the two theoretical variables k and c.

Though domestic and foreign take-overs occur simultaneously in response to certain economic conditions, the cross-sectional data collected for this study for the period 1962 to 1973 indicate that foreign take-overs relative to total take-overs vary from industry to industry. Reuber and Roseman\(^1\) also noted similar differences in their data for the period 1945 to 1961. They found that foreign relative to total take-overs on a cross-sectional basis

\(^1\) Reuber and Roseman, op.cit., Chapter 6.
were proportional to the foreign relative to total control. This, they asserted, implied that foreign entrepreneurs have the same propensity to take over as their domestic counterparts. This chapter tests their assertions for a different period with two major differences.

First, it uses foreign relative to total control at the beginning of the period, as an explanatory variable. Reuber and Roseman used the control at the end of the period for the same purpose. Their proxy for the control was rejected because control at the end of the period is the result of the take-over activity during the period and hence cannot be used as an independent variable to explain the take-over activity. They probably used their proxy because control data for 1945 may not have been available to them. Second, the results of the present study, it will be shown, are consistent with the conceptual framework developed in chapters two and three.

Since foreign take-overs vary from industry to industry, it can be postulated that foreigners have an advantage that varies from industry to industry. Where the advantage is greater, foreign relative to total take-overs would be greater. Where the advantage is less, domestic entrepreneurs may be more dominant and foreign entrepreneurs may take over relatively less firms. The advantage that varies between industries is called the 'industry advantage', It could
arise because the foreign entrepreneur may have better access to raw materials and control of markets for finished products and possess superior technology.

The foreign entrepreneur may also have an advantage that is common among industries, e.g., he may be financially more mobile, have better access to managerial expertise and display the ability and willingness to take risk. The advantage arising from such factors is called the 'common advantage' for the purpose of this study.

It has been asserted by the Watkins Report\(^2\) that the above advantages, without naming them as such, help foreign entrepreneurs to gain control of domestic industries. The common advantage would be instrumental in increasing the control in all industries. The industry advantage would culminate in acquiring different degrees of foreign relative to total control in various industries. Hence the control at the beginning of a period, would be an index of the advantages possessed by foreign entrepreneurs.

The advantages eventually result in a higher ratio of foreign to total take-overs in the industry. The relationship between the indices of take-overs and control is tested by using the cross-sectional data from 1962 to 1973 in an attempt to confirm that foreign entrepreneurs in Canada possess the two types of advantages.

4.1.2 Review of Previous Work

The industry advantage arises from at least three important factors, namely, the level of technology, the access to sources of raw materials and the control of the market for finished goods. All of these differ from industry to industry.

Superior technology is cited by the Gray report as one of the factors responsible for the industry advantage. If a foreign entrepreneur, by using better industry technology, can produce a better product, lower costs or devise a combination thereof, he would be in a much better position to compete in the domestic market. Hence the greater rate of return obtained by him can be explained as a return for his innovative techniques.

When a resource or a raw material that is vital to a particular industry is scarce and is controlled by a foreign entrepreneur, in order to obtain a greater return he may engage in forward vertical integration. By this process he can eliminate profit margins of the producers he takes over. Reuber and Roseman found that while the forward vertical integration by foreign firms accounted for

20% of foreign take-overs, such take-overs were only 11% of domestic take-overs. This was the most significant percentage difference between foreign and domestic categories classified by the authors.

Control of the market can give a foreign entrepreneur monopoly powers and thereby help him to achieve higher return. The control may be real or artificial and is based on product differentiation. The monopolist creates the image that his product is unique and has no close substitute. If the foreign entrepreneur has established such an image in a particular industry, he can expect greater returns. They can be attributed to the industry advantage.

The common advantage to foreign entrepreneurs also arises from at least three other important factors, namely, access to external funds, geographical diversification and ability and willingness to take risk. All of these factors are applicable to any industry and thus foreign entrepreneurs operating in different industries can envisage benefits from these factors.

The foreign entrepreneur operating in Canada has access to funds from various sources abroad. He can either obtain the funds in Canada, borrow outside Canada or channel internal funds from subsidiaries in other countries into

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5. Gray, op. cit., p. 33.
his Canadian subsidiaries and vice versa. This provides greater financial mobility to the foreign entrepreneur than to his domestic counterpart. A Canadian entrepreneur, in contrast, not having such easy access to external funds may be unable to take-over firms in Canada. If this phenomenon prevails in all industries, it may also be responsible for the higher common advantage to the foreign entrepreneur.

A foreign entrepreneur can take advantage of geographical diversification to reduce the risk of operating in different countries. Moreover as long as his existing fixed costs are covered at home, he may be inclined to take over a firm in another country and by integrating it with his existing enterprise, operate the firm with minimal fixed costs. This entire process may result in truncation of the manufacturing processes in different countries where the foreign entrepreneur operates.

If a foreign entrepreneur wants to pool different factors of production in order to take over and develop an enterprise in Canada, he needs the ability and willingness to take risk. The investment may be desirable from the Canadian viewpoint of creating additional employment, developing economically backward areas, etc. and hence may be encouraged by the government and higher risk may be compensated by greater returns. Since this phenomenon is

common between industries, the ability and willingness to take risk can contribute to the common advantage enjoyed by foreign entrepreneurs.
4.1.3 Relation to the Capital Budgeting Theory

When \( PV_{db} \gg PV_s \), a domestic take-over is expected to occur. On the other hand, for a foreign take-over, the condition to be satisfied is \( PV_{fb} \gg PV_s \). Entrepreneurial perception of \( PV \) depends on economic conditions that affect \( k \) and \( c \) and it differs from one entrepreneur to another.

The foreign relative to domestic take-over activity also depends on the entrepreneurial perception of \( PV \). However, in this case it is not determined by the economic conditions, but by the industry and common advantages enjoyed by the foreign entrepreneur.

The industry advantage to a foreign entrepreneur, as explained earlier, may result from technological superiority, access to raw materials and the control of the market for finished goods. All of these factors enable the foreign entrepreneur to have a different perception of \( PV_{fb} \) than the domestic entrepreneur's perception of \( PV_{db} \). Hence the necessary condition for a foreign relative to domestic take-overs can be stated as follows:

\[
PV_{fb} \gg PV_{db} \quad \ldots \ldots \ldots (4.1)
\]

The difference \((PV_{fb} - PV_{db})\) will be referred to as a 'relative valuation gap'. The greater the industry advantage, the wider will be the relative valuation gap in the industry, so that more foreign entrepreneurs are inclined to take-over domestic firms. Hence the foreign,
relative to total take-overs in the industry increase.

If the relative valuation gaps in an industry are smaller, some foreign entrepreneurs would not take over domestic firms in the industry and the foreign relative to total take-overs in the industry would be less.
4.1.4 Conceptual Framework for Relative Take-Overs

The basic condition for the conceptual model for the foreign relative to total take-overs is the same as for the levels of take-overs, namely, as long as there is a difference in the perceived valuations of the taken-over firm, take-overs would occur. However the difference between the domestic or foreign levels model and the relative model is that in the first two cases we were concerned with only one type of take-over, while in the third case we have to consider both foreign as well as domestic take-overs and explain why they differ between industries. Furthermore in the first two models, there were only two parties, the buyer either domestic or foreign and the seller of the taken-over firm. In the relative model there are three parties, the foreign buyer, the domestic buyer and the seller of the taken-over firm. Hence a third condition, already described in equation 4.1 is needed.

Figure 4.1, illustrating the relative model, starts with the three conditions for take-overs to occur. The two theoretical variables, the marginal cost of capital (k) and the anticipated net cash flow (c), have to be considered for the foreign buyer, the domestic buyer and the seller of the taken-over firm. Both k and c are affected by the entrepreneur's perception of the internal situation and the external environment.
FIGURE 4.1
MODEL FOR RELATIVE TAKE-OVERS

Type of Take-Over:

Basic Conditions:

Theoretical Variables:

Entrepreneurial Perception:

Advantages to Entrepreneur:

Economic Measurement:

Expected Results:

\[ \text{Relative} \]

\[ PV_{fb} > PV_{db} \]

\[ k \]

External Environment

Internal Situation

Internal Situation

External Environment

Industry Advantage

Proportional Control

\[ \beta = 1 \]

Common Advantage

Constant Factor

\[ \alpha > 0 \]
4.2.3 The Inter-Industry Relative Take-Overs Hypothesis (H₃ₐ)

The relative take-overs hypothesis (H₃ₐ), consistent with the industry and common advantages, can be stated as follows:

THE FOREIGN RELATIVE TO TOTAL TAKE_OVERS IN A CANADIAN INDUSTRY DEPEND ON THE FOREIGN RELATIVE TO TOTAL CONTROL IN THE INDUSTRY.

By combining the equations (4.6) and (4.7), the above hypothesis can be set-up for statistical testing in the following form:

\[
\frac{FT_1}{FT_1 + DT_1} = \alpha + \beta \frac{FC_1}{FC_1 + DC_1} \quad \ldots \ldots (4.8)
\]

Where:

All the symbols represent the same variables as those used in equation (4.6).

In order to find a proxy for the dependent variable, the industry classification can refer to the industry to which either the taken over firm, taking-over firm, or both the taken-over and taking-over firms belong. This gives rise to three proxies for the dependent variable as follows:

\[
y_1 = \frac{FAD}{FAD + DAD} \quad \ldots \ldots (4.9)
\]
confidence felt by the foreign entrepreneur that technology, access to raw materials, finished goods and capital markets and his ability to invest in and bear risk, he can generate a higher \( c \) than the or the domestic entrepreneur. However \( c \) would change from industry to industry and hence the relative take activity would also vary between industries.

The conceptual model for the relative \( \Delta c \) is illustrated in Figure 4.1. The industry and country advantages are operationalized for statistical \( \Gamma \) the following two sections.

4.2 Statement of Research Hypotheses

4.2.1 The Industry Advantage

This section argues that since various advantages enjoyed by the foreign entrepreneurs in different countries, the existing level of foreign, relative to local firms, the existing level of foreign, relative to local control can be used to predict the level of foreign control to total take-overs. This argument is further developed by using the example given by Reuber and Roseman, 1969, op. cit., Chapt. 6.

such firms. In a particular period there were 5 take-overs in each industry. If the propensity to take-over of foreign as well as domestic entrepreneurs was the same, one out of five new take-overs in industry A and two out of five new take-overs in industry B, could be foreign take-overs. Therefore, the ratio of foreign to total take-overs would be equal to the ratio of foreign to total control in both the industries. First consider the propensity to take-over of foreign as well as domestic entrepreneurs in both the industries:

I. Propensity to Take-Over in Industry A:

\[ F_A = \frac{\text{Foreign Take-overs}}{\text{Foreign Controlled Firms}} = \frac{1}{10} \]

\[ D_A = \frac{\text{Domestic Take-overs}}{\text{Domestic Controlled Firms}} = \frac{4}{10} \]

\[ \therefore F_A = D_A \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4.2) \]

II. Propensity to Take-Over in Industry B:

\[ F_B = \frac{\text{Foreign Take-overs}}{\text{Foreign Controlled Firms}} = \frac{2}{10} \]

\[ D_B = \frac{\text{Domestic Take-overs}}{\text{Domestic Controlled Firms}} = \frac{3}{10} \]

\[ \therefore F_B = D_B \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4.3) \]

Now consider the proportionality of control in both the industries by the foreign as well as domestic entrepreneurs:
I. Proportionality in Industry A:

\[ C_A = \frac{\text{Foreign Controlled Firms}}{\text{Total Firms}} = \frac{10}{50} = \frac{1}{5} \]

\[ T_A = \frac{\text{Foreign Take-Overs}}{\text{Total Take-Overs}} = \frac{1}{5} \]

\[ \therefore C_A = T_A \]

...............(4.4)

II. Proportionality in Industry B:

\[ C_B = \frac{\text{Foreign Controlled Firms}}{\text{Total Firms}} = \frac{20}{50} = \frac{2}{5} \]

\[ T_B = \frac{\text{Foreign Take-Overs}}{\text{Total Take-Overs}} = \frac{2}{5} \]

\[ \therefore C_B = T_B \]

...............(4.5)

The above illustration indicates that the \( C \) and \( T \) ratios will be equal to each other, only if the corresponding \( F \) and \( D \) ratios are equal for a particular industry. If the propensity to take-over for foreign entrepreneurs is greater, i.e., \( F > D \), then \( T > C \) and vice versa. This logic can be operationalized as follows:

\[ \frac{FT_i}{FT_i + DT_i} = \beta \frac{FC_i}{FC_i + DC_i} \]

...............(4.6)

Where:

\[ FT_i = \text{Foreign Take-Overs} \]

\[ DT_i = \text{Domestic Take-Overs} \]

\[ FC = \text{Foreign Controlled firms} \]

\[ DC = \text{Domestic Controlled firms} \]

\[ \beta = \text{The Parameter to Be Estimated.} \]
Hence if the propensity of foreign entrepreneurs in an industry is equal to that of the domestic ones, $\beta$ will be equal to unity in that industry.

4.2.2 The Common Advantage

The common advantage, as stated earlier, is the advantage possessed by foreign entrepreneurs and is evident across the board for all the domestic industries. It can, therefore, be argued that if the foreign entrepreneur has a common advantage over his domestic counterparts in all the industries, take-overs in various industries would increase over and above those caused because of the industry advantage.

Hence when the ratio of foreign to total control is used to explain the ratio of foreign to total take-overs in an industry, the common advantage would be represented by a constant in the equation:

\[
\frac{FT_i}{FT_i + DT_i} = \lambda + \frac{FC_i}{FC_i + DC_i} 
\]

\[
..... (4.7)
\]

Where:

All the symbols represent the same variables as those used in equation (4.6).

It is postulated that the common advantage does exist and works to the advantage of the foreign entrepreneurs. Hence $\lambda$ is expected to be significantly greater than zero.
4.2.3 The Inter-Industry Relative Take-Over's Hypothesis \((H_3^a)\)

The relative take-overs hypothesis \((H_3^a)\), consistent with the industry and common advantages, can be stated as follows:

THE FOREIGN RELATIVE TO TOTAL TAKEOVERS IN A CANADIAN INDUSTRY DEPEND ON THE FOREIGN RELATIVE TO TOTAL CONTROL IN THE INDUSTRY.

By combining the equations (4.6) and (4.7), the above hypothesis can be set-up for statistical testing in the following form:

\[
\frac{FT_1}{FT_1 + DT_1} = \alpha + \beta \frac{FC_1}{FC_1 + DC_1} \quad \ldots (4.8)
\]

Where:

All the symbols represent the same variables as those used in equation (4.6).

In order to find a proxy for the dependent variable, the industry classification can refer to the industry to which either the taken over firm, taking-over firm, or both the taken-over and taking-over firms belong. This gives rise to three proxies for the dependent variable as follows:

\[
y_1 = \frac{FAD}{FAD + DAD} \quad \ldots (4.9)
\]
Where 

\[ FAD = \text{the number of foreign take-overs in an industry where the taken-over firm is located in that industry} \]

\[ DAD = \text{the number of domestic take-overs in an industry where the taken-over firm is located in that industry.} \]

\[ Y_1 \] therefore becomes the ratio of foreign to total taken-over firms in an industry during the period under study. Since this study emphasizes the aspects pertaining to the taken-over firm, the take-overs were classified according to the industrial classification of the taken-over firm. This variable emphasizes industry advantages as they relate to the taken-over firm.

\[ Y_2 = \frac{FAG}{FAG + DAG} \quad \ldots \ldots (4.10) \]

Where 

\[ FAG = \text{the number of foreign take-overs made by firms located in a particular industry.} \]

\[ DAG = \text{the number of domestic take-overs made by firms located in a particular industry.} \]

\[ Y_2 \] therefore emphasizes the industry classification of the taking-over firms because it is the ratio of foreign to total taking-over firms in an industry. This variable allows for the industry advantages to spread from one industry to another in a take-over situation. Reuber and Roseman\(^9\) consider this as the most important ratio because

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it accounted for cases that caused conglomerate or vertical take-overs.

\[ Y_3 = \frac{FAA}{FAA + DAA} \quad \ldots \quad (4.11) \]

Where

- FAA = the number of foreign take-overs in a particular industry where both the taken-over and taking-over firms are located in that industry.

- DAA = the number of domestic take-overs in a particular industry where both the taken-over and taking-over firms are located in that industry.

\( Y_3 \), it is evident, limits the hypotheses to only those cases where the taking-over and taken-over firms belong to the same industry. However Reuber and Roseman used this ratio and it is proposed to use it in this study to compare the results.

The independent variable is the ratio between foreign and total control in an industry at the beginning of the period. The number of corporations in the industry was used as a measure to compute the proxy for the independent variable.

It is expected that \( \alpha \) will be greater than zero and \( \beta \) will be equal to one. The implications of these results are discussed in the last chapter.
4.3 Methodology and Results

4.3.1 The Cross-Sectional Data

The data pertaining to the dependent variable was obtained from the merger register, already described in detail in section 2.3.1. The firms in the register were classified using the two digit Standard Industrial Classification (SIC)\(^{10}\) of Statistics Canada, dividing the manufacturing companies into 18 and the non-manufacturing into 7 categories. Hence in order to test the hypotheses the two sets of data with 18 and 25 industries was used.

One of the major and the most reliable sources of data pertaining to foreign control of Canadian businesses is the information collected under the Corporations and Labour Union Returns Act (CALURA) 1962. The Act is administered by the Chief Statistician of Canada under the authority from the Minister of Industry, Trade and Commerce. The purpose of the act is to collect financial and other information on the affairs of certain corporations and labour unions carrying on activities in Canada. However the Act applies only to corporations with gross revenues during the reporting period, in excess of $500,000 or assets in excess of $250,000. Crown corporations and corporations operating under the authority of specific Government of Canada statutes are exempt under the Act. The data pertaining to the proxy for independent variable was obtained from the CALURA annual reports.

4.3.2 Statement of the Results

The statistical results are summarized in Table 4.1 for the two sets of data for the manufacturing industries as well as for all the industries. Table 4.1 contains information relating to the expected values, standard errors and t statistic for each of the two parameters, $\alpha$ and $\beta$. It also lists $R^2$ for each of the equations.

**TABLE 4.1**

<table>
<thead>
<tr>
<th></th>
<th>S.D. of $\alpha$</th>
<th>t for $\alpha$</th>
<th>S.D. of $\beta$</th>
<th>t for $\beta$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturing Industries:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Y_1$</td>
<td>0.18</td>
<td>0.05</td>
<td>3.45</td>
<td>0.82</td>
<td>6.90</td>
</tr>
<tr>
<td>$Y_2$</td>
<td>0.16</td>
<td>0.06</td>
<td>2.81</td>
<td>0.96</td>
<td>6.95</td>
</tr>
<tr>
<td>$Y_3$</td>
<td>0.14</td>
<td>0.06</td>
<td>2.21</td>
<td>1.01</td>
<td>6.82</td>
</tr>
</tbody>
</table>

|                  |                  |                |                  |                |       |
| **All Industries:** |                  |                |                  |                |       |
| $Y_1$            | 0.15             | 0.04           | 3.72             | 0.85           | 8.06  | 0.74  |
| $Y_2$            | 0.12             | 0.05           | 2.49             | 1.00           | 7.66  | 0.72  |
| $Y_3$            | 0.11             | 0.06           | 1.91             | 1.03           | 6.77  | 0.67  |

|                  |                  |                |                  |                |       |
| **Reuber and Roseman Results for Manufacturing Industries:** |                  |                |                  |                |       |
| $Y_2$            | 0.19             | -              | 2.41             | 0.89           | -     | 4.79  | 0.56  |
| $Y_3$            | 0.21             | -              | 3.43             | 1.00           | -     | 7.15  | 0.75  |
4.3.3 Testing for Statistical Significance

The above results can be tested for the significance of $\lambda$, $\beta$ and $\rho^2$. First let us consider setting confidence limits for $R^2$, the sample coefficient of determination to find out whether it is in fact the population coefficient of determination $\rho^2$ at 95% confidence. $R^2_{.95}(d.f., n-2)$ for the manufacturing industries sample is 0.43 and for all industries sample is 0.35. This indicates that $R^2$'s in the six equations are significantly different from zero.

Now consider the confidence limits for $\lambda$. In this case for $\lambda$ to be significantly greater than zero at 95% confidence, the t values should be greater than 2.12 for the first set of equations where $N-2$ is 16 and 2.07 for the second set of equations where $N-2$ is 23. Using these values, $\lambda$ for the first five equations is significantly greater than zero.

In order to test for $\beta$, the t values given in the t tables cannot be used directly because they are based on the null hypothesis that $\beta = 0$, while this study hypothesizes that $\beta = 1$. The t statistic can be computed by using the following formula:

$$t = \frac{\hat{\beta} - \beta}{\sqrt{\frac{S^2}{\sum X_i^2}}} \quad \text{(4.9)}$$

\( \hat{\beta} \) is the estimated value of the coefficient and the denominator is the standard error of the coefficient. \( \beta \) in this case is one. Hence using these values, a t statistic can be computed for each \( \beta \) in the two equations. Then referring to the t tables, if the t values are less than 2.12 and 2.07 respectively, the assertion that \( \beta \) is not significantly different from one would be supported. The results indicate that \( \beta \) is not significantly different from one for the six equations.

Now consider the assumptions regarding the error term mentioned in section 2.3.1. The plots for the residuals indicate that they are approximately normally distributed and there is hardly any sign of heteroscedasticity.

Reuber and Roseman [12] tested the hypotheses only with the help of 18 manufacturing industries and used only \( Y_2 \) and \( Y_3 \) ratios. Their results, reported in table 4.1 also indicated \( \alpha \) to be significantly greater than zero and \( \beta \) not significantly different from one. It should be noted that there are many similarities between their results and the results obtained in this study. However, the fact that the proxies for the independent variable were dissimilar makes it a little difficult to undertake comparisons.

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4.3.4 The Summary of the Findings

In the six equations tested above, the cross-sectional model measures industry advantages by $\beta$. Foreign to total control in an industry is used as an index of industry advantages enjoyed by foreign entrepreneurs. The greater the advantage in an industry, the more the foreign take-overs in the industry. Since $\beta$ is not significantly different from 1, it is an indication that foreign entrepreneurs enjoy industry advantages in Canada in proportion to their existing control in different Canadian industries.

The cross-sectional model also measures the common advantage by introducing the parameter $\alpha$. Since $\alpha$ is significantly greater than zero, it is an indication that the common advantage to foreign entrepreneurs in Canada existed during the period 1962-73 and has led to gradual increase in foreign control in all industries.

The cross-sectional study conducted on the lines explained above was necessary to find whether some industries offer a special advantage and all industries offer a common advantage to foreign entrepreneurs. Reuber and Roseman\textsuperscript{13} found that the two types of advantages, called the industry and common advantages respectively in this study, did exist during the period 1945-61 and this study supports their assertions for the period 1962-73.

\textsuperscript{13} Reuber and Roseman, 1969, op. cit., p.112.
However the results obtained by this study are stronger than those obtained by Reuber and Roseman, partly because this study considered control at the beginning of the period as an explanatory variable compared to control at the end of the period used by Reuber and Roseman. Moreover this study also considered $Y_1$, the ratio not considered by Reuber and Roseman and found significant statistical results. It also considered non-manufacturing industries and obtained significant results.

The chapter reaffirms certain beliefs. First, the existing foreign relative to total control in an industry can be used as an index of the future foreign relative to total take-overs in the industry. Second, in a given industry both foreign and domestic entrepreneurs in Canada have the same propensity to take-over other firms. Third, all foreign entrepreneurs possess the advantage that is common to all industries.

A consistent development of the conceptual framework in chapters two, three and four has encouraged the author to apply it to micro data in chapter five that tests the distinguishing financial characteristics of domestic taken-over, foreign taken-over and non-taken-over firms.
CHAPTER 5

THE FINANCIAL CHARACTERISTICS OF TAKEN-OVER FIRMS

5.1 Development of Research Hypotheses

5.1.1 Introduction

The results obtained in chapter two indicate that domestic take-overs respond to the levels of certain economic variables. The same economic variables, it was found in chapter three, affect foreign take-overs. The results of the cross-sectional study in chapter four indicate that foreign relative to total take-overs in an industry during a period, can be explained by foreign relative to total control in the industry at the beginning of the period.

This chapter considers three categories of firms: non-taken-over, domestic taken-over and foreign taken-over and attempts to achieve three basic objectives. First, it statistically tests the assertions made in the literature regarding the financial characteristics of the three types of firms. 'Financial characteristics', for the purpose of this study, are defined as the standardized items of reported accounting information obtained from financial records of the firm. Second, it explores whether firms belonging to any one of the above categories can be distinguished from firms belonging to any other category on the basis of their financial characteristics. Third, it endeavours to apply the conceptual frame-
work developed earlier and tested for macro and cross-sectional data to micro data.

The financial characteristics used in this chapter were chosen after considering the importance of such characteristics for a take-over decision, existing empirical studies in the area and availability of the data. The results obtained in this chapter indicate that the three categories of firms mentioned above emanate from the same population. Hence the difference between the means of those characteristics are not statistically significant enough to distinguish between the firms belonging to any two of the three categories. The implications of the results are explained in the sixth chapter.

5.1.2 Review of Previous Work

A study by Simkowitz and Monroe\(^1\) considered the financial characteristics of 46 firms taken-over in the U.S. during the period from April 1 to December 31, 1968. They contended that a profile of financial characteristics could provide a basis for identifying the prospective taken-over from non-taken-over firms. They considered 24 financial data items of measurement to get six variables designed to provide quantitative measures for the firm's

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growth, size, profitability, leverage, dividend policy and liquidity. They used stepwise multiple discriminant analysis to distinguish taken-over from non-taken-over firms. They concluded that the taken-over firms were smaller and had lower price-earnings, dividend payout and equity growth ratios.

Stevens\(^2\), selected 20 items of financial measurement and using factor analysis combined them into four factors representing leverage, profitability, activity and liquidity. He used these factors in a multiple discriminant model to classify a sample of firms taken-over in that year. On the basis of his results, he concluded that the financial characteristics alone provide a means by which the taken-over firms can be separated from the non-taken-over firms.

While the Steven's study analyzed the financial characteristics of the U. S. firms, a study by Singh concentrated its attention on the U. K. firms. Singh considered 67 items of standardized accounting information to obtain ten measures of seven variables representing profitability, dividend payout, liquidity, size, stock growth and valuation ratio. His sample was drawn from firms taken-over during two time periods: 1955-58 and 1959-60. With the help of the multiple discriminant

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analysis, he considered a few of the above variables at a time, to find out whether they could distinguish taken-over from non-taken-over firms. However he concluded: "When taken-over and non-taken-over firms are compared on the basis of their multiple characteristics, for most sets of data it is not possible to reject the hypothesis (at the 5% level of significance) that the two groups of firms emanate from the same population." 3

A study by Fogelberg conducted on the same lines as above, tested the financial characteristics of taken-over firms drawn from a sample of firms that were listed on the New Zealand Stock Exchange before their take-over. He selected eight factors covering profitability, liquidity, trend in profits, trend and stability in profit distribution, external expectations, variability in earnings and trend and stability in financial structure. His data covered the period from 1965 to 1972 inclusive. He observed: "The conclusion that must be reached from this study is that it is not possible to use financial aspects alone to differentiate between companies likely to be taken-over and those not likely to be taken-over. The study has shown, quite strongly, that the two types of companies do not have significantly different profiles." 4

The above studies indicate that the attempts to distinguish between taken-over and non-taken-over firms based on the data for one year or less gave significant results. However the studies that covered a period longer than one year, have not succeeded in identifying financial characteristics of firms in order to predict their vulnerability to take-overs. It may be noted that none of the abovementioned studies looked at both, one year data and data pooled over a number of years.

Reuber and Roseman\(^5\) compared the financial characteristics of domestic with foreign taken-over firms. However their comparison was based on averages. They did not use the technique of hypotheses testing either with the help of univariate or multivariate technique. The present study attempts to do this with both the univariate and multivariate techniques.

The present chapter uses the Canadian data from 1962 to 1973 inclusive, pertaining to taken-over firms in order to distinguish between non-taken-over and taken-over, either domestic or foreign as well as between domestic and foreign taken-over firms. Moreover it also tests the discriminating power of financial characteristics based on data for a one year period, 1968. The purpose of this chapter is to test some commonly held beliefs regarding financial characteristics of taken-over, both domestic and foreign firms.

\(^5\) Reuber and Roseman, op. cit., pp. 43-72.
5.1.3 Conceptual Framework for Financial Characteristics

If the present value of a firm as perceived by an entrepreneur is greater than the present value of the firm perceived by its management, there would be a take-over. If this difference in perception is affected by financial characteristics of the taken-over firm, it would be possible to distinguish between the firms belonging to any two of the three categories: non-taken-over, domestic taken-over and foreign taken-over.

If the financial characteristics affect the two theoretical variables, the marginal cost of capital (k) and the anticipated net cash flows (c), it can be argued that they would change the entrepreneurial perception of \( PV_{db} \) and would result in a take-over. This particular aspect is tested in the domestic hypothesis (H\(_{4a}\)) that classifies firms as domestic taken-over and non-taken-over firms.

If the foreign entrepreneur, because of the advantages enjoyed by him, experiences a low \( k \) and a high \( c \), he would be willing to take-over a firm from which he can derive the most benefit because of these two factors. The foreign hypothesis (H\(_{4b}\)) stipulates that such a firm can be distinguished from other firms on the basis of their financial characteristics. Hence the hypothesis classifies firms as foreign taken-over and non-taken-over.
In the relative hypotheses \( H_4_c \) it is postulated that financial characteristics of the taken-over firm affect \( k \) and \( c \) and thereby the entrepreneurial perception of both \( PV_{db} \) and \( PV_{fb} \). If the perception of both the domestic and foreign entrepreneurs is affected by the financial characteristics, it would be possible to segregate the targets of domestic from foreign take-overs. Hypothesis \( H_4_c \), therefore, classifies firms as foreign and domestic take-overs.

The models described above are illustrated in figure 5.1 and the financial characteristics are discussed in detail in the succeeding five sections.
FIGURE 5.1
MODEL FOR FINANCIAL CHARACTERISTICS OF TAKEN-OVER FIRMS

Type of Take-Over:

Basic Conditions:

Theoretical Variables:

Financial Characteristics:

Proxies:

Signs:

Type of Model:

Classification:
5.2 The Financial Characteristics

5.2.1 Liquidity

If buyers in general have greater access to external funds at a lower cost than sellers of a firm, valuation gaps widen and take-overs occur. Hence a firm that is in need of funds to finance its working capital requirements is likely to be a take-over target. The buyer, after take-over, expects to bring additional funds into the firm, improve its liquidity position and thereby enjoy a lower cost of capital and a higher $PV_{db}$.

Gray has pointed out that "the need for liquid capital, either for expansion or inheritance tax" is an important reason for a foreign take-over. The foreign entrepreneur may have better access to funds and derive greater benefits from them than the domestic entrepreneur. Hence we can expect that given two firms belonging to the same industry and more or less of the same size, the firm with low liquidity is likely to be taken-over and more likely, the take-over would be a foreign take-over.

The empirical results as has been pointed out earlier give mixed results. While Stevens as well as Simkowitz and Monroe found that liquidity helped explain domestic take-overs, Singh and Fogelberg found it had very little discriminating power.

5.2.2 Leverage

A high degree of leverage in the capital structure makes it difficult for the firm to obtain additional external financing at a lower cost. Therefore, the marginal cost of capital for the firm is high. Hence another firm that can provide additional financing would be interested in taking over the highly levered firm. An entrepreneur who can inject more equity into the firm and cover the leverage, reduces the cost of capital. This would enable him to perceive a higher $PV_{db}$ than $PV_{s}$.

The Gray report indicated that one of the sources of financing for foreign controlled firms is "new direct investment from abroad."\(^7\) This, in addition to the ability of foreign entrepreneurs to raise capital in Canada would enable them to improve upon the leverage positions of taken-over firms. Hence, given two firms belonging to the same industry and more or less of the same size, the firm with more leverage in the capital structure would be a target for take-over and more so by foreign entrepreneurs.

Leverage was used by Stevens as well as Simkowitz and Monroe in their study. They found that the variable was important in explaining domestic take-overs.

\(^7\) Gray, op. cit., p. 24.
5.2.3 Payout

A high payout ratio indicates that either owners of the firm have a preference for current income over capital gains or the firm does not have productive opportunities for the purpose of investing the funds paid as dividends. This would reduce the growth rate of the firm. A growth oriented entrepreneur may have a preference for capital gains and be able to identify productive opportunities. Hence $P_{\text{db}}$ can be expected to be greater than $P_{\text{vs}}$.

The Gray report points out that the internal cash flow is one of the important sources of capital for foreign controlled firms in Canada. If this is true, a foreign entrepreneur who has greater preference for capital gains over current income and can identify growth opportunities and wants to exploit the advantages enjoyed by him would be interested in a firm that has a higher payout.

Given two firms belonging to the same industry and more or less of the same size, the firm with a higher payout would attract some domestic as well as foreign entrepreneurs. However it should be noted that a higher payout ratio in some cases may cause shortage of working capital thereby also invite take-over bids. Simkowitz and Monroe found that the taken-over firms had lower dividend payout. The inadequacy of cash for working capital as well as for distribution of dividends to shareholders may lead to take-over bids.

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5.2.4 Activity

Activity is a measure of efficiency with which the firm utilizes its resources in order to generate output. Hence given two firms belonging to the same industry and more or less of the same size, the firm with the greater activity would be more visible to another entrepreneur for two important reasons. First, he may consider this as an indication of a high demand for the firm's products. Second, he may think that the firm is operating at or near full capacity. Hence he may conclude that by contributing additional resources, he can increase the output, meet the potential demand and thereby increase the anticipated net cash flows. Hence $PV_{db}$ for him would be greater than $PV_s$.

In case of a foreign entrepreneur who has better access to the markets for raw materials, controls the markets for finished goods and can obtain the necessary funds at a lower cost, expansion of the firm with high activity would be possible. Hence $PV_{fb}$ would be greater than both $PV_{db}$ and $PV_s$.

The greater the activity, the greater would be the possibility of a take-over. Steven's measure of activity, sales divided by assets, indicated very little group difference but still contributed to the multivariate profile that differentiated the taken-over from non-taken-over firms.
5.2.5 Profitability

An entrepreneur may be attracted to a more profitable firm because by investing his funds in such a firm he expects to increase the rate of return for himself. Moreover by contributing better management, technology and access to markets for finished goods, he expects higher $R$ than the one expected by the entrepreneur who manages the firm. Hence $PV_{db}$ would be greater than $PV_s$.

If the foreign entrepreneur possesses the advantages, his costs with reference to a take-over target, would be even more than that of the domestic entrepreneur. This would make $PV_{fb}$ greater than $PV_{db}$. Hence given two firms belonging to the same industry and more or less of the same size, a more profitable firm would be more attractive to other entrepreneurs from the standpoint of take-over, and more so for foreign entrepreneurs.

Steven's profitability measure ranked second in his model while Singh's and Fogelberg's measures for profitability did not contribute significantly to the discriminating power of the function.

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9. This assertion is based on the findings of Reuber and Roseman, 1969, op. cit., p. 65. They found that there was a substantial difference in profit rates of taking-over and taken-over firms, but domestic and foreign taken-over firms did not differ significantly from each other.
5.3 Multiple Discriminant Analysis

5.3.1 The Availability of Data

For the purpose of this chapter, the merger register, described in detail in section 2.3.1, served as a starting point for the collection of the data. Intensive efforts were made to obtain financial data pertaining to the taken-over firms listed in the register. The Financial Post data cards, the FRI data bank, the annual reports of various companies and Can Fil and Bell and Howell microfilms were the major sources of information. All these sources provided information regarding 116 foreign and 167 domestic taken-over firms.

After obtaining the above sample, non-taken-over firms were chosen to match the foreign taken-over firms. The non-taken-over firms were matched by two digit industry classification, the year of take-over and the nearest asset size. This was necessary because the financial characteristics may differ between industries and between very large and small firms in the same industry. 65 non-taken-over firms were found to match the 65 foreign take-overs. These firms then were compared to the domestic taken-over firms and out of the sample of 167, only 55 domestic taken-over firms could be obtained that matched 55 foreign taken-over and 55 non-taken-over firms according to the three criteria. Thus the total sample size was 165 for the present study. However for finding
the coefficients by using the multiple discriminant analysis. 44 firms were chosen from each group at random. The remaining 11 cases from each sample were included in the third group for each run for finding the possibility of misclassification.

The above sample size compares favourably with other major studies in the area. The Altman\textsuperscript{10} study considered a sample of 66, 33 in each of the two groups of bankrupt and non-bankrupt firms. His source of data was financial statements and the sample selection was based on a stratification by industry and asset size. The Stevens\textsuperscript{11} sample consisted of 80 firms, 40 in each of the two groups of acquired and not acquired firms. His 40 acquired firms were selected from 69 due to data availability. He obtained his data from the Federal Trade Commission in the U.S. The Moody's Industrials were used for financial characteristics. The Singh\textsuperscript{12} study had a sample that varied between different tests. However the maximum size was 176. His sources of data were the Board of Trade for accounting data and Moody's cards (U.K.) for market data. He identified the names of firms and the dates of their take-over from the Board's files on acquisitions.

\textsuperscript{11} Stevens, op. cit.
\textsuperscript{12} Singh, op. cit.
He matched each taken-over firm with the non-taken-over firm nearest to it in assets in the same industry at the last accounting date before the take-over. The Fogelberg\textsuperscript{13} study had a sample size of 86. Out of these, 43 firms for the non-taken-over group were selected by identifying and matching each of the companies, the taken-over firms from the same industry group and with a similar asset size. The data were obtained from the New Zealand Stock Exchange.

5.3.2 The Three Discriminant Hypotheses

The objective of a multiple discriminant analysis (MDA) is to classify objects, by a set of independent variables into one of two or more mutually exclusive and exhaustive categories. In these hypotheses the two categories are: 'domestic' or 'non-taken-over' (H₄ₐ), 'foreign' or 'non-taken-over' (H₄ₖ) and 'foreign' or 'domestic' (H₄ₗ). The three hypotheses can be stated as follows:

H₄ₐ: A DOMESTIC TAKEN-OVER FIRM CAN BE DISTINGUISHED FROM A NON-TAKEN-OVER FIRM ON THE BASIS OF LIQUIDITY, LEVERAGE, PAYOUT, ACTIVITY AND PROFITABILITY.

\textsuperscript{13} Fogelberg, op. cit.
H4b: A FOREIGN TAKEN-OVER FIRM CAN BE DISTINGUISHED FROM A NON-TAKEN-OVER FIRM ON THE BASIS OF LIQUIDITY, LEVERAGE, PAYOUT, ACTIVITY AND PROFITABILITY.

H4c: A FOREIGN TAKEN-OVER FIRM CAN BE DISTINGUISHED FROM A DOMESTIC TAKEN-OVER FIRM ON THE BASIS OF LIQUIDITY, LEVERAGE, PAYOUT, ACTIVITY AND PROFITABILITY.

The MDA reduces the multi-dimensional variable space into a single dimension. It gives a single function Z, called the discriminant function. Z is a linear combination of the various discriminating variables used in the model. The Z equation for the above three hypotheses can be stated as follows:

\[ Z_i = b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} \quad \ldots \quad (5.1) \]

Where:

- \( Z_i \) = Discriminant Score of \( i^{th} \) Observation
- \( X_1 \) = Liquidity of the Firm
- \( X_2 \) = Leverage of the Firm
- \( X_3 \) = Payout of the Firm
- \( X_4 \) = Activity of the Firm
- \( X_5 \) = Profitability of the Firm
- \( b_1, \ldots, b_5 \) = Discriminant coefficients

The following table gives the standardized items of financial information used for each company. The information relates to the financial data reported for the preceding financial year of the taken-over firm.
TABLE 5.1
Standardized Items of Financial Information

F1 = Net Sales
F2 = Earnings Before Interest, Taxes and Depreciation
F3 = Depreciation Expense
F4 = Interest Expense
F5 = Income Taxes Payable
F6 = Cash Dividends
F7 = Current Assets
F8 = Total Assets
F9 = Current Liabilities
F10 = Long Term Liabilities
F11 = Capital Stock
F12 = Retained Earnings

The liquidity measure used in this study was (F7 - F9)/F8. This was considered as a proxy for the liquidity because the numerator stands for the working capital representing the availability of short term assets and the denominator represents total assets that normalize the size effect of the numerator. The same measure was used by Stevens 14, Singh 15 and Fogelberg 16.

15. Singh, op. cit., p. 84
16. Fogelberg, op. cit., p. 16.
Stevens found that the taken-over firms were more liquid. However this characteristic was least important in group discrimination. Singh's results rank liquidity third in a group of five variables he considered for discriminating taken-over from non-taken-over firms. The Fogelberg study ranked liquidity as a second discriminator in the group of four variables he tested. Since lower liquidity as explained in section 5.2.1, indicates the possibility of a take-over, b1 is expected to have a negative sign.

The measure for leverage was \((F9 + F10)/F8\). This ratio indicates the proportion of total financing obtained by creating short as well as long term liabilities. The financial leverage measure in Steven's study was the most significant indicator in both the univariate and multivariate models. Singh's leverage measure, on the other hand, was not a particularly strong discriminating measure. In accordance with the conclusions of section 5.2.2 higher leverage increases the possibility of a take-over. Hence \(b2\) is expected to have a positive sign.

The proxy for the payout was \(F6/(F2 - F3 - F4 - F5)\). This represents the dividend as a proportion of current earnings available for distribution. Stevens used the

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same measure and found that it did not enter the discrimi-
minant function. Singh\textsuperscript{20} considered the retention ratio
and found that in the univariate analysis it was almost
always the best discriminator, but the impression was not
confirmed by the multivariate analysis. Fogelberg\textsuperscript{21}
introduced volatility and trend in the dividend rate as a
factor and found that it did not enter the final model.
The higher payout ratio according to section 5.2.3 would
attract take-overs. Hence $b_3$ is expected to have a
positive sign.

Activity was measured by the turnover of total assets
($F_1/F_8$). Stevens\textsuperscript{22} found that though activity indicated
very little group difference it did contribute to the
multivariate profile that differentiated the group. Both
Singh and Fogelberg did not use the measure in their final
model. Greater activity according to section 5.2.4 means
more take-overs. Hence $b_4$ would have a positive sign.

Profitability was represented by earnings before
interest and taxes (EBIT) divided by total assets:
$(F_2 - F_3)/F_8$. The reason for selecting this proxy was that
it is not influenced by the financing tax and size impli-
cations. Stevens\textsuperscript{23} measure of profitability was EBIT

\begin{thebibliography}{99}
\bibitem{Singh} Singh, \textit{op. cit.}, p. 154.
\bibitem{Fogelberg} Fogelberg, \textit{op. cit.}, p. 11.
\bibitem{Stevens} Stevens, \textit{op. cit.}, p. 154.
\bibitem{Stevens2} Stevens, \textit{Ibid.}, p. 154.
\end{thebibliography}
divided by sales. While the ratio ranked second in the contribution to the MDA model, the univariate test indicated no group differences. Singh's^24 measure of profitability was pre-tax profits as a percentage of total assets. He found that profitability was the best discriminator when all the variables were considered simultaneously. Fogelberg^25 considered net income after taxes divided by total assets as a measure of profitability. The results were not particularly significant though the variable did enter the final model that included three other variables. Higher profitability according to section 5.2.5 indicates possibility of a take-over. Hence \( b5 \) will have a positive sign.

5.3.3 The Requirements of MDA

In order to use MDA in the study it is necessary to find out whether the data obtained for empirical testing of the above three hypotheses meets certain basic requirements. These requirements can be outlined as follows:

First, in MDA the dependent variable is nominally scaled, e.g., 'good' or 'bad', 'bankrupt' or 'non-bankrupt',

'acceptable' or 'non-acceptable'. In the present analysis we are concerned with two categories at a time, namely, 'foreign' or 'domestic', 'foreign' or 'non-taken-over', 'domestic' or 'non-taken-over'. This satisfies the first condition of MDA.

Second, the discriminant variables that are hypothesized to affect the Z scores must be at least intervally scaled, i.e., it should be possible to assign numerical values with equal intervals to the variables. In the present study, therefore, it was necessary to operationalize the financial characteristics of foreign and domestic taken-over firms as well as non-taken-over firms by finding suitable proxys (already described in Table 5.1) for which numerical values were obtained.

Third, the user of MDA must have a priori defined groups. This is essential because the estimates of the coefficients of different values are based on the classification that is undertaken beforehand. In the present study we have a priori knowledge of the three groups already described above.

Since the above three basic conditions for using MDA in the present study are met, the use of MDA is justified.
5.3.4 The Advantages of MDA

MDA possesses certain advantages that are particularly useful for the present study. They can be listed as follows:

First, no numerical measurements for the dependent variable are required. As long as we have a priori knowledge of the classification procedure, it is sufficient to provide a basis for nominal scaling of the dependent variable. Hence the problem of searching for an appropriate proxy for the dependent variable is eliminated.

Second, given the discriminant variables, the MDA assigns coefficients such that an index, Z score, can be found to classify sample observations. The Z scores so found are useful in ranking the observations within the groups. This technique is useful for comparing observations within the groups.

Third, the coefficients obtained for each variable give an indication of the relative importance of the variable. This helps the user to rank them according to their importance for further study. It should be remembered that the results obtained by using t-tests under univariate assumptions for comparing importance of different variables differ significantly from the multivariate case. The reason is obvious. In the univariate case all variables, except the one under consideration, are held constant, while in a multivariate case the impact...
of all variables is considered simultaneously. This however adds to the usefulness of the multivariate technique.

Fourth, the technique has predictive capabilities. If the user believes that the conditions under which the coefficients of different predictor variables were obtained, still persist, the coefficients can be used in order to classify other observations. The predictibility of the estimate would, of course, depend on the cost of misclassification, the derivation of which is beyond the scope of the present study.

The advantages of the technique of MDA as described above appear to be adequate for the present study.

5.3.5 The Classification Procedure

The discriminant analysis gives us a single function (Z), called the discriminant function. Z, in the present study, is a linear combination of five or less independent discriminating variables. Once observations are recorded in terms of their Z scores, the next step is to divide them in two groups in such a way as to minimize the probability of misclassification.

The procedure for classifying observations in mutually exclusive and exhaustive groups can be described
as follows:

If \( Z_i > Z_c \), classify observations as belonging to Group I.

If \( Z_i < Z_c \), classify observations as belonging to Group II.

The classification boundary, \( Z_c \), is then the critical value of \( Z \) and is drawn in such a way that no \( Z_i \) is equal to \( Z_c \). In a two dimensional space, \( Z_c \) is a straight line. In a three dimensional space it is a two dimensional plane dividing the space in two parts. In \( n \) dimensional space it is \( n-1 \) dimensional hyperplane.

The value of \( n \) depends on the number of predictor variables used in the equation. In the present study where there are five independent variables, we would be considering a five dimensional space and a critical value of \( Z \) in four dimensional hyperplane.

The logic of the discriminant analysis and the formulae for computing the function are described in detail by Frank, Kuehn and Massy.\(^\text{26}\).

5.4 Development of Methodology and Results

5.4.1 Statistical Significance of the Results

The results for the domestic (H\textsubscript{A}), the foreign (H\textsubscript{B}), and the relative (H\textsubscript{C}) hypotheses with the two sets of data, 1962-73 and 1968 are summarized in Table 5.2.

**Table 5.2**

Results for the Discriminant Functions

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Liquidity</th>
<th>Leverage</th>
<th>Payout</th>
<th>Activity</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-73 Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H\textsubscript{A}</td>
<td>-0.17</td>
<td>0.38</td>
<td>0.40</td>
<td>-0.54*</td>
<td>0.15</td>
</tr>
<tr>
<td>H\textsubscript{B}</td>
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<td>0.07</td>
<td>0.56</td>
<td>0.53</td>
<td>-0.02*</td>
</tr>
<tr>
<td>H\textsubscript{C}</td>
<td>-0.50</td>
<td>-0.43*</td>
<td>0.15</td>
<td>0.14</td>
<td>-0.07*</td>
</tr>
</tbody>
</table>

| 1968 Sample |
| H\textsubscript{A} | -0.37 | 0.41 | 0.85 | 0.44 | 0.10 |
| H\textsubscript{B} | 0.43* | -0.06* | 0.67 | 0.64 | -0.32* |
| H\textsubscript{C} | 1.04* | -0.25* | -0.00* | -0.18* | -0.11* |

* Signs not as expected (See Figure 5.1).

In order to test the significance of the multivariate results, Mahalanobis $D^2$ statistic can be used. $D^2$ is a generalized distance between two groups where each group is characterized by the same set of $n$ variables. It is simply a multi-dimensional $t$ test for the statistical significance of the difference between one sample mean $\bar{X}_1$ and another sample mean $\bar{X}_2$. 
If $D^2$ is a generalized statistic under the assumption of normality, it would have a chi-square distribution with $m(k-1)$ degrees of freedom where $m$ is the number of variables and $k$ is the number of groups and $n$ is the sample size. The computational procedure for Mahalanobis $D^2$ statistic is as follows:

$$D^2 = (n_1 + n_2 - 2) \sum_{p=1}^{m} \sum_{q=1}^{m} (\bar{X}_{pq1} - \bar{X}_{pq2}) (\bar{X}_{q1} - \bar{X}_{q2}) \ldots \quad (5.2)$$

Rao\textsuperscript{27} suggests a method whereby the $D^2$ can be converted into an $F$ statistic for the purpose of testing. The following method can be used to obtain the $F$ statistic:

$$F(m, n_1+n_2-1-m) = \frac{n_1n_2(n_1+n_2-m-1)}{m(n_1+n_2)(n_1+n_2-2)} \cdot \frac{D^2}{\ldots} \quad (5.3)$$

The $F$ statistic can now be used to test the null hypotheses that the mean values are equal in both the groups. If they are rejected, the alternate hypotheses that they are not equal, can then be accepted.

The results of the $F$ tests are summarized in Table 5.3. They indicate that the three hypotheses tested with the sample of 88 firms indicate that the financial characteristics of the firms are not sufficiently significant to discriminate between either domestic and non-taken-over, foreign and non-taken-over or foreign and domestic

firms. Moreover, the one year sample does not improve the results. Further statistical analysis, therefore, does not include analysis of the results obtained from the 1968 data.

**TABLE 5.3**

Significance Tests for MDA

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>$D^2$</th>
<th>$F(d.f.)$</th>
<th>$F(0.95)$</th>
<th>$F(0.99)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I 1962-73 Sample:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H_{4a}$</td>
<td>0.22</td>
<td>0.94 (5,82)</td>
<td>2.34</td>
<td>3.28</td>
</tr>
<tr>
<td>$H_{4b}$</td>
<td>0.28</td>
<td>0.95 (5,82)</td>
<td>2.34</td>
<td>3.28</td>
</tr>
<tr>
<td>$H_{4c}$</td>
<td>0.07</td>
<td>0.30 (5,82)</td>
<td>2.34</td>
<td>3.28</td>
</tr>
<tr>
<td><strong>II 1968 Sample:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H_{4a}$</td>
<td>0.97</td>
<td>0.66 (5,12)</td>
<td>3.11</td>
<td>5.06</td>
</tr>
<tr>
<td>$H_{4b}$</td>
<td>1.13</td>
<td>0.76 (5,12)</td>
<td>3.11</td>
<td>5.06</td>
</tr>
<tr>
<td>$H_{4c}$</td>
<td>0.59</td>
<td>0.40 (5,12)</td>
<td>3.11</td>
<td>5.06</td>
</tr>
</tbody>
</table>

From the above results we can conclude that the financial characteristics alone cannot discriminate between the three categories of firms. Though the financial characteristics are not significant, it is necessary to ensure that the statistical validity of the model is not marred either by the problems of heteroscedasticity or the normality of the Z distribution. This is to make certain that the MDA as used here was an appropriate technique.
5.4.2 Homogeneity of Variance

After obtaining Z scores, it is necessary to verify whether Z distributions obtained for each of the two groups meet the conditions of homogeneity and normality. This section considers the homogeneity condition which stipulates that the variances of Z obtained for each group are equal.

In order to test for homogeneity Hartlay's test described by Ferguson was used. The procedure for calculating the $F_{\text{max}}$ statistic can be explained as follows:

$$F_{\text{max}} = \frac{S^2_{\text{largest}}}{S^2_{\text{smallest}}} \quad \ldots \ldots \quad (5.4)$$

where $S^2$ is the variance of the specified group. The degrees of freedom are $(n_a - 1)$ for the numerator and $(n_b - 1)$ for the denominator. Where $n_a$ is the number of observations in the largest group and $n_b$ is the number of observations in the smallest group.

If $F_{\text{max}} \leq F_{0.95}$, the null hypothesis that the variability in the two groups is the same (homoscedasticity) will be accepted and the alternate hypothesis that the two groups have different variances (heteroscedasticity) will be rejected. Table 5.4 summarizes $F_{\text{max}}$ for the three hypotheses.

TABLE 5.4
Test Results for Homogeneity

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>$S_a^2$</th>
<th>$S_b^2$</th>
<th>$F_{max}$</th>
<th>$F(0.95)$</th>
<th>$F(0.99)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_{4a}$</td>
<td>0.00003</td>
<td>0.00003</td>
<td>1.0(43,43)</td>
<td>1.69</td>
<td>2.11</td>
</tr>
<tr>
<td>$H_{4b}$</td>
<td>0.00004</td>
<td>0.00002</td>
<td>2.0(43,43)</td>
<td>*</td>
<td>1.69</td>
</tr>
<tr>
<td>$H_{4c}$</td>
<td>0.00001</td>
<td>0.00001</td>
<td>1.0(43,43)</td>
<td>1.69</td>
<td>2.11</td>
</tr>
</tbody>
</table>

* Rejected at 0.95 level only.

Note that the results indicate that at 0.99 level of significance, the null hypothesis that group 1 and 2 have the same variances is accepted. This indicates that the use of MDA was an appropriate choice for finding the multivariate discriminant power of the various financial characteristics.

5.4.3 Normality of Z Distribution

After having tested the significance of the discriminant function and the homogeneity between the two Z distributions in each group, the next step is to ascertain whether the distributions of observations in each group are multi-normal. This means that the Z scores obtained for each sample group are normally distributed. The
goodness of fit test described by Ferguson\textsuperscript{29} is recommended for this purpose.

The goodness of fit test computes $\chi^2$ distribution as follows:

$$\chi^2 (i - 3) = \frac{(O - E)^2}{E} \quad \ldots \ldots \quad (5.5)$$

Where

- $i$ = The Number of Intervals
- $O$ = The Observed Frequency of the Interval
- $E$ = The Expected or Theoretical Frequency of the Interval

Note that the intervals are formed around the expected values and the expected frequency of the interval is obtained by using normal standard deviate tables. The loss of three degrees of freedom for the $\chi^2$ distributions results because the observed and expected distributions are made to agree with the sample size of the group ($N$), expected value ($\bar{X}$) and standard deviation ($S$).

If $\chi^2 (i-3) (0.95 \text{ or } 0.99) < \frac{(O - E)^2}{E}$, we conclude that the distribution is normal. If this hypothesis is rejected it would mean that the distribution of $Z$ is normal. Table 5.5 gives the computed values for both the groups in all the three tests.

\textsuperscript{29} Ibid., pp. 194-200.
### TABLE 5.5

**Goodness of Fit Tests**

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Group I ($\chi^2$)</th>
<th>Group II ($\chi^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_{4a}$</td>
<td>4.75</td>
<td>4.18</td>
</tr>
<tr>
<td>$H_{4b}$</td>
<td>3.38</td>
<td>5.60</td>
</tr>
<tr>
<td>$H_{4c}$</td>
<td>5.12</td>
<td>0.66</td>
</tr>
</tbody>
</table>

The computations contained in Table 5.5 are obtained by considering eight intervals for each group. Hence the degrees of freedom are ($8 - 3 = 5$). At 5 degrees of freedom $\chi^2$ distribution at 5% and 1% confidence level gives theoretical values of 11.07 and 15.09 respectively. At these values we get acceptable results for all the groups. Hence we can conclude that the normality test is satisfied by all the models tested in this section.

#### 5.4.4 Univariate Ranking of Variables

The univariate test for finding the contributions of discriminating variables is obtained from SPSS. This is an F test formulated to test the null hypothesis that the coefficients of the $j$th discriminant variable $b_j$ is not

---

significantly different from zero. If the null hypothesis is rejected, we can conclude that the coefficient is significantly different from zero. The F value can give us the indication regarding the level of significance of the variable under univariate circumstances.

Table 5.6 shows the results for each variable in all the three tests. It gives the F values as well as the actual level of confidence for the variable and its ranking within the model.

The results contained in Table 5.6 indicate that under univariate setting none of the variables is significant at either 95% (F = 4.00) or 99% (F = 7.08) level of confidence. This supports the results already explained under section 5.4.1 that the financial characteristics are not sufficient for distinguishing either domestic from non-taken-over, foreign from non-taken-over or foreign from domestic taken-over firms.

The results, however, provide a basis for making other interesting observations by ranking the variables. Consider now the ranking of each of the variables. First, liquidity ranks at the top for distinguishing foreign from domestic taken-over firm, but not so for distinguishing a taken-over from a non-taken-over firm. Second, ranking of leverage is fairly uniform in all the three models tested above. It neither ranks first nor last for any of the three models. Third, payout is fairly low in overall ranking, though
### TABLE 5.6

Univariate Test Results for Discriminant Variables

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Liquidity</th>
<th>Leverage</th>
<th>Payout</th>
<th>Activity</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Domestic Vs. Non-Taken-Over (H4a)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F(1, 86)$</td>
<td>0.3355</td>
<td>1.1613</td>
<td>1.1429</td>
<td>3.2531</td>
<td>0.0508</td>
</tr>
<tr>
<td>% Level of Significance</td>
<td>41.226</td>
<td>69.693</td>
<td>69.176</td>
<td>91.914</td>
<td>16.070</td>
</tr>
<tr>
<td>Univariate Ranking</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>II. Foreign Vs. Non-Taken-Over (H4b)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F(1, 86)$</td>
<td>0.0081</td>
<td>0.2098</td>
<td>1.6540</td>
<td>2.4347</td>
<td>0.0166</td>
</tr>
<tr>
<td>% Level of Significance</td>
<td>6.708</td>
<td>32.507</td>
<td>78.167</td>
<td>86.299</td>
<td>10.000</td>
</tr>
<tr>
<td>Univariate Ranking</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>III. Foreign Vs. Domestic Taken-Over (H4c)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F(1, 86)$</td>
<td>0.4450</td>
<td>0.3694</td>
<td>0.0221</td>
<td>0.2190</td>
<td>0.0766</td>
</tr>
<tr>
<td>% Level of Significance</td>
<td>48.886</td>
<td>42.142</td>
<td>11.064</td>
<td>33.148</td>
<td>20.570</td>
</tr>
<tr>
<td>Univariate Ranking</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

| Rank Total                                      | 10        | 7        | 10      | 5        | 13            |
| Overall Rank                                    | 3         | 2        | 3       | 1        | 5             |
it is the second contributor in distinguishing foreign from non-taken-over firms. Fourth, activity is the most important financial characteristic for distinguishing a taken-over firm, whether domestic or foreign from a non-taken-over firm. However it does not discriminate between a domestic and a foreign taken-over firm. Fifth, profitability ranks the lowest among the five variables, indicating that historical profitability is the least important of all the five financial characteristics.

5.4.5 Multivariate Ranking of Variables

The conclusions reached in the preceding section need to be verified under a multivariate setting because all the relationships undergo considerable change in the multivariate analysis that considers the effects of different variables and their interactions on a simultaneous basis.

The technique of computing the relative contribution of each variable to the discriminant power of the function is explained by Cooly and Lohnes. In order to obtain a scaled vector that can be used for ranking purposes, it is


32. This method is used if the output from BMD04M programme is available. However the scaled vector used in Table 5.6 is directly obtained from SPSS vector called the standardized discriminant function coefficients.
## TABLE 5.7

Multivariate Test Results for Discriminant Variables

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Liquidity</th>
<th>Leverage</th>
<th>Payout</th>
<th>Activity</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Domestic Vs. Non-Taken-Over ((H_4a))</strong>:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scaled Vector</td>
<td>0.17016</td>
<td>0.38242</td>
<td>0.39698</td>
<td>0.54137</td>
<td>0.14501</td>
</tr>
<tr>
<td>Multivariate Ranking</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>II. Foreign Vs. Non-Taken-Over ((H_4b))</strong>:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scaled Vector</td>
<td>0.32599</td>
<td>0.07125</td>
<td>0.55582</td>
<td>0.53170</td>
<td>0.02384</td>
</tr>
<tr>
<td>Multivariate Ranking</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>III. Foreign Vs. Domestic Taken-Over ((H_4c))</strong>:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scaled Vector</td>
<td>0.49701</td>
<td>0.43063</td>
<td>0.15884</td>
<td>0.13940</td>
<td>0.06897</td>
</tr>
<tr>
<td>Multivariate Ranking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Rank Total</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Overall Rank</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>
Hence if the propensity of foreign entrepreneurs in an industry is equal to that of the domestic ones, \( \beta \) will be equal to unity in that industry.

4.2.2 The Common Advantage

The common advantage, as stated earlier, is the advantage possessed by foreign entrepreneurs and is evident across the board for all the domestic industries. It can, therefore, be argued that if the foreign entrepreneur has a common advantage over his domestic counterparts in all the industries, take-overs in various industries would increase over and above those caused because of the industry advantage.

Hence when the ratio of foreign to total control is used to explain the ratio of foreign to total take-overs in an industry, the common advantage would be represented by a constant in the equation:

\[
\frac{FT_i}{FT_i + DT_i} = \lambda + \frac{FC_i}{FC_i + DC_i} \quad \ldots \ldots \ldots \ldots \ldots (4.7)
\]

Where:

- All the symbols represent the same variables as those used in equation (4.6).

It is postulated that the common advantage does exist and works to the advantage of the foreign entrepreneurs. Hence \( \lambda \) is expected to be significantly greater than zero.
necessary to obtain the standard deviation of each parameter estimate. This is done by taking the appropriate diagonal element in the sum of products of deviations from means matrix, dividing it by the degrees of freedom (N - 2) and then taking its square root. When the standard deviation so obtained is multiplied by the coefficient, the appropriate element in the scaled vector is obtained. This vector gives the relative discriminant power of each variable under multivariate setting and thereby facilitates ranking of variables on the basis of their contribution to the discriminant function. Table 5.7 computes the scaled vector, in order to rank the variables within each of the three tests.

The overall rank order indicates that payout, activity, liquidity, leverage and profitability are important in multivariate analysis in that order.
necessary to obtain the standard deviation of each parameter estimate. This is done by taking the appropriate diagonal element in the sum of products of deviations from means matrix, dividing it by the degrees of freedom \((N - 2)\) and then taking its square root. When the standard deviation so obtained is multiplied by the coefficient, the appropriate element in the scaled vector is obtained. This vector gives the relative discriminant power of each variable under multivariate setting and thereby facilitates ranking of variables on the basis of their contribution to the discriminant function. Table 5.7 computes the scaled vector, in order to rank the variables within each of the three tests.

The overall rank order indicates that payout, activity, liquidity, leverage and profitability are important in multivariate analysis in that order.
necessary to obtain the standard deviation of each parameter estimate. This is done by taking the appropriate diagonal element in the sum of products of deviations from means matrix, dividing it by the degrees of freedom \((N - 2)\) and then taking its square root. When the standard deviation so obtained is multiplied by the coefficient, the appropriate element in the scaled vector is obtained. This vector gives the relative discriminant power of each variable under multivariate setting and thereby facilitates ranking of variables on the basis of their contribution to the discriminant function. Table 5.7 computes the scaled vector, in order to rank the variables within each of the three tests.

The overall rank order indicates that payout, activity, liquidity, leverage and profitability are important in multivariate analysis in that order.
5.4.6 The Summary of the Findings

The results indicate that financial characteristics of the taken-over firm considered in this study distinguish between neither domestic and non-taken-over, foreign and non-taken-over nor foreign and domestic taken-over firms. Their ranking in the multivariate setting puts payout variable first which is followed by activity, liquidity, leverage and profitability in that order.

The belief held by the Gray report that the foreign entrepreneurs are attracted by higher payout ratios is not supported by the results. Stevens' assertion that the greater the activity, the greater the possibility of take-over was also found without statistical support. The statement by Gray that the need for liquidity is an important reason for take-over was found empirically significant by Stevens, as well as Simkowitz and Monroe, but not by Singh and Fogelberg. The results of this chapter did not find statistical significance for the liquidity variable. Similarly leverage as asserted by Gray and found significant by Stevens as well as Simkowitz and Monroe was not statistically significant in this study. The belief held by Reuber and Roseman and empirically supported by Stevens, but not Singh and Fogelberg that profitability is an important variable was not supported by the findings of this chapter.
The results, in summary, suggest that it is not possible to locate take-over targets, either domestic or foreign by using financial characteristics as suggested by some writers. It is possible that the pre-take-over measurements of these variables are not useful in discriminating between either domestic and non-taken-over, foreign and non-taken-over or domestic and foreign taken-over firms.

Though the validity of the conceptual framework that was tested with macro and cross-sectional data was not supported by the results, it can be argued that the buyer is more interested in the expected levels of these variables and these expectations affect the perceived PV of the taken-over firm. The historical accounting ratios, therefore are not adequate proxies for the expectations of entrepreneurs in take-over situations. The results do not disprove the conceptual frame-work, but only indicate that in order to apply it in the micro context more than historical information is required.
APPENDIX 5A

The Wilcoxon Test

The multiple discriminant analysis being a multivariate parametric approach, requires rigorous statistical assumptions. The Wilcoxon Test \(^{33}\) requires less rigorous assumptions and follows a univariate approach. It was used to compare each matched pair in the three samples, two taken at a time, to find whether any one or more ratios differed significantly between the three groups.

The results are summarized below where \(R_1\) considers comparison between domestic taken-over and non-taken-over, \(R_2\) represents foreign taken-over minus non-taken-over and \(R_3\) stands for foreign vs. domestic taken-over firms:

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Probability of Type I Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R_1)</td>
<td>0.5028</td>
</tr>
<tr>
<td>(R_2)</td>
<td>0.0574</td>
</tr>
<tr>
<td>(R_3)</td>
<td>0.0010(^*)</td>
</tr>
<tr>
<td>Liquidity</td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td></td>
</tr>
</tbody>
</table>

The above results confirm the results obtained by using the multiple discriminant analysis. However \(R_1\) and \(R_2\) for

---


\(^*\) Significant at \(\alpha = 0.05\) or less.
the activity ratio are statistically significant. This is in line with the univariate findings reported in Table 5.6 where activity ranked first for both these ratios.
CHAPTER 6

SUMMARY AND IMPLICATIONS OF THE RESULTS

6.1 Introduction

The purpose of this study, as stated earlier, was to find the determinants of the levels and targets of domestic take-overs, foreign take-overs and foreign relative to total take-overs in Canada for the period 1962 to 1973. This was done by developing a conceptual framework for the process of take-overs and conducting empirical tests consistent with this framework. The conceptual framework is summarized in section 6.2. The subsequent four sections summarize the results of the empirical tests and their implications.
6.2 The Process of Take-Over

Conceptual model building in the area of take-overs has seldom been attempted in the literature. Some authors have made assertions, but not tested them empirically. While others tested some empirical relationships, but never explained them in relation to a consistent framework. A few works that state theory and test relationships have weak logical links. For example, Gort attempted to develop the theory of economic disturbance. He asserted that economic disturbances cause random changes in expectations of individuals. However he does not provide any explanation why this would happen or a disturbance of lesser magnitude would cause less take-overs and vice versa. Reuber and Roseman recognize the importance of capital budgeting theory as a basis for take-over decisions. Yet they do not make any attempt to derive economic conditions that affect the entrepreneurial perception of PV and resort to the trial and error method to find the economic conditions.

This study considers various ideas in the literature and by pulling them together attempts to build a conceptual framework that logically explains how economic conditions affect take-over activity. The conceptual framework can be briefly summarized as follows:

A take-over, when viewed as a capital budgeting decision, means that the present value of the taken-over firm to the
management of the taking-over firm is larger than the present value to the management of the taken-over firm. Hence the taking-over firm is willing to pay more for the business than the taken-over firm feels it is worth. When there are two bidders, the one who bids the highest price gets the firm. If for some reason a foreigner is willing to pay more, it means that the present value of the firm is greater to him than to the domestic bidder.

The present value of the firm, according to the theory of capital budgeting, is determined by the two theoretical variables, marginal cost of capital (k) and anticipated net cash flows (c). In order to explain the levels of domestic take-overs and foreign take-overs, it was postulated that, domestic economic conditions, i.e., the availability of external credit and internal funds, together with economic expectations affect entrepreneurial perception of the theoretical variables. With a view to explaining the level of foreign relative to total take-overs on an industry to industry basis, it was postulated that common and industry advantages enjoyed by foreign entrepreneurs affect their perceptions of the two theoretical variables. In order to locate the target of domestic, foreign and domestic relative to foreign take-overs, it was postulated that financial characteristics of the taken-over firm often emphasized in the literature affect entrepreneurial perception of the two theoretical variables.
When the perception of the two theoretical variables is affected by either the economic conditions in the domestic country, the advantages enjoyed by foreign entrepreneurs or the financial characteristics of the taken-over firm, at different levels of these factors, entrepreneurs are expected to perceive different valuations for the taken-over firm. Since the two theoretical variables are ex-ante concepts, different entrepreneurs perceive different valuations for the same firm. The differences in valuations, often called 'valuation gap' in the literature, makes it possible for the buyer as well as the seller of the firm to gain from the transaction and a take-over occurs. If the buyer happens to be a foreign buyer, it would be a foreign take-over.

The conceptual model, in this study, was first developed for domestic take-overs. Empirical hypothesis was set up to test the statistical relationship between the level of domestic take-overs and three economic variables that were selected for their consistency with the model. The results were significant. Hence the model was applied to foreign take-overs. The results, again statistically significant, indicated that the same economic conditions affect domestic as well as foreign take-over activity. The model was further extended and applied to foreign relative to total take-overs on an industry to industry basis. The empirical test was set up where foreign relative to total take-overs were
expressed as a function of foreign relative to total control at the beginning of the period. The results were again significant and consistent with the conceptual model. They support the findings of Reuber and Roseman. The conceptual model was further extended to locate take-over targets. However the results obtained indicate that the targets cannot be located by using only the historical accounting data as proxies for financial characteristics.

In summary, the conceptual model, as developed in this study, rests mainly on the notion that valuation differences in entrepreneurial perceptions cause take-overs. The perceptions are affected by domestic economic conditions and the advantages enjoyed by foreign entrepreneurs relative to those enjoyed by their domestic counterparts. The model is illustrated in Figure 6.1.

At this stage, it should be recognized that the empirical hypotheses described above, though consistent with the conceptual model, do not test its validity. The results, though significant for the macro and cross-sectional data, need to be supplemented by further research in order to test all the logical links of the model and transform it into a viable theory of take-overs. Some areas where research is warranted can be listed as follows:

1. Is there a significant difference in the cost of capital faced by the foreign buyer, the domestic buyer and the seller? What are the causes of these differences, if any?
2. How do entrepreneurs, both Canadian and foreign, obtain external funds to take-over firms in Canada? Is there a significant difference between the methods used?

3. Is the seller financially more mobile than the buyer, so that he can obtain funds whenever he needs them either to meet a contingency or take-over other firms? Is the foreign buyer financially more mobile than the domestic buyer?

4. Is the buyer's forecast of anticipated net cash flows for the taken-over firm more optimistic and/or superior to that undertaken by the seller? The Westwick study has indicated, as pointed out earlier, the presence of the above phenomenon in Britain. A similar study in Canada may be useful for supporting the conceptual framework of this study.

5. What are the growth strategies of the foreign buyer, the domestic buyer and the seller? Do they differ significantly in relation to their ability to undertake planning and identify productive opportunities?

6. How does a particular economic condition have a differential impact on the valuations of the firm by different entrepreneurs? Why would there be the differences?

7. This study has postulated that domestic economic conditions, advantages enjoyed by foreign entrepreneurs and financial characteristics of the taken-over firm are the three factors that affect valuation gaps. Are there any other factors?
FIGURE 6.1

THE MODEL FOR TAKE-OVERS

Type of Take-Over:
- Domestic
- Relative
- Foreign

Basic Conditions:
- $PV_{db} > PV_{s}$
- $PV_{fb} > PV_{db}$
- $PV_{fb} > PV_{s}$

Theoretical Variables:
- $k$
- $c$

Entrepreneurial Perception:
- External Environment
- Internal Situation

Environmental Factors:
- Credit Effect
- Funds Effect
- Expectations Effect
- Industry Advantage
- Common Advantage

Economic Measures:
- Rate of Interest
- Corporate Cash Flow
- Stock Market Index
- Proportional Control
- Constant Factor

Expected Results:
- +
- -
- +
- $\rho = 1$
- $\alpha > 0$
6.3 The Level of Domestic Take-Overs

The empirical results of this study indicate that the level of domestic take-overs was positively related to the rate of interest and the stock market index and negatively related to corporate net cash flows during the period 1962 to 1973.

The relationship between domestic take-overs and the rate of interest, though significant in this study, was found insignificant by Reuber and Roseman, probably because they used a quarterly indicator of interest rates to explain yearly take-overs. The relationship between domestic take-overs and corporate net cash flows was consistent with the findings of Reuber and Roseman. However the present study used a better proxy for corporate net cash flows. The relationship between take-overs and stock market index, found significant in this study, has been used by many others for a variety of reasons and is the most popular economic variable in the literature that explains take-overs.

An important policy implication of the present results is that the decision-maker who is in a position to affect public policy regarding the above three variables should be aware of their effect on the domestic take-over activity in this country. Moreover to the extent that economic conditions can be forecasted, it would provide a basis for predicting future take-over activity. The more specific implications of economic variables in this study can be summarized as follows:
1. If public policy is aimed at reducing the level of interest rates, its impact on take-over activity should be considered.

2. The interest rate used in this study was a proxy for credit conditions. Hence during the periods of high interest rates, to control the level of take-over activity, low interest loans can be made available to firms that are vulnerable to take-overs, if they can be located.

3. Since the proxy for corporate net cash flows was computed after deducting taxes and dividing by total assets, an increase in cash flows can be brought about by reducing corporate taxes or increasing capital cost allowances. These measures would increase corporate net cash flows and thereby reduce domestic take-overs.

Further research as an extension of the present study can be undertaken to explore whether there are any other economic conditions, consistent with a conceptual model, that affect domestic take-over activity.
6.4 The Level of Foreign Take-Overs

The results of the present study indicate that the level of foreign take-overs was positively related to the levels of the Canadian rate of interest and the Canadian stock market index and negatively related to the corporate net cash flows in Canada during the period 1962 to 1973. The results are not only consistent with the conceptual framework of the study, but it has been shown, for the first time, that the same domestic economic variables affect the levels of both domestic and foreign take-overs in Canada. The Reuber and Roseman study explained foreign take-overs by selecting three variables that gave the best results. Only one of these three, the corporate net cash flows, was considered for this study with an improved proxy.

In addition to the effect of domestic economic conditions on the level of foreign take-overs, this study also explored the effect of the U.S. economic conditions on the U.S. take-overs of Canadian firms. There is some support to the notion, both in the literature and the findings of this study that economic conditions affect take-overs in the U.S. and encourage the U.S. buyer to buy Canadian firms. However the results for this version of the model were not as good as those for the domestication model.
The differential effect advocated by Levitt and Maule and to some extent tested by Reuber and Roseman indicates that foreign take-overs can be explained by the differences in economic variables in foreign and domestic countries. The results of the differential version of this model were not as good as those for the above two versions. However other differential proxies may prove more useful.

All the policy implications suggested in section 6.3 for reducing the level of domestic take-over activity would be applicable for reducing the level of foreign take-over activity in Canada, if that is the goal of the public policy. Further research, however, can be conducted on the following lines:

1. It can be explored whether there are any other economic conditions consistent with the conceptual model that affect the level of foreign take-overs.

2. It may be interesting to find out the impact of FIRA on foreign take-over activity after 1973. If the same economic conditions affect domestic take-over activity, but not the foreign take-over activity in Canada, this may provide a basis for the belief that FIRA has had some impact on foreign take-overs in Canada.
6.5 Foreign Relative to Total Take-Overs

The results indicate that the foreign relative to total control in an industry at the beginning of a period can explain the foreign relative to total take-overs in the industry for that period. The results of the linear regression obtained by using cross-sectional data gave a positive constant (\( \alpha \)) and a coefficient (\( \beta \)) that was equal to unity. These observations support the results obtained by Reuber and Roseman for a prior period. However, the present study used an improved proxy for control. Three different proxies were used for the relative take-overs, all of which have different implications.

First, consider the implications for positive \( \alpha \). It indicates that over the period under review foreign control in Canadian industries has increased. This can be attributed to the advantages enjoyed by foreign entrepreneurs that do not depend on industry characteristics. These were called 'common advantages' in this study.

Second, consider the implications for \( \beta \), where the dependent variable is foreign take-overs of firms in an industry where the taking-over firms also belong to the same industry. The proportionality between the control and the take-over variable in this case indicates that foreign and domestic entrepreneurs already located in a given industry in Canada have the same propensity to take-over firms in that industry.
Third, consider the implications for $\beta$ where the dependent variable is foreign taken-over firms in an industry. Here the proportionality indicates that the independent variable which is a proxy for the historical industry advantage attracts firms from outside and the proportion of foreign to total control of Canadian firms on an industry to industry basis is maintained over time.

Fourth, consider the implications for $\beta$ where the dependent variable is foreign taking-over firms in an industry. In this case the proportionality is an indication that historical industry advantage enables foreign firms to maintain their relative control of that industry.

The above discussion indicates an important policy consideration. Though foreign and domestic entrepreneurs have the same propensity to take-over other firms in Canada, foreign control increases because of the common advantage enjoyed by foreign entrepreneurs. If the objective of public policy is to reduce the foreign control over time, it would be necessary to reduce $\alpha$ as well as $\beta$. This can be done by establishing an agency that will determine the common advantage and perhaps investigate ways and means of making them available to take-over targets.

Further research regarding foreign relative to total take-overs can be conducted on the following lines:
1. What industry advantages have historically been enjoyed by foreign entrepreneurs in different Canadian industries? Do they still continue to enjoy those advantages?
2. What specific common advantages are enjoyed by foreign entrepreneurs in Canada? How can they be made available to their domestic counterparts.

3. A similar analysis for a period after 1973 can be conducted to find out whether the emergence of FIRA has in any way reduced the common advantage and the propensity of foreign buyers to take-over Canadian firms.
6.6 Locating Take-Over Targets

The results obtained in this study indicate that domestic taken-over, foreign taken-over and non-taken-over firms emanate from the same population and the historical accounting ratios representing liquidity, leverage, payout, activity and profitability cannot discriminate between the above three categories of firms.

The Fogelberg and Singh studies that used the New Zealand and the U.K. data also found that accounting ratios do not help to locate targets of take-overs. The Stevens study that used the U.S. data found that accounting ratios can help to locate targets of take-overs. However, his data was for only a one year period. It may be noted that the present study differs from the above studies because it tried to locate the targets of not only domestic, but also foreign and domestic relative to foreign take-overs in Canada.

The important implication of this study is that the pre-take-over measurements of the five variables were not useful in discriminating between the three categories of firms. Perhaps this is because the management of the taking-over firm is more interested in the expected levels of these variables and these expectations affect the entrepreneurial perception of the PV of the firm. Historical accounting ratios may not be adequate proxies for the expectations of entrepreneurs in take-over situations.
Further research in this area can be done by finding better proxies for the above five variables and adding non-accounting variables. The conceptual framework developed in this study can be used for this purpose. For example, the firms that do not undertake such activities as financial forecasting, investment in research may be the likely targets of take-overs.
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