RELATIONSHIP BETWEEN MARKET POWER, LEVERAGE AND SYSTEMATIC RISK: THE CANADIAN EVIDENCE

by

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ABSTRACT

A number of studies demonstrated a positive relationship between market power and firm profitability. Economic theory demonstrates that these high profits imply higher prices and restricted output and consequently inefficient resurce allocation.

Financial leverage, however, could be a possible alternative explanation for these profits. Market power may increase the ability of firms to support low cost debt capital and therefore the higher observed profitability could also be the result of greater financial leverage. This study then attempted to find empirical evidence to support the hypothesis that there is no significant difference between the financial structures of powerful firms and other less powerful firms. Leverage should increase risk because it represents a fixed obligation to the firm.

The method of study employed is the application of analysis of variance and regression analysis to a cross-sectional sample of Canadian industry during the period 1962 to 1969. This study represents a first attempt to apply a finance model viz. CAPM to a problem in industrial organization, viz.concentration.

The results indicate that powerful firms have relatively lower debt than other less powerful firms, thus rejecting the hypothesis. As a result of lower debt, powerful firms incur lower risk. The firm with market power apparently prefer low risk and a conservative capital structure.

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CHAPTER I

INTRODUCTION

A. Statement of Purpose

The purpose of this study is to consider evidence to support or refute the following null hypothesis and its alternative.

> H_0, Null Hypothesis: There is no significant difference between the financial structures of firms with great market power and those with less market power.
>
> H_1, Alternative Hypothesis: There is a significant difference between the financial structures of firms with great market power and those with less market power.

B. Background of the Study

The basic economic problem confronting any society is the allocation of scarce resources among competing human wants. Within the Canadian market forces, market power and public policy governs this economic allocation. Public policy pursues objectives which society as a whole deems desirable: the attainment of efficient production and thereby cost minimization, the attainment of reasonable prices and profits.

Efficient production has two aspects: allocative efficiency and productive efficiency.[1] At any moment in

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[1] Harvey Leibenstein, "Allocative Efficiency vs. X-Efficiency", American Economic Review, 56 (June 1966), pp. 392-416.

time, society possesses only a limited stock of productive input factors, each with an associated cost and productivity. Allocative efficiency means the utilization of these limited inputs in precisely that combination to insure production of the optimum valued social output at minimum input costs.

Allocative efficiency then implies productive efficiency which has two components. Productive efficiency means that an individual firm will select the lowest cost combination of inputs necessary to produce any given level of output. Production efficiency also means that an individual firm will employ within the productive process sufficient measures of managerial control, motivation and productive technique to insure that the productive process does in fact yield the highest value of output possible from a given set of inputs. In short, productive efficiency means the least cost transformation of inputs into completed output goods.

By definition, efficiency is cost minimization. Allocative efficiency demands production of the highest valued output that society's limited input resources are capable of producing. Productive efficiency by definition requires firms to use the least cost combination of inputs capable of producing a given output, and productive efficiency also requires the least cost transformation of those inputs into finished output. Any conclusions concerning

the relative efficiency of a given firm or group of firms implies conclusions concerning their minimization of costs.

Output prices should allow the producer to cover all costs, including a profit sufficient to compensate for risk. But in the long run, the producer should receive only this reasonable profit. Public policy holds that society and not individual producers should receive the benefits of efficient production. The benefits which accrue to society result from the diversification effects of collusion.

Economic theory demonstrates that competitive markets better achieve these socially desirable public policy objectives than monopolistic markets.[2] Both the competitive and monopolistic economic models assume that each market participant selects the least cost combination of inputs capable of producing a desired level of output and transforms that input into output at minimum cost. But when contrasted, the competitive and monopolistic models demonstrate the allocative inefficiency associated with monopoly. Because of restricted entry and ability to determine output price, the monopolist produces less and charges more than competitively determined output quantity and price. Thus, monopoly generates higher prices and profits, restricted output and ineffective resource allocation. The monopolist's restriction of output causes inputs to flow into other less

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[2] C.E. Ferguson, Microeconomic Theory, (Homewood, Illinois: Richard D. Irwin, Inc., 1966), pp. 192-219.

optimal uses, forming the basis for the classical condemnation of monopoly.

In reality, individual world markets contain varying elements of competition and monopoly. Careful observation leads to the belief that some firms are better able to control the major variables of their existence, as could ae monopolist, than other more competitive firms. These firms which control their environment are said to possess market power defined as "the ability of a market participant or group of participants..... to influence price, quantity and the nature of the product in the market-place."[3] Market power is then a nebulous yet pervasive concept, and important to an understanding of the performance of modern economic markets and the conduct of the firms that participate in them.

A number of studies have examined the relationship between market power, or more precisely certain more easily measured proxies for market power such as number of sellers and ease of entry, and firm profitability. This literature, reviewed in Chapter II, concludes that greater market power generates higher rates of profitability, and the existence of this higher profitability over time is condemned because it implies higher prices, restricted output and consequently allocative inefficiency.

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[3] W.G. Shepherd, Market Power and Economic Welfare, (New York, New York: Random House, Inc., 1970), p.11.

Because of entry barriers, the managements of powerful firms presumably set output prices in excess of those which a competitive market would permit, and by doing so only satisfy a restricted demand. Hence the total value of society's output is lower than its stock of inputs could have produced, since inputs now produce other less optimal outputs. And entry barriers prevent these higher profits from being bid away by new market entrants.

The role of number of market participants is intuitively apparent. If sellers are few, each can inflict identifiable harm upon the others and expect retaliation in kind. Accordingly, each seller may choose to play safe, keeping its output restricted and its prices high. If sellers are few, any firm that cuts prices will be discovered quickly, with the result that no firm has an incentive to do so. In fact, each may trust the others to maintain prices at super-competitive levels. This recognition of mutual dependence reaches its greatest effect under conditions of few sellers, identical costs, and the acceptance by each firm of a fixed market share. Under these conditions, individual firm profit maximization will produce a level of prices and a distribution of outputs that maximize joint industry profits, i.e., the monopoly solution. Relaxation of any of these conditions or alternative behavioral assumptions will produce results ranging between this outcome and the purely competitive one.

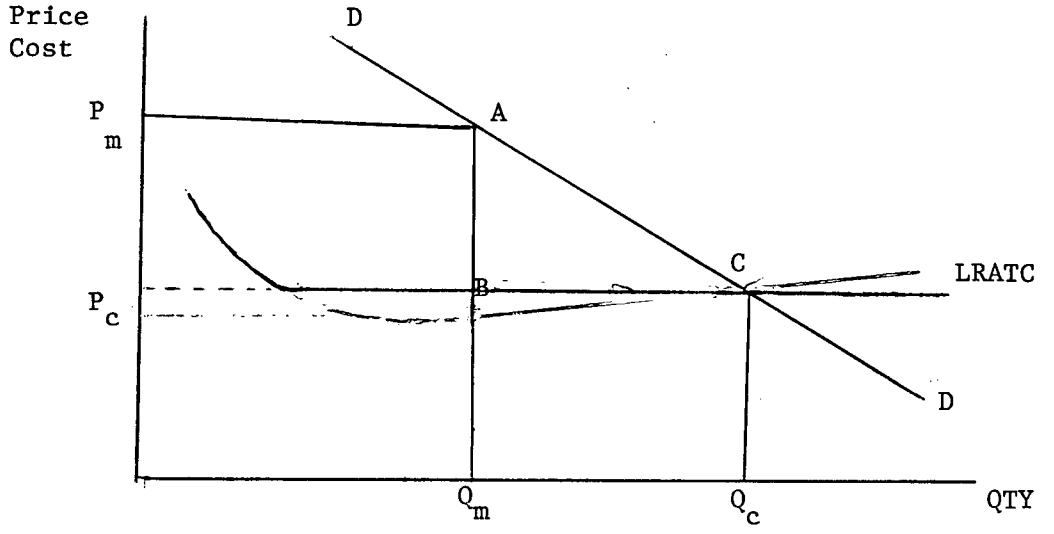
Divergences from the competition allocation of resources would result in welfare losses. Such welfare losses can serve as a basis for government intervention in the market place. Monopoly power grants the producer the ability to restrict output and charge price above the long run marginal cost. As a result, the producer is able to earn super-normal profits.

As a result of the allocative inefficiency due to restriction of output, there is a "deadweight burden" imposed on society as a whole. This welfare loss is the loss of consumer's surplus due to restriction of output and price above long run marginal cost.

Figure 1 shows the deadweight burden imposed on society as a whole.

FIGURE 1

DEADWEIGHT BURDEN WITHOUT X-INEFFICIENCY



Where P_m = Monopoly price, Q_m = Monopoly output,

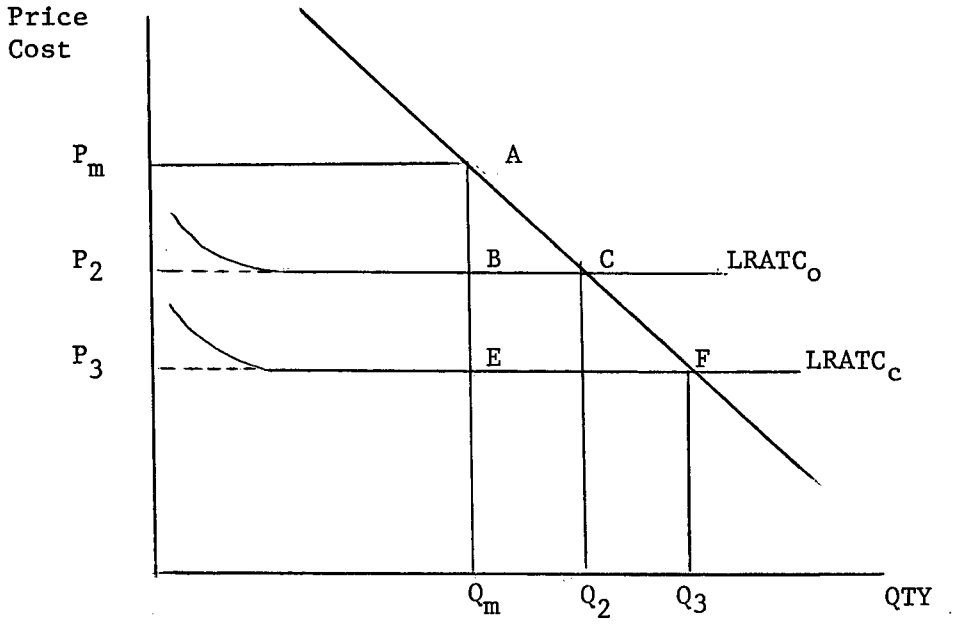
P_c = Competitive price, Q_c = Competitive output

In Figure 1, the area ABC is the deadweight burden and PcPmAB is the amount of excess profits. The amount of social welfare loss depends upon the price elasticity of demand and the extent of the restriction of output and price above the competitive level.

The presence of X-inefficiency would increase the size of the deadweight burden of monopoly as indicated in Figure 2.

FIGURE 2

DEADWEIGHT BURDEN WITH X-INEFFICIENCY



With no X-inefficiency, the observed cost curve ($LRATC_o$) is also the competitive cost curve, and the deadweight burden is the area ABC.

If a significant degree of X-inefficiency does exist, such that the observed costs exceed the competitive costs ($LRATC_c$), the deadweight burden is now the area AEF and therefore

a larger welfare loss. Comanor and Leibenstein[4] estimated that the actual degree of allocative inefficiency may be very much larger than the level as calculated, because of the presence of X-inefficiency.

Stanbury[5] concluded that the empirical evidence available indicate significant welfare losses due to the possession of market power by producers.

Table 1 lists some of the empirical test concerning welfare losses due to market power by producers.

Scherer[6] questioned some of the assumptions underlying those estimates by Harberger and Schwartzman. The estimates depend strongly upon the assumed elasticity of demand. Harberger assumed anelasticity of demand of 2, while Schwartzman assumed an elasticity of demand of 1. Scherer asserted that the reason why the price-cost margins observed in monopolistic industries are seldom exorbitant is that long-run price elasticities are often much higher than 1.0 or 2.0 because of substitution between loosely related commodities. To the extent

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[4] W.S. Comanor and H. Leibenstein, "Allocative Efficiency, X-Efficiency and the Measurement of Welfare Losses," Economica, (August, 1969), pp.304-309.

[5] W.T.Stanbury, "The Consumer Interest, Economic Welfare and Consumer Research". A Paper presented at the meeting of Canadian Association of Administrative Sciences (Marketing Division), Edmonton, Alberta, June 1975. Figures 1 and 2 are extracted from the same paper.

[6] F.M. Scherer, Industrial Market Structure and Economic Performance, (Chicago, Illinois: Rand McWally & Co.,1970)p.402.

that this is true, the welfare losses estimated by Harberger and Schwartzman are understated. Applying the multiplicative correction factors to the results of Harberger and Schwartzman, Scherer found that the dead-weight welfare loss due to market power in the U.S. lies between 0.5% and 2% of GNP.

Scherer, using 1966 data, further estimated that the total welfare loss due to market power in the U.S. is 6.2% of GNP.

The empirical evidence suggest significant welfare losses due to market power.

TABLE 1

A SURVEY OF STUDIES ON WELFARE LOSSES

STUDY	METHODOLOGY	UNIVERSE	PERIOD	WELFARE LOSS
Harberger 1954[7]	Hotelling's Model	73 U.S. Manufacturing Industries	1924- 1928	0.1% of national income
Schwartzman 1960[8]	Partial equilibrium analysis	Pairs of Canadian and U.S. Industries	1954	0.1% of national income
Schwartzman 1961[9]	Partial equilibrium analysis	Pairs of Canadian and U.S. Industries	1954	0.13% of national income
Kamerschen 1966[10]	Hotelling's Model	U.S. industries	1956-1961	1%-8% of national income
Scherer 1970[11]			1966	6.2% of gross national product

[7] A.C. Harberger, "Monopoly and Resource Allocation," American Economic Review, (May, 1954), pp.77-87.

[8] D. Schwartzman, "The Burden of Monopoly," Journal of Political Economy, (December, 1960), pp.627-630.

[9] _____, "The Effect of Monopoly: A Correction," Journal of Political Economy, (October, 1961), p.494.

[10] D.R. Kamerschen, "An Estimation of the 'Welfare Losses' from Monopoly in the American Economy," Western Economic Journal, (Summer, 1966), pp. 221-236.

[11] F.M. Scherer, op.cit. p.408

Besides the above condemnations of market power for fostering allocative inefficiency, powerful firms stand accused of productive inefficiency as well. One attribute of the modern corporation is the separation of ownership as represented by a diverse group of stockholders, and control, as represented by a unified group of professional managers. The managements of powerful firms freed from the pressures of a competitive market and the scrutiny of ownership interests simply do not have to be productively efficient. Powerful firms can still earn superior profits in spite of inflated expenses. If correct, the higher observed profits associated with market power reveal only a portion of the inefficiency caused by market power.

O.E. Williamson[12] has moved this analysis a step further: powerful firms incur excess expenses not out of unplanned inefficiency but because of the preferences of management for certain types of expenses. These higher expenses take two basic forms: those that personally benefit management, and those that make the job of managing the firm easier by increasing its market power.[13] Williamson calls this notion expense preference:

> The essential notion that we propose in order to connect motives with behaviour is

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[12] O.E. Williamson, "Managerial Discretion and Business Behaviour", American Economic Review, (December 1963), pp. 1032-1057.

[13] Ibid., p. 1045

> that of expense preference. That is, the management does not have a neutral attitude toward costs. Directly or indirectly, certain classes of expenditure have positive values associated with them.[14]

If Williamson's notion of expense preference is a reasonably accurate description of the conduct of powerful firms, then market power leads to serious inefficiencies, both allocative and productive. Powerful firms can charge sufficiently high prices as to report superior profits in spite of inflated expenses. These inflated expenses may reinforce the very market power which permits the higher prices to exist over time. In addition, the management of powerful firms receive inflated compensation for managing less risky enterprises. Certainly such conduct would violate both objectives of public policy: efficient production and the attainment of reasonable prices and profits.

Productive processes have two basic types of input: fixed and variable usually represented by capital and labor. Modern firms have the option of financing their stock of capital assets by some combination of debt funding and equity funding. This is the problem of financial leverage or optimum capital structure and that literature is reviewed in Chapter III.

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[14] Ibid., p. 1032.

After allowing for corporate income taxes, Modigliani and Miller came to agree that the use of financial leverage can effect a firm's capital costs and its overall level of risk. Financial leverage is a means by which corporate management can trade higher risk for higher profits. As such, financial leverage would appear to be an excellent device for the managements of powerful firms to employ expense preference. These managements could employ inefficiently low financial risk and high capital costs. High output prices could absorb these high capital costs and still permit the earning of superior profits, and management would have the personal advantage of directing a lower risk operation.

By utilizing less than the optimum amount of debt, the firm's fixed interest charges would be reduced, thereby reducing its overall level of risk. Management could presumably raise money quickly and at favourable rates to meet new opportunities. This strong financial position would reinforce entry barriers by providing funds for advertising campaigns, research and development activities, and discourage potential competitors from entering the industry. In addition, monopoly output prices would permit above average returns on stockholders' equity thereby satisfying stockholders' desires and attaining for management the prestige associated with operating a consistently profitable firm. This is a possible explanation of the influence of market power on financial leverage.

There is also an alternative explanation of that relationship. Because of their ability to control the major variables of their existence, powerful firms may have the ability to support large amounts of low-cost debt, debt which would lower their overall capital costs. If true, the higher observed profits associated with market power could be the result of lower capital costs and not monopoly prices and restricted output, thereby breaking the link between those profits and allocative inefficiency. In fact, market power may have the socially desirable property of permitting firms to reduce capital costs. F.M. Scherer clearly stated this possibility in a recently published text.

> It is possible that the high observed returns on stockholders' equity in concentrated industries have been due as much to financial leverage as to greater success in realizing monopoly gains on the total amount of capital employed. That is, firms in concentrated industries may have elected a capital structure with an unusually high ratio of low-cost but inflexible debt obligations, so that returns above interest charges were magnified in relation to the relatively small quantity of equity capital. Stigler found that concentrated industries had significantly more stable returns over time than unconcentrated industries, and this may put them in a better position to accept high leverage without incurring excessive risks. The possibility of interactions among concentration, leverage and profitability has not yet been subjected to thorough empirical analysis. Further research is clearly needed.[15]

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[15]F.M. Scherer, Industrial Market Structure and Economic Performance, (Chicago, Illinois: Rand McNally and Co., 1970), p. 185.

Whereas the investment decision determines the basic business risk of a firm, the financing decision determines its financial risk. Broadly defined, financial risk encompasses both the risk of possible insolvency and the variability in the earnings available to common stockholders. As a firm increases the proportion of debt, lease commitments, and preferred stock in its capital structure, fixed charges increase. All other things being equal, the probability that the firm will be unable to meet these fixed charges increases also. As the firm continues to lever itself, the probability of cash insolvency, which may lead to legal bankruptcy, increases. To illustrate this notion of financial risk, suppose that two firms have different degrees of leverage but are identical in every other respect. Each has expected annual cash earnings of $80,000 before interest and taxes. However, firm A has no debt, while firm B has $500,000 worth of 6% perpetual bonds outstanding. Thus, the total annual financial charges for firm B are $30,000, whereas firm A has no financial charges. If cash earnings for both firms should be 75% lower than expected, i.e., $20,000, firm B will be unable to cover its financial charges with cash earnings. As a consequence, the probability of cash insolvency increases with the financial charges incurred by the firm.

The second aspect of financial risk involves the relative dispersion of income available to common stockholders. To illustrate, suppose that the expected future annual operating

incomes over the next five years for firms A and B were subjective random variables where the expected values of the probability distributions were each $80,000 and the standard deviations, $40,000. As before, assume that firm A has no debt while firm B has $500,000 in 6% bonds. If, for simplicity, we abstract from federal income taxes, the expected value of earnings available to common stockholders would be $80,000 for firm A and $50,000 for firm B. Because the standard deviation about the expected values is the same for both firms, the relative dispersion of expected earnings available to common stockholders is greater for firm B than for firm A. For firm A

$$\text{Coefficient of variation} = \frac{\$40,000}{\$80,000} = 0.50$$

while for firm B

$$\text{Coefficient of variation} = \frac{\$40,000}{\$50,000} = 0.80$$

As a result, the relative dispersion, as measured by the coefficient of variation, is less for firm A.

As a firm increases the proportion of fixed-income obligations in its capital structure, the financial risk to stockholders rises. Therefore, the use of financial leverage can effect a firm's overall level of risk. Financial leverage is a means by which corporate management can trade higher risk for higher profits. Management could employ inefficiently low financial leverage with its associated low financial risk.

Chapter IV introduces the concept of systematic risk and the Capital Asset Pricing Model (CAPM).

It is necessary to distinguish between a firm's "unsystematic" risk, risk which can be washed away by combining the security with other securities in a diversified portfolio, and its "systematic" risk, the portion of risk which cannot be washed away through diversification. By increasing diversification, the unsystematic risk gradually tends to be eliminated, leaving only systematic risk, the portion of total risk which is related to the overall performance of the market. The implication is that the return on a well-diversified portfolio is highly correlated with the market, and its variability is essentially a reflection of the variability of the market as a whole.

The CAPM provides a theoretical relationship between risk and return of a capital asset under conditions of market equilibrium. Basically, the model asserts that, under certain assumptions, the expected rate of return on a security is a linear function of a risk-free borrowing and lending rate and the expected return on a market factor. In this study, the CAPM is employed to test for the systematic risk of the concentrated group relative to that of the unconcentrated group, and thus constitutes a contribution to the risk-return relationship. If the CAPM is right, empirical tests would show that on the average, and over long periods of time, the firms with high rates of return should have high systematic risk.

For convenience, the methodology and results are divided into two chapters. Chapter V selects a sample of firms and a time period to empirically test the hypothesis that there is no significant difference between the financial structures of powerful firms and other less powerful firms.

Chapter VI examines the evidence concerning market power and return. And if powerful firms do indeed earn a higher rate of return, this chapter proceeds to establish empirically whether powerful firms incur higher systematic risk or lower systematic risk. This would constitute a test of the Capital Asset Pricing Model.

Chapter VII presents the summary and conclusions of this study. If powerful firms do employ greater amounts of debt, then serious rethinking of the opposition to market power in the legal and economics professions would be in order. For if market power grants the socially desirable ability to reduce capital costs, then opposition to it must result from a balancing of its advantages and disadvantages. If powerful firms do not employ greater amounts of debt, then such findings would support and strengthen the traditional opposition to concentrations of market power for causing allocative inefficiency.

C. Methodology

The data analyzed in this study were obtained from public documents published by Statistics Canada. The documents used in this study include the Corporations and Labor Unions Returns Act Reports, Corporation Financial Statistics and Corporation Taxation Statistics. In addition, the TSE tape was used when the empirical evidence concerning systematic risk and return was examined. The TSE tape contains monthly data on prices, dividends and investment performance relatives for all common stocks listed on the Toronto Stock Exchange from June 1961 through June 1973. In computing the investment performance relatives, all dividends are assumed to be re-invested at the end of the month in which they were paid and the prices are adjusted for stock dividends and splits. In addition, firms included in the study must not be missing any data over the period 1962 through 1969. This criterion was used to avoid the problem of what to do about missing data.

The method of analysis and the rationale behind it are explained in more detail in Chapters V and VI, and will be summarized here only briefly. The method of study is essentially cross-sectional in nature. Such an approach permits the analysis of different groups from the cross-section and a comparison of these groups. The statistical tests employed involve a combination of analysis of variance and simple regression analysis. It is believed that such an approach permits the results to be accorded greater weight.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter reviews the literature on the relationship between market power and profitability. Part A of this chapter summarizes some of the literature which has attempted to explain profitability by the size of the firm. In part B, market concentration is suggested as a factor related to profitability. The literature on this relationship is reviewed in this part. Part C presents the literature on the relationship between entry barriers and profitability. Finally, a summary of the conclusion of the studies reviewed in this chapter.

A. Firm Size and Profitability

One method of market power classification involves the division of firms into market power groups according to relative size as measured by either sales or assets. For example, 60 firms might be divided into three market power groupings: (1) firms with total assets below $250 million, (2) firms with total assets between $250 million and $500 million, and (3) those firms with total assets above $500 million. Then the profitability of each group is examined and compared.

Alexander[1] examined all American manufacturing firms submitting balance sheets with their 1937 federal income tax returns

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[1] Sidney Alexander, "The Effect of Size of Manufacturing Corporation on the Distribution of the Rate of Return," Review of Economics and Statistics, (August,1949), pp.229-235.

and found a positive relationship between firm size and the ratio of net income to the book value of stockholders' equity (NI/SE). Alexander emphasized that variability of profit rates increased as the size of the corporation declined. He argued this greater variability in two ways. First, by a very careful statistical analysis, he established that "for any given year the dispersion of profit rate is much greater among small corporations than among large."[2] Second, after a brief graphical analysis, he concluded that "from bad times to good the profit rates of small ... corporations fluctuate more."[3]

Hall and Weiss[4] worked with 341 American firms for the period 1956 to 1962 and found a positive relationship between firm size and NI/SE. They selected firms from the Fortune "Directories of 500 Largest Industrial Corporations" for the years 1956 to 1962. There were 467 firms but 126 of these were excluded from their sample for various reasons. First, 21 firms were excluded because they were smaller than the minimum efficient plant scales. Second, 4 firms were excluded because their profit rates were in some way subject to public regulation. Third, 38 firms were excluded because they were too diversified to permit assignment to a particular industry. Fourth, 63 firms had to be excluded because no index of industrial production was available for the industry to which they were assigned. Finally,

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[2] Ibid., p.229.

[3] Ibid., p.229.

[4] Marshall Hall and Leonard Weiss, "Firm Size and Profitability," Review of Economics and Statistics, (August,1967), pp. 319-331.

7 firms were excluded by error. Each firm in each year was treated as a separate observation. The method of analysis was the multiple regression. The dependent variable was NI/SE, the rate of return after tax on year-end equity. The independent variables were size, seller concentration, growth and stability, time dummies for each year observed after 1956, and the ratio of stockholders' equity to the book value of total assets. It was held that profits after taxes were the most appropriate variable. Profit rates before taxes might differ because of differing tax treatments of different industries, but entry should bring profit rates after taxes toward equality under competition.

The present study prefers the rate of return on equity to that on total assets because it seems theoretically correct. It is what managers acting in the owners' best interests would seek to maximize. The argument is that capital structure is an element of input mix. Either profit maximization or sales maximization would require some optimal rate of borrowing which differs from industry to industry depending on such things as stability and growth prospects. As a result, rates of return on assets should differ between industries, even in perfectly competitive long-run equilibrium, but rates of return on equity should tend toward equality between industries.

Hall and Weiss concluded that there was a positive relationship between firm size and the ratio of net income to the book value of stockholders' equity.

Stekler examined all American firms filing income tax returns for the period 1947 to 1949 and found medium-sized firms

were more profitable, profitability as measured by NI/SE. That is, the returns of firms with total assets between $500,000 and $10,000,000 were higher than larger or smaller firms.[5] Stekler's study was the first to deal carefully with the question of what measure of profitability is appropriate to what problem. To measure potential for growth, Stekler pointed to profit rates after taxes as the appropriate indicator. Stekler's data was limited to annual American Internal Revenue Service data for the period 1947 to 1949.

Osborn examined income tax returns for United States manufacturing corporations during the period 1931 to 1946 and also found medium-sized firms more profitable, profitability as measured by NI/SE.[6] In fact, Osborn noted that what results were obtained depended on what stage of the cycle was examined because small corporations had much the greatest variation of profit rate, middle-sized the next greatest, and large the least variation. Thus, in depression the largest appear the most profitable, but in prosperity the medium-sized corporations seem the most profitable.

What may be concluded from the summary of all these studies? Conclusions concerning the relationship between firm size and profitability seem to depend heavily upon the sample of firms selected, the time period studied and the determination

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[5]H.O.Stekler, Profitability and Size of Firm,(Berkeley, California: Institute of Business and Economic Research, The University of California at Berkeley, 1963), p.74.

[6]Richard Osborn, Effects of Corporate Size on Efficiency and Profitability,(Urbana, Illinois: University of Illinois, Bulletin No.72, 1950), p.58.

of size groups.

B. Market Concentration and Profitability

A second method of market power classification consists of the so-called concentration ratios. Before proceeding to a review of the literature, it is useful to briefly summarize the problem of determining a base of measurement and the various measures of concentration. Many bases have been used as a measure of concentration. Some of them are sales, assets, value added and number of employees. Scitovsky[7] has come out strongly in favour of the value added base and the sales base. While the value added base is often considered superior, value added data are rarely available. As a result, the present study will use the sales base as the base for measuring concentration.

There are three major classes of concentration indices, none of which has gained universal acceptance.

The first group of indices measures the extent to which a small number of firms control a large portion of the industry output, if the sales base is used. This measure is usually computed using the largest three, four, or eight firms in each industry, although any other small number of firms would be appropriate.

The second class of indices closely related to the first class, measures the number of firms required to account for some

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[7] T. Scitovsky, "Economic Theory and the Measurement of Concentration," Business Concentration and Price Policy, (Princeton, New Jersey: Princeton University Press, 1955), p.111.

percentage of total industry output. The level of output chosen is usually 70 percent. This is an inverse measure of concentration, increasing in numerical value as concentration decreases. A major disadvantage of this index is that it does not consider the total number of firms in the industry.

These two classes of indices are most often criticized because they consider only one point on a cumulative concentration curve which relates percentage of industry output to the number of firms producing that output.[8] Nevertheless, they are useful measures in determining the monopolistic potential in a particular industry.

The third class of indices considers all the firms in an industry and is not subject to the criticism of the other two classes. The best known index of this class is Herfindahl's summary index.[9] This measure is the sum of the firm sizes, measured as a percentage of total industry size or output depending upon the base. The index is defined as follows:

Let S.S.Q. = the concentration index, the sum of the squares,

A_i = the proportion of industry output controlled by the ith firm,

then

$$S.S.Q. = (A_i)^2 \text{ summed over all } i.$$

However, it is not as specific as the other two classes of indices in measuring the monopolistic potential of an industry.

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[8] G. Rosenbluth, "Measures of Concentration" Business Concentration and Price Policy, (Princeton, N.J.: Princeton University Press, 1955), p.59.

[9] Ibid., p.60.

Rosenbluth examined the relationship between concentration indices of the first group on an employment base using different numbers of firms. Rank correlations betwee n the largest two, three, four and eight firms in 1947 exceeded 0.90 in all cases.[10] Therefore it would appear thatif an index of the first group were selected, the number of firms included in the index would not be crucial.

In comparing the three main classes of indices for 1947 on an employment base, Rosenbluth found a rank correlation in excess of 0.97 in all cases.[11] He concluded:

> These three comparisons suggest that in the analysis of cross-section data, the use of any one of the indexes considered here will result in substantially the same ordering of observations as any of the others. Analytical results that rest on the ordering of observations willnnot be greatly affected by the index used.[12]

Thus, the choice of index would not affect the analytical results.

Weiss[13] made a survey of 46 empirical tests devoted to the concentration - profits relationship and presented the principal findings in a table. The conclusion was that dominant firms were associated with high prices and high profit rates. The empirical tests provided support to this conclusion

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[10] Ibid., p.64

[11] Ibid., p.69

[12] Ibid., p.69

[13] L.W. Weiss, "The Concentration-profits relationship an and Antitrust," Industrial Concentration: The New Learning, (Toronto; Ontario : Little, Brown and Comapny, 1974), pp.184-245.

for the period 1953 - 1967, though the concentration-profits hypothesis is weakened in periods of accelerating inflation. The concentration-profits relationship holds equally well for Britain, Canada, United States, and Japan. Weiss concluded that in general, the findings lend support to the relationship predicted by theory. The several studies yielding results at variance with the orthodox concentration - profits hypothesis seemed to stem from the selection of the sample and the period in question. One such study was conducted by Stigler.[14] For the period 1942-1947, he found a negative relationship between concentration and profitability.

Joe Bain has written one of the many studies devoted to the relation between concentration and profit rates.[15] Bain employed Securities and Exchange Commission data on average profits and equities of 1,106 companies for the period 1936 to 1940. Using the ratio of profit (after tax) to equity, he concluded that there was some positive relation between profit rate and the concentration of industry.On the other hand, he found a rather low correlation (r=.33), so the relationship is not simple, though it is significant. Nevertheless, the highly concentrated did have higher profit rates as a group. Thus Bain noted: "The positive conclusion which does emerge is that there is a rather distinct break in average profit-rate

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[14] G. Stigler, Capital and Rates of Return in Manufacturing Indudstries, (Princeton: Princeton University Press, 1963).

[15] Joe Bain, "Relation of Profit Rates to Industry Concentration," Quarterly Journal of Economics, (August,1951), pp. 293-324.

showing at the 70 percent concentration line, and that there is a significant difference in the average of industry average profit rates above and below this line."[16] In particular, in the twenty-two industries in which concentration by eight firms was over 70 percent, he found a profit rate of 12.1 percent. In the twenty industries where concentration by eight firms was under 70 percent, he revealed a profit rate of only 6.9 percent. Such a difference was significant at the .001 confidence level.

Using difference techniques, Weiss[17] reached similar conclusions for the period following World War II. By computing weighted average four-firm concentration ratios for 22 broad two-digit industry groups, he was able to cover the whole of U.S. manufacturing industry. For the 1949-1958, he found average after-tax profits as a percentage of Stockholders' equity to be strongly and positively correlated with concentration, with a correlation coefficient of 0.73. Industry groups with average profits of 12.7 percent, while those with ratios below 30 percent averaged only 8.8 percent.

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16 Ibid., pp. 313-314.

17 L.W. Weiss, "Average Concentration Ratios and Industrial Performance," Journal of Industrial Economics, (July, 1963), pp.237-253.

The one study yielding results at variance with the orthodox concentration - profitability hypothesis was by Stigler.[18] His approach departed from other in two main respects. First, his meausre of profitability was the sum of interest payments, dividends on stock and after-tax additions to retained earnings as a percentage of total assets, including those financed through debt and trade credit. This choice attenuated, but for the years following 1947 did not eliminate, the positive correlation between returns to capital and concentration. Thus, 14 three-digit manufacturing industry groups with weighted average four-firm concentration ratios of 60 percent or higher had 1951-1957 capital returns averaging 6.64 percent, compared to 5.22 percent for 54 industry groups with average four-firm ratios of less than 50 percent. Second, Stigler discovered that the concentrated industries included a smaller fraction (2% by sales) of firms with assets below $250,000 than unconcentrated industries (13 percent). Arguing that smaller firms were more apt to reap their economic profits in the form of high owner-manager salaries, Stigler adjusted his data in a way which almost wiped out the differential between concentrated and unconcentrated industry returns. His adjustment technique has been shown to impart a systematic statistical bias.

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[18] G. Stigler, op.cit., pp.54-70.

Collins and Preston[19] avoided the methodological flaw of assigning profits to specific industries on a firm-wide basis. Instead they used the percentage margins between prices and estimated costs. As is usually the case, the penalty for avoiding some problems was the acceptance of others, since depreciation and advertising costs could not be deducted in computing the price-cost margins. After correcting for differences in capital/output ratios, to which depreciation is related, they found moderate to strong positive correlations between their price-cost margin index and four-firm concentration ratios for the four-digit industries in six groups: food products; stone, clay and glass products; primary metals; fabricated metal products; electrical machinery; and miscellaneous manufacturing.

Jones, Laudadio and Percy[20] presented some empirical evidence relating profitability of Canadian industry to various measures of market structure. They reported the results of regressing the profitability of a sample of 30 Canadian consumer goods industries on various measures of market structure for the year 1965. The independent variables were concentration, product differentiation, growth of demand, scale economies, absolute capital requirements, a regional variable, and foreign competition. The results revealed that concentration, product differentiation, demand, and foreign competition are important determinants of inter-industry differences in profitability. The major sources

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[19] N.R. Collins and L.E. Preston, Concentration and Price-Cost Margins in Manufacturing Industries, (Berkeley: University of California Press, 1968), pp.79-106.

[20] J.C.H. Jones, L.Laudadio and M.Percy, "Market Structure and Profitability in Canadian Manufacturing Industry," Canadian Journal of Economics, (August, 1973), pp.356-368.

of their data were Statistics Canada, Corporation Financial Statistics, 1965 and the Department of Consumer and Corporate Affairs, Concentration in Manufacturing Industries of Canada.

Bloch[21] extended the above study to include the influence of concentration and tariffs on prices, costs, and profits of domestic import-competing industries. His hypotheses were tested using data on the relative prices, direct costs per unit, and gross profit per unit for a sample of corresponding Canadian and United States manufacturing industries. The tests supported the hypotheses that the influence of tariffs and concentration on prices and on costs was interdependent. The interdependence was such that prices and costs tended to be high when both tariffs and concentration are high, but did not exhibit such a tendency when tariffs or concentration or both were low. The tests further suggested that concentration had an independent upward influence on profit per unit, but that tariffs had little or no influence on profit per unit.

C. Entry Barriers and Profitability

A third method of market power classification consists of the analysis of entry conditions into various industries. Economic theory demonstrates that the condition of entry into a given industry has strong influence upon the competitive conditions within that industry. Some real world markets appear easier to enter than others. The expectation is that blockaded markets would

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21 Harry Bloch, "Prices, Costs and Profits in Canadian Manufacturing: the Influence of Tariffs and Concentration," Canadian Journal of Economics, (November, 1974), pp. 594-610.

have higher prices than competitive markets, and that these higher prices could lead to some combination of higher profits and higher expenses. Two researchers have examined the proposition that high market entry barriers imply high profitability for market participants.

Bain examined the relationship between entry conditions and NI/SE for the leading firms in 20 oligopolistic[22] industries during the periods 1936 to 1940 and 1947 to 1951. From various published sources and interviews with industry executives, Bain estimated the extent to which four factors impeded entry into each of the 20 industries. The four factors were: (1) the existence of economies of scale,[23] (2) product differentiation advantages of established firms,[24] (3) control of scarce productive resources by the established firms,[25] (4) ability of potential entrants to raise capital to enter the industry.[26] With the extent of each factor upon each industry determined, Bain placed each industry and the leading firms within that industry into one of three categories of overall entry condition: high entry barrier, substantial entry barrier, and moderate-to-low entry barrier.[27]

Bain presented two major conclusions. Industries in

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[22]The lowest four seller concentration ratio in Bain's sample of firms was 27%. See: J.Bain, Barriers to New Competition,(Cambridge,Mass.: Harvard University Press,1956), p.45.

[23]Ibid., Chapter 3, pp.53-113.

[24]Ibid., Chapter 4, pp.114-143.

[25]Ibid., Chapter 5, pp.144-166.

[26]Ibid., Chapter 5, pp.144-166.

[27]Ibid., Chapter 6, pp.167-181.

the high entry barrier group earned higher average NI/SE than industries in the other two groups, but these latter two groups showed no difference in average NI/SE.[28] Industries in which the largest eight firms accounted for over 70 percent of industry sales had higher average NI/SE than industries in which the largest eight firms accounted for less than 70 percent of industry sales.[29]

Mann replicated Bain's study for the period 1950 to 1960 increasing the number of industries included in the study from 20 to 30.[30] He divided the 30 industries and their leading firms into the same three market power classification groups as Bain, using the same determinants of entry condition.[31]

Mann, like Bain, found a significant difference between the NI/SE of the high entry barrier group and the two others, but no such difference between the substantial and moderate-to-low entry barrier groups.[32] Mann, again like Bain, found that industries in which the largest eight firms accounted for over 70 percent of sales had higher NI/SE than industries in which the largest eight firms accounted for less than 70 percent of sales.[33] If there is a consensus concerning entry barriers, it is that they must be "very high" to influence market performance. However the basis of assigning industries into the three market power

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[28] Ibid., p.196.

[29] Ibid., p.196.

[30] H.M.Mann, "Seller Concentration, Barriers to Entry, and Rates of Return," Review of Economics and Statistics, (August, 1966), pp.296-307.

[31] Ibid., p.297.

[32] Ibid., p.299.

[33] Ibid., p.300.

classification groups was highly arbitrary since it was based on intuitive judgment.[33]

D. Summary:

The studies reviewed in this chapter conclude that firms with great market power have higher profit rates than those with less market power. The proxies of market power used in these studies are the size of the firm, market concentration and entry barriers. Profitability is defined as the ratio of net income to the book value of stockholders' equity. The existence of this higher profitability over time is condemned because it implies higher prices, restricted output and consequently allocative inefficiency.

There is also the alternative explanation of the influence of market power on financial leverage. Because of their ability to control the major variables of their existence, powerful firms may have the ability to support large amounts of low-cost debt, debt which would lower their overall capital costs. If true, the higher observed profits associated with market power could be the result of lower capital costs and not monopoly prices and restricted output, thereby breaking the direct link between those profits and allocative inefficiency. The next chapter examines this alternative explanation.

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[33] Ibid., p.301.

CHAPTER III

FINANCIAL LEVERAGE

The literature reviewed in the previous chapter concludes that greater market power generates higher rates of profitability and the existence of this higher profitability over time is condemned because it implies higher prices, restricted output and consequently allocative inefficiency. Alternatively, the firm's capital structure may also influence its profitability. Because of their ability to control the major variables of their existence, powerful firms may have the ability to support large amounts of low-cost debt, debt which would lower their overall capital costs. If true, the higher observed profits associated with market power could be the result of lower capital costs and not monopoly prices and restricted output, thereby breaking the direct link between those profits and allocative inefficiency.

This chapter discusses the influence of capital structure on the cost of capital. Part A of this chapter presents a review of the concept of financial leverage. In part B, a discussion of the cost of capital is introduced. Part C discusses the relationship between financial leverage and the cost of capital. Part D discusses the conditions under which 100% debt financing may not be advantageous. Finally, part E analyzes the corporate debt capacity which may provide an explanation why firms do not carry a large amount of debt in their capital structure.

A. The Concept of Financial Leverage

What is the "cost of capital" to a firm in a world in which funds are used to acquire assets whose yields are uncertain; and in which capital can be obtained by many different media, ranging from pure debt instruments, representing money-fixed claims, to pure equity issues, giving holders only the right to a pro-rata share in the uncertain venture? This question has vexed at least three classes of economists: (1) the corporation finance specialist concerned with the techniques of financing firms so as to ensure their survival and growth; (2) the managerial economist concerned with capital budgeting; and (3) the economic theorist concerned with explaining investment behavior at both the micro and macro levels.

The economic theorist has tended to side-step the essence of this cost-of-capital problem by proceeding as though physical assets could be regarded as yielding known, sure streams. Given this assumption, the theorist has concluded that the cost of capital to the owners of a firm is simply the rate of interest on bonds, and has suggested that the rational firm will tend to push investment to the point where the marginal yield on physical assets is equal to the market rate of interest. This suggestion can be shown to follow from either of two criteria of rational decision-making which are equivalent under certainty, namely, (1) the maximization of profits and (2) the maximization of market value.

According to the first criterion, a physical asset is worth acquiring if it will increase the net profit of the owners of

the firm. But net profit will increase only if the expected rate of return of the asset exceeds the rate of interest. According to the second criterion, an asset is worth acquiring if it increases the value of the owners' equity, that is, if it adds more to the market value of the firm than the costs of acquisition. But what the asset adds is given by capitalizing the stream it generates at the market rate of interest, and this capitalized value will exceed its cost if and only if the yield of the asset exceeds the rate of interest. Under either formulation, the cost of capital is equal to the rate of interest on bonds regardless of the source of the funds. In a world of certainty, the distinction between debt and equity funds is one of terminology.

When the existence of uncertainty is taken into account, investment decisions are then supposed to be based on a comparison of the "risk adjusted" or "certainty equivalent" yield with the market rate of interest. No satisfactory explanation has yet been provided, however, as to the factors determining the size of the risk discount and as to how it varies in response to changes in other variables.

Recently economists have begun to face up seriously to the problem of the cost of capital allowing for risk. In the process, their interests and endeavors have merged with those of the finance specialist and the managerial economist. In a world of uncertainty, the equivalence between the two criteria of rational decision-making vanishes. In fact, the profit maximization criterion is no longer well defined. Under uncertainty there corresponds to each decision of the firm not a unique profit outcome, but a plurality of mutually exclusive outcomes which can at best

be described by a subjective probability distribution. The profit outcome, in short, has become a random variable and as such its maximization no longer has an operational meaning. For decisions which affect the expected value will also tend to affect the dispersion and other characteristics of the distribution of outcomes. In particular, the use of debt rather than equity funds to finance a given venture may well increase the expected return to the owners, but only at the cost of increased dispersion of the outcomes.

Under these conditions the profit outcomes of alternative investment and financing decisions can be compared and ranked only in terms of a subjective "utility function" of the owners which weighs the expected yield against other characteristics of the distribution. However, the utility approach has serious drawbacks for normative as well as analytical purposes.

Under the market value maximization criterion, any investment project and its financing plan must pass only the following test: Will the project, as financed, raise the market value of the firm's shares? If so, it is worth undertaking; if not, its return is less than the marginal cost of capital to the firm. Such a test is entirely independent of the tastes of the current owners, since market prices will reflect not only their preferences but those of all potential owners as well. If any current stockholder disagrees with management and the market over the valuation of the project, he is free to sell out and reinvest elsewhere, but will still benefit from the capital appreciation resulting from management's decision.

Financial leverage, then, possesses a powerful advantage. A given firm can increase its return on equity provided that it can obtain debt financing at a cost lower than its return. Debt financing involves the risk of default since interest on debt is a contractual obligation. The directors of a corporation may pass common dividends without legal difficulty but failure to meet interest payments and other fixed charges gives creditors the option of forcing the firm's bankruptcy. Financial leverage thus provides a direct mechanism for the trade-off of higher returns on stockholders' equity for higher risk. And this trade-off mechanism is under managerial control.

The degree of usage of financial leverage by individual firms will influence the results of studies such as those reviewed in Chapter II. Since the usual measure of profitability in such studies was the ratio of net income to stockholders' equity, two firms could have similar assets, sales, prices, and expenses, yet have differing profitability measures dependent upon the amounts of financial leverage utilized. The objective of this study is to examine the relationship between market power, profitability and financial leverage. Specifically, the purpose is to determine if powerful firms utilized large amounts of debt in their capital structure, debt which may explain their superior returns on stockholders' equity. And if they did not use large amounts of debt in their capital structure, whether that failure could be attributed to extreme managerial risk-aversion and therefore decisions not to minimize capital costs.

Financial leverage decisions of individual firms are of interest to this study to the extent they influence capital costs.

B. Cost of Capital

Like any productive factor, capital has a cost associated with its use. Theoretically considerable agreement exists as to the precise nature of the cost of capital, but in practice, its measurement is surrounded with difficulty.

> The cost of capital is perhaps the most difficult and controversial topic in finance. In theory, most would agree that it is the rate of return on the project that will leave unchanged the market price of the firm's stock. In practice, there are widespread differences as to how this cost should be measured.[1]

As noted in the previous section, firms raise capital from two general sources, debt and equity. Since the future costs associated with issuing debt are contractually stated, determining their cost to the firm is fairly straightforward. The future costs of equity are, on the other hand, variable, that is, contingent upon future events. In order to determine the costs of equity, a particular firm must know the price at which it can sell its common shares and the future benefits that investors who purchase the shares expect. Since the firm presumably knows the former but not the latter, the solution is indeterminant. Two unknowns present themselves, the costs of equity and the expectations of investors, and consequently no precise solution is possible. Cost of capital then depends not only upon the actions of the firm, but also upon the evaluation of those actions by capital markets.

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[1]James Van Horne, Financial Management and Policy, (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1971), p.90.

As such, its practical determination is most difficult.[2]

C. Financial Leverage and the Cost of Capital

The traditional approach to valuation and leverage assumes that there is an optimal capital structure and that the firm can increase the total value of the firm through the judicious use of leverage. To illustrate one variation of the traditional approach, assume that a hypothetical firm has $3,000 in debt at 5 percent interest. Further assume that the equity-capitalization rate is 11 percent. The valuation of the firm then is:

O	Net operating income	$1,000
F	Interest on debt	150
E	Earnings available to common stockholders	850
k_e	Equity-capitalization rate	0.11
S	Market value of stock	7,727
B	Market value of debt	3,000
V	Total value of firm	$10,727

The implied overall capitalization rate is:

$$k_o = \frac{O}{V} = \frac{1,000}{10,727} = 9.3 \text{ percent}$$

This example suggests that the firm can lower its cost of capital and increase the total value of the firm and share price by leverage. With no leverage, B/S = 0 ; and the overall capitalization rate, k_o, is 10 percent. Although investors raise the equity capitalization rate, k_e, as the firm becomes more financially

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[2]For a discussion of the difficulties involved in the computation of cost of capital, see: Michael Keenan, "Models of Equity Valuation: The Great SERM Bubble," Journal of Finance, (May,1970), pp.243-273.

risky with leverage, the increase in k_e does not offset entirely the benefit of using cheaper debt funds. As a result, total valuation and share price increase, and the cost of capital decreases.

The traditional approach implies that beyond some point, k_e rises at an increasing rate with leverage. Moreover, the cost of debt, k_i also may rise beyond some point. To illustrate, suppose now that the firm increases its debt from $3,000 to $6,000 and uses the proceeds of the debt issue to repurchase stock. Assume also that the average rate of interest on all debt rises to 6 percent and that the equity-capitalization rate, k_e, at that degree of leverage is 14 percent. The valuation of the firm then is:

O	Net operating income	$1,000
F	Interest on debt	360
E	Earnings available to common stockholders	640
k_e	Equity-capitalization rate	0.14
S	Market value of stock	4,571
B	Market value of debt	6,000
V	Total value of firm	$10,571

The implied overall capitalization rate is:

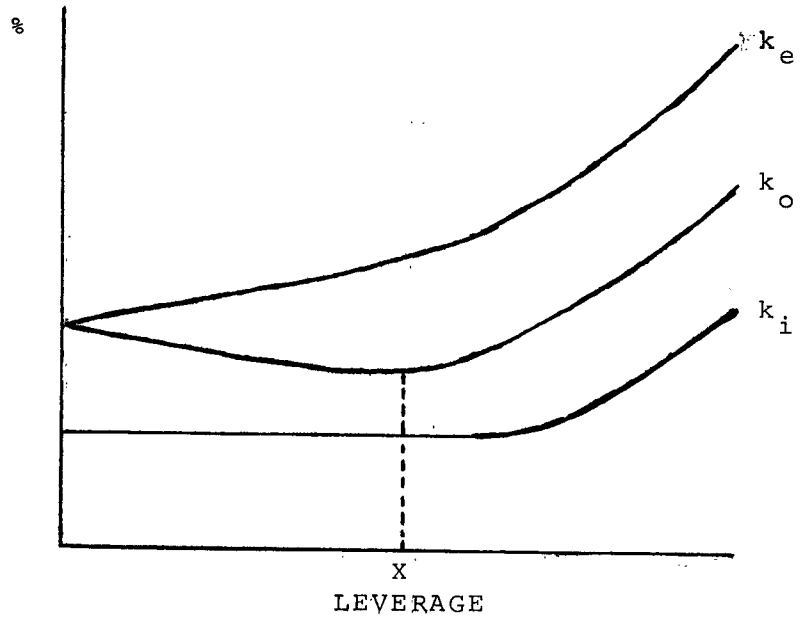
$$k_o = \frac{O}{V} = \frac{1,000}{10,571} = 9.5 \text{ percent}$$

Thus, the total valuation of the firm is lower and its cost of capital slightly higher than when the amount of debt was $3,000. This result is due to the increase in k_e and to a lesser extent, the increase in k_i. From these two observations, the optimal

capital structure in this example occurs before a debt-to-equity ratio of 6,000/4,571 or 1.31. Graphically, one variation of the traditional approach is shown in Figure 3.

FIGURE 3

TRADITIONAL VIEW



As can be seen in the figure, k_e is assumed to rise at an increasing rate with leverage, whereas k_i is assumed to rise only after significant leverage has occurred. At first, the weighted-average cost of capital declines with leverage because the rise in k_e does not offset entirely the use of cheaper debt funds. As a result, the weighted-average cost of capital, k_o, declines with moderate use of leverage. After a point, however, the increase in k_e more than offsets the use of cheaper debt funds in the capital structure, and k_o begins to rise. The rise in k_o is supported further once k_i begins to rise. The optimal capital structure is the

point at which k_o bottoms out; in the figure, this optimal capital structure is point X.

Thus, the traditional view implies that the cost of capital is not independent of the capital structure of the firm and that there is an optimal capital structure. At that optimal structure, the marginal real cost of debt is the same as the marginal real cost of equity. For degrees of leverage before that point, the marginal real cost of debt is less than that of equity; beyond that point, the marginal real cost of debt exceeds that of equity.

Modigliani and Miller[3] (MM) proposed that the relationship between leverage and the cost of capital was explained by the net operating income approach. They made a formidable attack on the traditional approach by offering behavioral justification for having the cost of capital, k_o, remained constant throughout all degrees of leverage. Their assumptions were: (1) Capital markets were perfect; (2) The average expected future operating earnings of a firm were represented by a subjective random variable, and all investors had homogeneous expectations with regard to the expected return; (3) Firms could be categorized into "equivalent return" classes, and all firms within a class had the same degree of business risk. However, this assumption was not essential for their proof. (4) The absence of corporate income taxes was assumed. MM removed this assumption

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[3] F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, (June, 1958); reprinted in: Stephen Archer and Charles D'Ambrosia, editors, The Theory of Business Finance: A Book of Readings, (N.Y., N.Y.: The Macmillan Co., 1968), pp. 125-159.

later. Using the same notation as MM, consider an economy in which all physical assets are owned by corporations. Assume that these corporations can finance their assets by issuing common stock only. This assumption will be relaxed later.

In equilibrium in a perfect capital market the price per dollar's worth of expected return must be the same for all shares of any given class. Or, equivalently, in any given class the price of every share must be proportional to its expected return.

Let $1/\rho_k$ = the factor of proportionality for the kth class,

p_j = the price per share of the jth firm in class k,

$\bar{x}_j$ = the expected return per share of the jth firm in class k,

then,

$$p_j = 1/\rho_k . \bar{x}_j \qquad (1)$$

or, equivalently,

$$\bar{x}_j/p_j = \rho_k \qquad (2)$$

a constant for all firms j in class k.

The constants ρ_k (one for each of the k classes) can be given several economic interpretations: (a) From (2) each ρ_k is the expected rate of return of any share in class k. (b) From (1) $1/\rho_k$ is the price which an investor has to pay for a dollar's worth of expected return in the class k. (c) From (1) again, ρ_k can be regarded as the market rate of capitalization for the expected value of the uncertain streams of the kind generated by the kth class of firms.

The assumption that firms cannot issue bonds can now be dropped. The introduction of debt financing changes the market for shares in an important way. Because firms may have different proportions of debt in their capital structure, shares of different firms, even in the same class, can give rise to different probability distributions of returns. MM derived the following two basic propositions with respect to the valuation of securities in firms with different capital structures:

Proposition I. Consider any firm j and let $\overline{X}_j$ denote the expected return on the assets owned by the firm. Let D_j denote the market value of the firm's debts and S_j denote the market value of its common shares. The market value of the firm is denoted by V_j, and $V_j \equiv S_j + D_j$. Then MM's Proposition I asserts that in equilibrium:

$$V_j \equiv (S_j + D_j) = \overline{X}_j / \rho_k \qquad (3)$$

for any firm j in class k.

That is, the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate ρ_k appropriate to its class.

Proposition I can also be stated in terms of the firm's average cost of capital, $\overline{X}_j / V_j$, which is the ratio of its expected return to the market value of the firm. Proposition I then becomes:

$$\frac{\overline{X}_j}{(S_j + D_j)} \equiv \frac{\overline{X}_j}{V_j} = \rho_k \qquad (4)$$

for any firm j in class k.

That is, the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class.

MM proceeded to establish that as long as the relations (3) or (4) did not hold between any pair of firms in a class, arbitrage will take place and restore the stated equalities.

Consider two firms in the same class and assume that the expected return, $\overline{X}$, is the same for both firms. Let firm 1 be financed entirely with common stock while firm 2 has some debt in its capital structure. Further let V_2 be the value of the levered firm; V_1 the value of the unlevered firm and $V_2 > V_1$.

Consider further an investor holding s_2 dollars' worth of the shares of firm 2 representing a fraction α of the total outstanding stock, S_2. The return from this portfolio, denoted by Y_2, can be written as:

$$Y_2 = \alpha(X - rD_2) \tag{5}$$

where X = total return of the firm = $X_2 = X_1$,

r = the market rate of interest.

Suppose now the investor sold his αS_2 worth of firm 2 shares and bought an amount $s_1 = \alpha(S_2 + D_2)$ of the shares of firm 1. By utilizing the proceeds, αS_2, from the sale and borrowing an additional amount αD_2 on his own credit, he would thus secure for himself a fraction $s_1/S_1 = \alpha(S_2 + D_2)/S_1$ of the shares and earnings of firm 1. When allowance is made for interest payments on his personal debt αD_2, the return from the new portfolio

Y_1, is given by:

$$Y_1 = \frac{\alpha(S_2 + D_2)}{S_1} X - r\alpha D_2 \qquad (6)$$

$$= \alpha \frac{V_2}{V_1} X - r\alpha D_2$$

Comparing (5) with (6) as long as V_2 is greater than V_1, Y_1 would be greater than Y_2. Therefore it pays owners of the shares of firm 2 to sell their holdings thereby depressing S_2 and hence V_2, and to purchase shares of firm 1, thereby raising S_1, and thus V_1. MM concluded that levered firms cannot command a premium over unlevered firms because investors have the option of substituting their own personal leverage. This conclusion holds also in the case where V_2 is less than V_1.

Proposition II. From Proposition I, MM derived the following proposition concerning the rate of return on common stock in firms whose capital structure includes some debt.

Let i_j = the expected rate of return, i , on the stock of any firm j in class k,

then,

$$i_j \equiv \frac{\bar{X}_j - rD_j}{S_j} . \qquad (7)$$

From Proposition I, equation (3) is given as:

$$\bar{X}_j = \rho_k (S_j + D_j) .$$

Substituting in (7) and simplifying, then ,

$$i_j = \rho_k + (\rho_k - r) D_j / S_j \qquad (8)$$

That is, the expected yield of a share of stock is equal to the appropriate capitalization rate ρ_k for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between ρ_k and r.

The propositions, when adjusted for taxes, continue to have the same form as their originals. However, certain interpretations must be changed. In particular, the after-tax capitalization rate ρ_k^{τ} can no longer be identified with the average cost of capital which is $\rho_k = \overline{X}_j / V_j$. The difference between ρ_k^{τ} and the "true" average cost of capital is relevant when investment planning within the firm is considered.

Proposition III. MM proceeded to derive the following proposition:

Let ρ^* = the rate of return on the investment, and

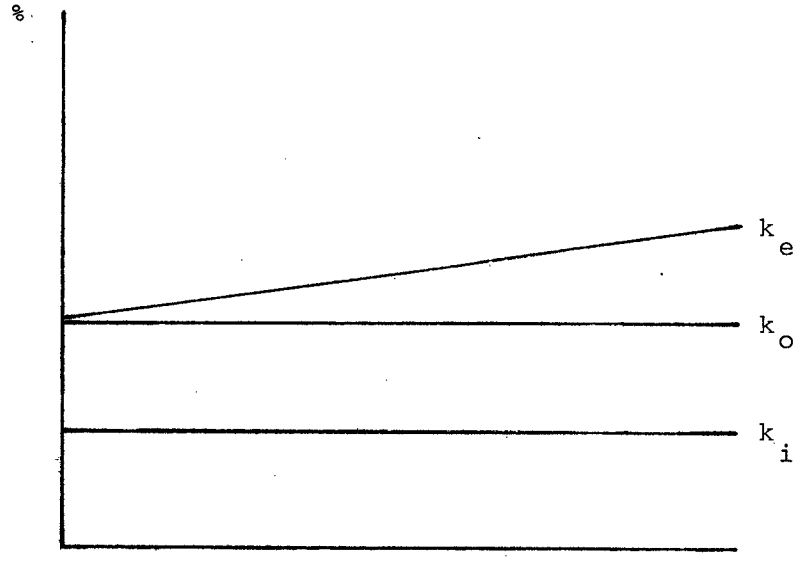
ρ_k = the average cost of capital.

If a firm in class k is acting in the best interest of the stockholders at the time of the decision, it will undertake an investment project if and only if $\rho^* \geq \rho_k$. That is, the cut-off point for investment in the firm will in all cases be ρ_k and will be completely unaffected by the type of security used to finance the investment.

The MM position is presented in Figure 4.

FIGURE 4

MODIGLIANI-MILLER VIEW



Durand questioned the MM assumed identity of corporate and personal leverage, noting the restrictions on margin borrowing.[4] In addition, Durand[5] noted the existence of other market imperfections, most notably brokerage commissions and tax considerations.

Since interest payments are deductible tax expenses for corporations and dividends are not, governmental taxing policy favors the use of corporate debt. MM came to agree that

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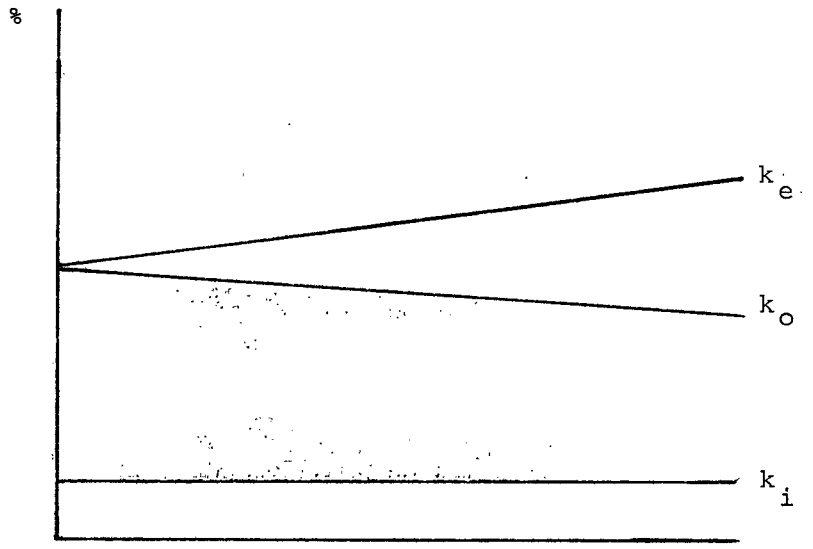
[4]David Durand, "The Cost of Capital, Corporation Finance, and the Theory of Investment: Comment," American Economic Review, (June,1963), pp.433-443; reprinted in: Archer and D'Ambrosia, op.cit., pp.160-176.

[5]Ibid., p.166.

corporate income taxes reduce the cost of debt, but except for this tax effect their position was unchanged.[6] The revised MM position is presented in Figure 5.

FIGURE 5

REVISED MODIGLIANI-MILLER VIEW



The deductibility of interest payments for corporate income tax purposes has reduced k_i, now defined as the after-tax cost of debt. By combining k_e with the cheaper k_i, the overall capitalization rate, k_o declines with every increase in debt.

D. Why 100% Debt Financing May Be a Disadvantage

In the previous section, MM came to recognize that with the introduction of corporate income taxes, the cost of capital

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[6] F.Modigliani and M.Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," American Economic Review, (June,1963), pp.433-443; reprinted in Archer and D'Ambrosio, op.cit., pp.192-202.

can be lowered with leverage. The greater the leverage, the higher the total value of the firm and the lower its cost of capital. Is it reasonable to conclude that debt financing should always be preferred to equity financing? Robichek and Myers examined the conditions under which debt financing may be disadvantageous.[7]

Robichek and Myers argued that market imperfections prevented the full operation of the arbitrage process MM described. In this case, MM's Proposition I would not hold in real life. Instead they postulated the traditional U-shaped cost of capital curve. In this case, there are obvious disadvantages associated with high degrees of debt financing. They further argued that the assumption of unchanged investors' estimates of the amount and riskiness of the firm's expected earnings before interest and taxes as a result of the firm's choice between debt and equity may not be correct.

To earn a constant expected income, the firm will have to reinvest a portion of its annual cash flows in order to maintain its income-producing assets. The actual amount of investment is dependent on the firm's actual future income which may be more or less than the estimated income. If the firm's actual future income is consistently larger than the estimated income, the firm would be expected to increase its yearly investment in order to expand the firm further. If it is less, the firm's managers would be expected to take a more conservative approach to reinvesting the firm's actual future cash flows. As a consequence,

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[7] A.Robichek and S.Myers, Optimal Financing Decisions, (Englewood Cliffs, N.J.: Prentice-Hall, Inc.,1965), pp.40-42.

the estimates of the amount and riskiness of the expected income must reflect some assumptions regarding the expected strategy of the firm's managers when faced with unexpected events.

It is reasonable to expect a firm's future investment strategy to be changed by the substitution of debt for equity in the firm's capital structure if a highly levered firm may be forced to pass up profitable investments which an unlevered, but otherwise identical, firm would be able to undertake. Consider the case of a highly levered firm finding itself in a situation where insufficient funds are available to meet fixed charges to creditors and to make all planned investments. Assume that there are no corporate income taxes. Two alternative courses of action are available to the levered firm.

First, the firm may not make all planned investment. If the present value of these foregone investments is positive, then the total value of the firm will decline. Second, in perfect markets, planned investment would not be reduced since additional financing would always be available at the cost of capital. The firm's planned investment would be reduced only if market imperfections limit the financing available to the firm at the cost of capital.

These market imperfections appear to exist, however, particularly for highly levered firms experiencing poor operating results. Difficulties in borrowing may arise because of restrictions imposed by creditors on the financial policies of the firm, or because of the unwillingness of institutional investors to lend funds to "unsafe" concerns. Similar considerations apply to

possible new equity shares issues.

The attempt to issue stock in the face of poor operating results may be interpreted as a sign of weakness by the market. If so, prospective shareholders would be willing to purchase the firm's stock only at a substantial discount from the intrinsic value of the shares. These market imperfections may interrupt the firm's planned investment.

It is reasonable to expect financial managers to attempt to avoid situations in which the value of the firm would be reduced because of unavailability or high cost of additional financing. Investments considered highly risky could be avoided, for example. On the other hand, dividends could be reduced in order to build up a liquid balance of cash or marketable securities. These alternatives represent changes in the firm's investment strategy.

E. Corporate Debt Capacity

In spite of the practical difficulties associated with the determination of cost of capital and optimal capital structure, businessmen cannot escape the problem. Donaldson[8] has studied the attitudes, practices and justifications of corporations and their managements toward the use of debt financing.

In general, corporate managements are well aware of the advantages[9] and risks associated with financial leverage. Businessmen appear to shun the direct computation of cost of capital

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[8] Gordon Donaldson, Corporate Debt Capacity, (Boston, Massachusetts: Harvard University Press, 1967).

[9] Ibid., p.68.

and tend to rely upon a wide range of decision rules to determine the proper level of debt financing. The debt-to-equity ratio itself is an important decision rule.[10] Firms evidently through experience determine an appropriate level of debt for their operations. Another popular decision rule is the earnings coverage standard.[11] By this rule, the net income or the income before interest and taxes, the amount available for fixed charges, of the firm must be at least a certain number of times the interest payments and other fixed charges. Such a standard has the advantage of focusing attention upon the payment of interest and other fixed charges, but shares the disadvantage of any arbitrary standard in possibly fostering non-optimal decisions.

Scanlon[12] examined the financial policies followed by the Bell System and found that in determining the amount of debt a firm could safely carry, it was necessary to consider the basic risks inherent in that business. This varies considerably among industries and is related essentially to the nature and demand for an industry's product, the operating characteristics of the industry, and its ability to earn an adequate return in an unknown future. All of these factors have entered into determination of Bell System debt ratio policy. In addition, the need to maintain high-grade credit standing has also influenced Bell System debt ratio policy. Since there are risks associated with debt financing, the next chapter will examine the question of risks.

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[10] Ibid., pp.100-102.

[11] Ibid., pp.103-105.

[12] John Scanlon, "Bell System Financial Policies," Financial Management, (Summer,1972), pp.16-26.

F. Summary

Proponents of the traditional position argue that there is an optimal capital structure and that the firm can increase the total value of the firm through the judicious use of leverage. When we allow for corporate income taxes, the impact of leverage is even greater. They further argue that the cost of capital must rise with extreme leverage owing to increased financial risk. Consequently, the optimal capital structure is not one that calls for the maximum use of debt.

Proponents of the MM position, on the other hand, argue that the total value of the firm must be the same regardless of its financing mix because of the presence of arbitrage in the capital markets. However, they recognize that with the introduction of corporate income taxes, the cost of capital can be lowered with leverage. Their position implies that a firm can lower its cost of capital continually with increased leverage. The greater the leverage, the higher the total value of the firm and the lower its cost of capital. However, the MM position is on the weakest ground when leverage is extreme.

Since there are risks associated with debt financing, Chapter IV will consider the question of risks. As a consequence, an investor would require a higher risk premium to compensate him for the risk associated with debt financing.

CHAPTER IV

SYSTEMATIC RISK

Since there are risks associated with debt financing, an investor would require a higher risk premium to induce him to invest in a highly levered firm.

Chapter IV is organized into five major parts. Part A discusses the concept of risk. Part B is concerned with the measurement of risk. Part C discusses efficient portfolios and the effects of diversification. Part D differentiates between systematic and unsystematic risks. Part E examines the relationship between risk and return.

A. The Concept of Risk

The conceptual definition of "risk" employed in this study is taken specifically from Sauvain.[1] In the context of Sauvain's theory, "risk" refers to the estimated degree of uncertainty with respect to the magnitudes of expected future receipts by owners of securities. These expected future receipts may be of two kinds: (1) income and (2) repayment or recovery of principal. Income may be in the form of interest, in the case of debt instruments, or in the form of dividends, in the case of equity instruments. Recovery of principal may take the form of repayment by the issuers of the securities or amounts received upon sale of securities in the market.

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[1]Harry Sauvain, Readings in Investment Management, (Bloomington, Indiana: Bureau of Business Research, Indiana University, 1965), pp.2-3, 5-10.

Sauvain classified risk according to the source of the uncertainty, the principal classifications being financial risk, interest rate risk, and purchasing power risk. "Financial risk" means "uncertainty of the size of amounts that an issuer of a security will pay to investors in that security in the future because of changes in the financial ability (or willingness) of the issuer to pay."[2] In the case of a security where recovery of principal depends on sale in the open market rather than on repayment by the issuer, as is the case with common stocks, the concept of financial risk also includes uncertainty as to the amount for which the security can be sold in the market, and this reflects psychological as well as financial factors which affect market prices.

"Interest rate risk" means "uncertainty of future market value of securities and uncertainty of the size of future income from securities upon reinvestment caused by fluctuations in the general level of interest rates in the capital markets."[3]

"Purchasing power risk" is defined as the "uncertainty of the purchasing power of amounts to be received by investors in the future in the form of income and principal recovered by sale of securities or redemption of debt ... caused simply by the fluctuation in the general level of prices ... (i.e.) in the cost of living."[4]

"Risk" as used in this study, refers largely to financial

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[2] Ibid., Chapter II, p.3.

[3] Ibid., Chapter III, p.2.

[4] Ibid., Chapter IV, p.1.

risk, as defined above, since all the dividends and a considerable portion of the fluctuations in the market price depend on the ability and willingness of issuers to make payments and on investors' appraisals of the issuers' ability and willingness. To the extent that changes in the level of interest rates in the capital markets affect the market prices of the stocks, the concept of risk employed here also reflects interest rate risk. Similarly, purchasing power risk is reflected only to the extent that considerations of purchasing power risk affect market prices of stocks.

Thus, the concept of "risk" as used in this study, refers to the estimated degree of uncertainty with respect to realization of expected future rates of return, measured in current dollars, which represent a combination of (1) expected future dividends and (2) an expected market price at some future time.

B. The Measurement of Risk

Perhaps the most widely-used single statistical measure of risk has been the standard deviation of annual rates of return for a security. This measure has been used by Markowitz,[5] Lintner,[6] Sharpe,[7] and others. It focuses directly on the

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[5]Harry Markowitz, Portfolio Selection: Efficient Diversification of Investments (N.Y.: John Wiley & Sons, Inc., 1959).

[6]John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, (February, 1965), pp. 13-37.

[7]William Sharpe, "Risk-Aversion in the Stock Market: Some Empirical Evidence," Journal of Finance, (September, 1965), pp. 416-422.

variable of ultimate concern to the investor, that is, the rate of return received. This variable reflects a great many underlying influences, such as earnings, dividends, investors' expectations, and psychological and financial market factors. The present analysis is in full sympathy with the focus on stability of the rate of return to the investor as the relevant variable in an attempt to measure risk.

There are, however, three modifications of the traditional procedure for analyzing the stability of rates of return that have certain conceptual or operational advantages to commend them for use in attempting to measure the relative degrees of risk associated with different securities. These three modifications of the traditional measurement have been incorporated in this study, each for a different reason. They concern (1) the frequency of observation of rates of return; (2) the relationship of the period over which risk is measured to the period over which relative returns are measured, and (3) the formula for measuring the stability of the observed rates of return.

Since the data on the Toronto Stock Exchange (TSE) tape are available on a monthly basis, it would be possible to measure stability of rates of return using monthly observations directly, or to derive observations on a quarterly or annual basis. It seems desirable to take observations more frequently than annually, since considerable significant fluctuation in security prices may take place within a year.

It has been noted that investors' expectations are not directly measurable, and therefore some assumption(s) must be

made to justify the choice of a measurable proxy to represent an approximation of such expectations. The particular assumption most commonly made in this respect in earlier investigations is the one used by Sharpe,[8] that is, investors were infallibly precise in predicting both the variability and levels of future returns. This rationale was used to justify the use of ex post values of standard deviations of rates of return (the actual values realized during the hypothetical holding periods for the stocks in question) as surrogates for investors' expectations.

It seems at least as reasonable, however, to consider variability of rates of return during some past period as proxy for investors' expectations of risk in the future as of any given point in time, which would imply that investors based their judgment of risk on pure extrapolation of observable past data. The extrapolation premise has one important advantage over the omniscience premise: the degree of risk can be measured at the time one may wish to examine characteristics of securities in connection with making an investment decision.

Therefore, this study used variability of rates of return observed in the past as a proxy for the uncertainty of investors' expectations regarding the security's future performance.

The measure of stability of rates of return commonly employed in other studies, such as those previously cited, has been the standard deviation of annual rates of return for a

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[8] William Sharpe, op. cit.

security over time, or the second moment about the arithmetic mean of the consecutive yearly rates of return. However, if a measure of dispersion around some measure of central tendency is to be most meaningful for any given purpose, it seems that the dispersion should be measured around that measure of central tendency which is most appropriate to the data and to the purpose for which the data is used.

By using the arithmetic mean as a measure of central tendency for a compound time series, such as rates of return on an investment portfolio over successive time periods, an upward bias is introduced. To the extent that the rate of return varies between one time period and another, the arithmetic mean rate of return will be higher than the discounted present value rate of return.

It is assumed in this study that all dividends are reinvested in the stock of the firm which made the payment, and that no withdrawals are made from the investor's portfolio until the entire portfolio is sold at a predetermined date. Under these assumptions, the geometric mean is the appropriate measure of central tendency to be used to represent the "average" rate of return for the period. However, the geometric rate of return assumes that all proceeds are reinvested and therefore varies in size.

In this study, when we mention rate of return, we will be referring to the single interval measure given by the following equation:

$$R_p = \frac{V_1 - V_0 + D_1}{V_0} \qquad (1)$$

where

V_1 = the portfolio market value at the end of the interval,

V_0 = the portfolio market value at the beginning of the interval,

D_1 = cash distributions to the investor during the interval.

C. Efficient Portfolios and Diversification

All risk concepts have been based on the utility function of each investor's wealth. A von Neuman-Morgenstern type of utility function can be written as:

$$\text{Max. } U\,[E(W_t)] \qquad (2)$$

where

U = utility, and

W = wealth.

In addition, the return on investment can be written as:

$$R_t = \frac{W_t - W_{t-1}}{W_{t-1}} \qquad (3)$$

where

W_t = wealth at the end of the period t,

W_{t-1} = wealth at the beginning of the period t.

Rewriting equation (3), we have the following:

$$W_t = RW_{t-1} + W_{t-1} \tag{4}$$

Because wealth in a certain period (W_t) is a function of return on investment, the maximum utility function is that of R:

$$\text{Max. } U\,[E(R)] \tag{5}$$

where

E(R) = the expected value of the return on investment.

Markowitz[9] synthesized the two concepts of maximization of discounted return and risk-aversion into an explicit portfolio model. He developed the two-parameter rule which consists of expected value and risk as represented by variance. He used two equations. The first is as follows:

$$E(R_p) = \sum_{i=1}^{N} X_i E(R_i) \tag{6}$$

where

$E(R_p)$ = the expected return on portfolio p,
X_i = the proportion invested in security i,
$E(R_i)$ = the expected return on security i.

This equation states that the expected return of a portfolio is the sum of the product of the individual return and the proportion invested in each security.

The second equation is as follows:

$$\sigma^2(R_p) = \sum_{i=1}^{N} \sum_{j=1}^{N} X_i X_j \text{Cov}_{ij} \tag{7}$$

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[9]Harry Markowitz, op.cit.

where

$\sigma^2(R_p)$ = the variance of the return on portfolio p,
X_i = the proportion invested in security i,
X_j = the proportion invested in security j,
Cov_{ij} = the covariance between the returns of security i and security j.

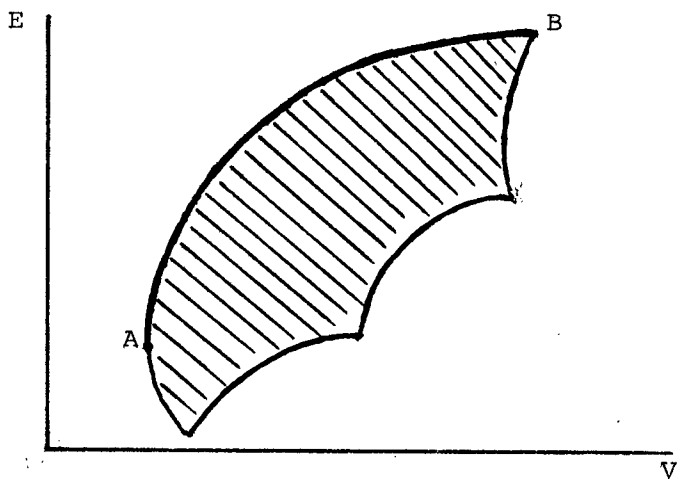
This equation states that the variance of the return of the portfolio is the sum of the variance of each security's return and the covariance between the returns of the two securities included in the portfolio.

$$\text{Max. } U = f\,[E(R_p), \sigma^2(R_p)] \tag{8}$$

Because each combination of securities has an expected value and variance, the investor has a choice of various combinations of $E(R_p)$ and (R_p), depending on his choice of portfolio defined by the $X_1, X_2, \ldots, X_\eta$. Markowitz suggested attainable E-V combinations as represented by the shaded area in the following figure.

FIGURE 6

ATTAINABLE E-V COMBINATIONS



Even though attainable E-V combinations are feasible for the rational investor, not all of them are efficient. A risk-averse investor would not take more risk without more return. The efficient combinations show that additional variance should be accepted for an increased return. In Figure 4, AB is the set of efficient combinations of expected return and risk.

The diversification phenomenon can be characterized quantitatively. Consider two different common stocks. Assume that they both have the same expected return, E(R). If part of the wealth available for investment, X_1, is allocated to one stock and the remaining part, $X_2 = 1 - X_1$ is invested in the other, the expected return on this two-stock portfolio is a weighted average of the two expected returns, that is,

$$E(R_p) = X_1 E(R) + X_2 E(R) = E(R) \tag{9}$$

The expected return on the portfolio is thus equal to that of either stock, since it is assumed that they are the same.

From equation (7), the variance of the two-stock portfolio is calculated as follows:

$$\sigma^2(R_p) = X_1^2\sigma_1^2 + X_2^2\sigma_2^2 + 2X_1X_2\,Cov_{12} \tag{10}$$

where

σ_1^2 = the variance of the return of security 1,

σ_2^2 = the variance of the return of security 2,

X_1 = the proportion invested in security 1,

X_2 = the proportion invested in security 2,

Cov_{12} = the covariance between the returns of security 1 and security 2.

The covariance term is crucial to the effect of diversification. If the two securities fluctuate in price independently of each other, then the covariance term is zero, and it is always possible to choose the relative proportions, X_1 and X_2 in such a way that the risk of the portfolio is smaller than that of either security taken separately. This is due to the effect of squaring numbers less than one. For example, when $\sigma_1^2 = \sigma_2^2$ and the covariance is zero, the risk of a portfolio of equal investment in each security is:

$$\sigma_p^2 = (.5)^2\sigma_1^2 + (.5)^2\sigma_2^2 = .5\sigma_1^2 \qquad (11)$$

Thus, the portfolio has a variance equal to only one-half of the variance of either security. Since the expected return is not reduced, such a portfolio is clearly preferable to a single-security portfolio for any risk-averse investor.

Typically, two securities exhibit some positive comovement; therefore the covariance term cannot be realistically assumed to be zero. The reduction of risk in that case is not as large as if the two securities were independent, but it can always be made smaller than the simple average risk of the two securities. Hence, diversification results from holding securities having less than perfect correlation among their returns in order to reduce portfolio risk.

Wagner and Lau[10] divided a sample of 200 New York Stock Exchange stocks into six subgroups based on the Standard and

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[10]Wayne Wagner and Sheila Lau, "The Effect of Diversification on Risk," Financial Analysts Journal, (November/December, 1971), pp. 48-53.

Poor's Stock Quality Ratings as of June 1960, and found that additional diversification by increasing the number of holdings in the portfolio results in rapidly diminishing reduction in risk.

D. Systematic and Unsystematic Risks

Another important conclusion of the Wagner and Lau[11] study is that while some risks can be washed away through diversification, others cannot. Thus, it is necessary to distinguish between a firm's "unsystematic" risk, risk which can be eliminated by combining the security with other securities in a diversified portfolio, and its "systematic" risk, the portion of risk which cannot be washed away through diversification. Sharpe[12] was first to consider the idea of risks as consisting of two components and also coined the term "systematic". By increasing diversification, the unsystematic risk gradually tends to be eliminated, leaving only systematic risk, the portion of total risk which is related to the overall performance of the market. For this reason, systematic risk is also referred to as market-related risk. The implication is that the return on a well diversified portfolio is highly correlated with the market, and its variability is essentially a reflection of the variability of the market as a whole. Irrespective of the number of holdings in a diversified portfolio, investors cannot avoid market

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[11] Ibid.

[12] William Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, (September, 1964), pp. 425-442.

risk. King[13] estimated that as much as 50% of the price fluctuation of a particular firm can be explained by overall market movements, and some 10% by the fluctuation of that industry. The remaining 40% fluctuation is that due to the characteristics of the individual firm.

E. Systematic Risk and Return

The Capital Asset Pricing Model (CAPM), as derived by Sharpe,[14] Lintner,[15] and others, provides a theoretical relationship between risk and return of a capital asset under conditions of market equilibrium. Basically, the model asserts that, under certain assumptions, the expected rate of return on the jth security, denoted by $E(R_j)$, is a linear function of a risk-free borrowing and lending rate, R_f and the expected return on a market factor such as the Standard and Poor 500 Stock Index, $E(R_m)$:

$$E(R_j) = R_f + \beta_j [E(R_m) - R_f] \qquad (12)$$

where β_j is a measure of the volatility of the jth security relative to the market factor, or a measure of systematic risk. Mathematically, $\beta_j = \text{Covariance}(\tilde{R}_j, \tilde{R}_m) / \sigma^2(\tilde{R}_m)$ where the tilde above the variable denotes a random variable. The principal theoretical assumptions of the model are as follows:

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[13]Benjamin King, "Market and Industry Factors in Stock Price Behavior," Journal of Finance, (January,1966), pp.139-190.

[14]William Sharpe, op.cit.

[15]John Lintner, op.cit.

(a) All investors are single-period, risk-averse, expected utility maximizers.

(b) Investors have homogeneous expectations about future returns for each security.

(c) Investors' perceptions about all securities may be summarized by the first two moments of the probability distribution of a security's return.

(d) Investors may lend or borrow as much as they like at a single risk-free rate.

(e) There are no transactions costs or taxes and each security is perfectly divisible.

It should be noted that the model is stated in terms of expectations. Therefore, equation (12) is not directly observable. It is a theoretically based result. However, it may be estimated using the market model of Sharpe.[16] This involves computing the parameters for the following time series regression model:

$$\tilde{R}_{j,t} = \alpha_j + \beta_j \tilde{R}_{m,t} + \tilde{\varepsilon}_{j,t} \qquad (13)$$

where t represents the individual periods, and α_j and β_j are parameters obtained using the ordinary least-square technique of regressing periodic observations of the jth security's return, $\tilde{R}_{j,t}$, on temporally corresponding observations of the market index returns, $\tilde{R}_{m,t}$. The $\tilde{\varepsilon}_{j,t}$ is the random error term and represents the unsystematic risk of the jth security.

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[16] William Sharpe, Portfolio Theory and Capital Markets, (New York, New York: McGraw Hill Book Company, 1970), p.118.

In other words, $\tilde{\varepsilon}_{j,t}$ is a reflection of the characteristics unique to the jth firm. In addition, the following principal statistical assumptions hold:

$$E(\tilde{\varepsilon}_{j,t}) = 0 \tag{14}$$

$$E(\tilde{\varepsilon}_{j,t}, \tilde{\varepsilon}_{j,t-1}) = 0 \tag{15}$$

$$E(\tilde{\varepsilon}_{j,t}, \tilde{\varepsilon}_{i,t}) = \begin{cases} 0 & (\text{for } j \neq i) \\ \sigma^2 & (\text{for } j = i) \end{cases} \tag{16}$$

Equation (14) states that the expected value of the error term is zero. It follows from this equation that the investor is not compensated for bearing unsystematic risk. Equation (15) asserts that no correlation exists between successive error terms. Finally, equation (16) asserts that the expected value of the error term is zero when the jth security is not equal to the ith security, and the variance when the jth security and the ith security are equal.

Given that equation (14) holds, equation (13) can be approximated as follows:

$$E(\tilde{R}_j) = \alpha_j + \beta_j E(\tilde{R}_m) \tag{17}$$

The parameters α_j and β_j can be obtained from the ordinary least-squares technique. Therefore, given the market return, the expected return of the jth firm can be computed.

As noted by Weston, "the great advantage of the Capital Asset Pricing Model is that all its factors other than β are

marketwide constants."[17] From this observation, Weston demonstrated an equivalent method of computing β directly without having to resort to regression analysis.

If the concept of systematic risk is to be of practical use in evaluating and selecting portfolios, it must be stationary through time. That is, the investor selecting a portfolio must be able to use past historical data to obtain estimates which will be a good indication of future risk. Furthermore, in evaluating portfolios, it is important to be able to assume that the riskiness of the portfolio has not changed over the period under consideration. Blume[18] demonstrated that a firm's systematic risk (β) is (a) fairly stable over time, (b) can be forecast very accurately using historical data, and (c) generally tends to the market β as a whole.

The implication from the foregoing is that if the economic environment is stable, if industry characteristics do not change, and if management policies have continuity, the measure of systematic risk will be relatively stable over the period under consideration.

Levy[19] like Blume tested for the stationarity of the β coefficients using weekly data for 500 common stocks listed on the New York Stock Exchange over the period 30th December 1960

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[17]Fred Weston, "Investment Decisions Using the Capital Pricing Model," Financial Management, (Spring,1973), p.25.

[18]Marshall Blume, "On the Assessment of Risk," Journal of Finance, (March,1971), pp.1-10.

[19]Robert Levy, "On the Short-Term Stationarity of Beta Coefficients," Financial Analysts Journal, (November/December, 1971), pp.55-62.

through 18th December 1970. The results were essentially the same as those of Blume. That is, past risk is an excellent proxy for future risk. Both studies used two measures of statistical association: product moment correlations and rank order correlations, for the test of stationarity.

Testing for the stationarity of the β coefficients is outside the scope of this study. As a consequence, it is assumed that the β coefficients obtained by regressing the individual security's return on the market return are relatively stable and therefore can be used as proxies for future risks.

F. Summary

Since there are risks associated with debt financing, an investor would require a higher risk premium to induce him to invest in a highly levered firm. Because the Capital Asset Pricing Model explicitly considers uncertainty and risk, it represents the best description of the risk-return relationship currently available. If the Capital Asset Pricing Model is correct, then powerful firms can earn a higher return only at a higher risk. Therefore, we would expect those with great market power and higher return to have higher β coefficients.

The next two chapters will examine the methodology and empirical results for the test of the hypothesis stated in Chapter I.

CHAPTER V

METHODS AND RESULTS

Chapter V is organized into four major parts: (A) the data used in this study, (B) the methods of analysis, (C) the empirical results, and (D) the evidence concerning corporate debt capacity.

A. The Data

This study is based on the analysis of 21 major manufacturing industries for which data are recorded in the Corporations and Labour Unions Returns Act Reports (CALURA), Corporation Financial Statistics (CFS), Corporation Taxation Statistics (CTS) and annual reports. The manufacturing sector in Canada is large and important, and it is desirable to add to the knowledge of its structure. In 1965, for example, manufacturing activity accounted for roughly 25 percent of gross domestic product at factor cost, 25 percent of employment, and 28 percent of wages and salaries.[1]

The data in this study cover the time period 1962 through 1969 inclusive and are taken from the 21 manufacturing industries shown in Appendix A, which also includes the number of firms contained in each industry by year. The assumption is that it is a sufficiently long period to achieve two major benefits. First, economic theory demonstrates that even perfectly competitive

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[1]Department of Consumer and Corporate Affairs, Concentration in the Manufacturing Industries of Canada, (Ottawa: Queen's Printer and Controller of Stationary, 1971), p.13.

markets may endure short-run adjustment periods during which profits and prices above the competitive are possible. Second, corporate managements have discretion under modern accounting procedures in timing the recognition of revenues and expenses. Averaging over a number of years minimizes any potential short-run fluctuations attributable to the above factors.

The manufacturing industries chosen for inclusion in the study must meet the following criteria. First, the industries must not be missing any data for the variables; assets, equity, sales, profits and interest expense over the period 1962 through 1969. Second, for the statistical testing to be meaningful, it is necessary that the industries selected represent a broad spectrum of business risk. The industries were chosen on an a priori basis, and not according to any measure of variability. Essentially, the same method has been used by Wippern.[2] The principal aim is to provide a heterogeneous sample.

This study considers the entire population in each of the 21 manufacturing industries. It is believed that this procedure would provide a high degree of statistical precision. In addition, since the financial data are all taken from the same source, consistency in the treatment of the basic accounting information, a condition vital to this study, is ensured. The following data were compiled for each industry for the average of the years between 1962 and 1969.

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[2]Ronald Wippern, "Financial Structure and the Value of the Firm," Journal of Finance, (December,1966), pp.615-633.

Assets: Included are cash, marketable securities, accounts receivable, inventories, fixed assets, investments in affiliated corporations and other assets. The amounts reported are those shown on the balance sheets of corporations after deducting allowances for doubtful accounts, amortization, depletion and depreciation.

Equity: This represents the shareholders' interest in the net assets of the corporation and generally includes the total amount of all issued and paid-up share capital, earnings retained in the business and other surplus accounts such as contributed and capital surplus.

Common Equity: This includes common stock at par or stated value plus paid-up surplus, retained earnings and surplus reserves.

Sales: The figure reported as sales is gross revenues from non-financial operations.

Profits: This comprises net earnings from operations, investment income and net capital gains. Profits are reported after deducting allowances for amortization, depletion and depreciation but before income tax provisions or declaration of dividends.

Interest Expense: This consists of interest and discount expense paid on debentures and mortgage bonds, guaranteed trust certificates and investment certificates.

As noted earlier, data for this study came from published public reports prepared in accordance with generally accepted accounting principles. As such, the data possessed several

limitations for the measurement requirements of this study. Although corporate managers do not have the ability to create income over the life of the enterprise by selecting from among various accounting procedures, they do have a degree of control over the timing of the recognition of revenues and expenses. As a consequence, they do have a degree of control over income reporting and asset valuation. Inter-industry comparisons of income or asset values could, in the short run, draw bias from the income recognition and asset valuation procedures employed in particular industries. By assumption, eight-year averages minimized the effects of this limitation.

Corporations carry assets at historical costs which may or may not represent current values. Clearly some firms, especially older firms and firms with large holdings of non-depreciable land, have understated asset values. These differences in asset valuation limit the conclusions of this study.

Ideally this study should deal with the coverage of fixed charges with leases and preferred stock viewed as debt. Because of lack of data, this study was forced to use the book values of common equity to total assets as the measure of financial leverage. As a consequence, the results may be biased in favor of low leverage use. It did not use market values for two reasons. First, the market value of common equity could reflect the capitalized value of future monopoly profits, the precise value to isolate. Second, market values would require enormous time and effort to compile.

B. Methods of Analysis

Three methods of market power classification were used in this study. The first approach classified the 21 manufacturing industries into three market power groups according to relative average asset size. Asset size is believed to be a measure of market power because it represents a capital barrier. It is the difficulty of financing large lumps of assets that limits entry to certain fields. In addition, the assets of a firm measure, to some degree, its ability to spread losses. As a consequence, there is some spreading of risk as assets increase.

The actual average assets for each industry - total assets divided by the number of firms -- was calculated for the average of the years between 1962 and 1969. This was done for reasons cited in the previous section. Then on the basis of the actual average assets, each industry was assigned to one of three market power groups: (1) Bottom group - average assets below $1,000,000, (2) Middle group - average assets between $1,000,000 and $5,000,000, and (3) Top group - average assets above $5,000,000.

As noted in the previous section, this study used the book values of common equity to total assets to capture the essence of an industry's financial structure. This was the measure employed in a 1967 study by Schwartz and Aronson[3] and a 1975 study by Scott and Martin.[4] In addition to the reasons cited in

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[3]Eli Schwartz and J.Richard Aronson, "Some Surrogate Evidence in Support of the Concept of Optimal Financial Structure," Journal of Finance, (March,1967), pp.10-18.

[4]David Scott, Jr. and John Martin, "Industry Influence on Financial Structure," Financial Management, (Spring,1975), pp.67-73.

the previous section for using the common equity ratio as the measure of leverage, Schwartz and Aronson[5] pointed out that sources of capital carrying prior claims on income and assets are to a high degree substitutable for one another.

The average common equity ratio in the financial structure for each industry was calculated for the average of the years between 1962 and 1969. This was done for each of the 21 manufacturing industries. Then arranging the industries by market power groups based on average asset size permitted mean equity ratios to be derived for each of the market power groups in the sample.

However, this approach suffers from a drawback. The cut-off points between the three market power groups are specified by the researcher and as such are essentially arbitrary.

To avoid the pitfall of non-representative groupings, a second approach was followed. The second approach, instead of using average asset size, employed concentration ratio, that is, the percentage of industry shipments by the largest four firms, as a measure of market power.

Other things being equal, the smaller the number of leading firms which account for a large proportion of an industry's output, the more highly concentrated is the industry and the more economic power it enjoys. Highly concentrated industries have this power because the presence of only a few rivals enables them to act inter-dependently.

The percentage of industry shipment by the largest four firms for each industry was computed for the average of the years

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[5]Eli Schwartz and J.Richard Aronson, op.cit., p.11.

between 1962 and 1969. Then arbitrarily selecting 70 percent as the cut-off point, each industry was assigned to one of two market power groups depending on whether its concentration ratio was above or below the cut-off point. This procedure suffers from the same drawback noted earlier. The cut-off point is specified by the researcher and thus essentially arbitrary. Except for the leather products industry, the industries that fall in the top and middle average asset groups also belong to the above 70 percent concentration group. The leather products industry which falls in the bottom average asset size group now belongs to the above 70 percent concentration group.

With the data classified in this manner, it was possible to test for significant differences in the mean equity ratios among various market power groups. The analysis of variance was the statistical test employed. It tests the null hypothesis that the difference among the population means of the various groups sampled is zero. If the variability of sample means among market power groups is significantly greater than within groups, the null hypothesis is rejected. Such a rejection would imply that the differences in financial structure between the market power groups are deliberate rather than occurring by chance.

To throw more light on the results, a third procedure employing simple regression analysis was followed. The hypothesis to be tested by simple regression analysis was formulated as follows:

$$LEVERAGE = a + b.POWER$$

In other words, leverage is assumed to be dependent upon market power. The measure of market power is the percentage of industry sales by the largest four firms for each industry. This was computed for the average of the years between 1962 and 1969. Similarly for the dependent variable, the mean ratio of debt plus leases plus preferred equity to total assets of the four largest firms for each industry is the measure of financial leverage. This was computed for the average of the years between 1962 and 1969. Thus, for the regression, there are 21 sets of observations.

However, since there is only one independent variable, the coefficients may be biased to the extent that there may be significant variables missing from the equation. We will return to address this problem in the next chapter when we discuss the Capital Asset Pricing Model.

C. Empirical Results

Table 21 presents a summary of mean equity ratios for the 21 industry sample divided into three market power groups based on relative average asset size: top, middle, and bottom; the computed F-ratios, and the critical F-ratios needed for significance at both the 1% and 5% levels. The reader is referred to Appendix B for a more complete data presentation.

TABLE 2

MEAN COMMON EQUITY RATIOS (COMMON EQUITY/TOTAL ASSETS) FOR TWENTY-ONE INDUSTRIES, 1962 - 1969 , CLASSIFIED BY AVERAGE ASSET SIZE AND RESULTS OF THE ANALYSIS OF VARIANCE

AVERAGE ASSET SIZE	MEAN COMMON EQUITY RATIOS 1962-1969
TOP GROUP (6 INDUSTRIES)	56.89
MIDDLE GROUP (9 INDUSTRIES)	50.83
BOTTOM GROUP (6 INDUSTRIES)	45.71
COMPUTED F-RATIO	4.48
DEGREES OF FREEDOM	2;18
CRITICAL F-RATIO	
1% LEVEL	6.01
5% LEVEL	3.55

Table 3 presents a summary of mean equity ratios for the 21 industry sample divided into two market power groups based on industry concentration ratios: industry concentration ratio above 70 percent and industry concentration below 70 percent. Included in the table are computed F-ratios and the critical F-ratios needed for significance at both the 1 percent and 5 percent levels.

TABLE 3

MEAN COMMON EQUITY RATIOS (COMMON EQUITY/TOTAL ASSETS) FOR TWENTY-ONE INDUSTRIES, 1962-1969, CLASSIFIED BY INDUSTRY CONCENTRATION AND RESULTS OF THE ANALYSIS OF VARIANCE

INDUSTRY CONCENTRATION	MEAN COMMON EQUITY RATIOS 1962-1969
ABOVE 70% GROUP (9 INDUSTRIES)	55.14
BELOW 70% GROUP (12 INDUSTRIES)	48.07
COMPUTED F-RATIO	5.69
DEGREES OF FREEDOM	1;19
CRITICAL F-RATIO	
1% LEVEL	8.18
5% LEVEL	4.38

Table 4 presents the results of the regression of the percentage of fixed charges to total assets by the leading four firms on the percentage of industry sales by the leading four firms.

TABLE 4

RESULTS OF THE REGRESSION OF THE PERCENTAGE OF FIXED CHARGES TO TOTAL ASSETS BY THE LEADING FOUR FIRMS ON THE PERCENTAGE OF INDUSTRY SALES BY THE LEADING FOUR FIRMS FOR TWENTY-ONE INDUSTRIES FOR THE AVERAGE OF THE YEARS BETWEEN 1962 - 1969.*

a	b	F-RATIO	R^2	S.E.	D.W.
26.0500	-0.0129	0.0260	0.0014	8.155	1.395
(5.5793)	(-0.1613)				

*t-statistics shown in parentheses below the coefficients: $t_{0.005} = 2.861$, $t_{0.01} = 2.539$, $t_{0.05} = 1.729$.

As the tabulation in Table 2 and Table 3 indicates, the null hypothesis is rejected at the 5% level of significance. The resulting inference is that the financial structures of the various market power groups are significantly different. In fact, in contrast to the expected positive relation between market power and leverage, the relation is inverse.

As Table 2 indicates, the mean equity ratio of the top average asset size group (56.89) is significantly greater than that of the middle average asset size group (50.83) which in turn is significantly greater than that of the bottom average asset size group (45.71).

As Table 3 indicates, the mean equity ratio of the over 70 percent market concentration group (55.14) is significantly greater than that of the under 70 percent market concentration group (48.07). The statistical technique of analysis of variance tested for, and confirmed the significant differences at the 5% confidence level.

Table 4, on the other hand, indicates that leverage is not significantly correlated with market power even at the 20% level, although the negative slope coefficient is consistent with the earlier results. The low coefficient of determination, high standard error and a Durbin-Watson statistic with a value significantly different from two in a cross section regression suggest the possibility that a variable has been omitted from the equation. In addition, the high standard error suggests that market power is a poor predictor of leverage.

In summary, the results indicate that relatively powerful firms have less debt in their financial structures than

those with less market power, although market power cannot be used as a predictor of financial leverage. The findings as indicated in Tables 2 and 3 are compatible with those of Schwartz and Aronson.[6] That is, the various classes of industries have developed optimum financial structures conditioned by the intensity of their business risks.

However, Schwartz and Aronson tested for significantly different equity ratios for only four industries. The present study therefore examines the financial structures of twenty-one industries. The four broad classes of firms used by them bias the results in favor of the optimal financial structure concept. Their study is composed of a sample drawn from railroad, electric and gas utility, mining and industrial firms. It may be argued that the inclusion of utilities made the Schwartz and Aronson study simply a test of whether financial structure pattern of regulated industries differs significantly from that of unregulated industries. The twenty-one industries used here did not include regulated industries.

The findings suggest a conscious policy on the part of financial managers to adjust the composition of their sources of funds to the business risk to which the firms are exposed. If this were not the case, the variability of equity ratios within market power groups should be much greater. It appears that the financial structures of firms in a given market power group do cluster in a definite way, supporting the notion that a central relation between financial structure and the value of

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[6]Eli Schwartz and J.Richard Aronson, op.cit.

the firm is recognized by practicing financial managers. This explanation is supported by Scanlon who found that "in determining how much debt a firm can safely carry, it is necessary to consider the basic risks inherent in that business."[7] The fact that those with market power choose lower leverage leads one to conclude that relatively powerful firms take some of the exceptional returns in the form of reduced risks rather than through increased leverage.

Alternatively, this movement towards a more conservative financial structure is an understandable consequence of increased public pressure on powerful foreign-owned firms to increase their equity base so that a greater number of Canadians can participate in the ownership of the industries in their own country. In recent years, there has been increasing animosity towards foreign investment in Canada. Because approximately 80 percent of the powerful firms are owned by non-residents, financial managers of these firms have become increasingly concerned about the use of leverage. As a consequence, financial managers of these firms are being more cautious in their choice of leverage.

Rather than aggressively pursuing the objective of profit maximization, powerful firms are satisfied attaining a reasonable profit margin, while maintaining a high-grade credit rating with relatively less debt in their financial structures. Because of satisficing behavior, powerful firms forego a higher profit margin with the use of less debt and thus maintaining a high-grade credit rating.

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[7]John J.Scanlon, "Bell System Financial Policies," Financial Management, (Summer,1972), p.19.

D. Corporate Debt Capacity

Since the data clearly supported the alternative hypothesis that there is a significant difference in financial structure between the various market power groups, this study attempted to measure the relative debt capacity of the various groups. Two measures of debt capacity were examined: the ratio of earnings before interest and taxes to total assets (EBIT/TA), and the ratio of earnings before interest and taxes to interest expense (EBIT/IE).

Ideally, this study should deal with the coverage of fixed charges with leases and preferred equity viewed as debt. However, because of lack of data, this study was forced to use the imperfect substitute of coverage of interest expense.

The ratio of EBIT/TA measures the rate of return on a firm's total asset base independent of the effects of taxation and financial leverage. As such, this measure of profitability provides a good indication of debt capacity since the higher the EBIT/TA, the greater the ability of a firm's operations to support debt.

The second measure of debt capacity was the number of times earnings before interest and taxes covered interest expense. Thus, the greater the number of times a firm is able to cover its interest expense, the greater the debt capacity.

Table 5 presents a summary of average EBIT/TA and average EBIT/IE for the 21 industry sample divided into three market power groups based on average asset size: top group, middle group and bottom group. The reader is referred to Appendix C for a

more complete data presentation.

TABLE 5

AVERAGE EBIT/TA AND AVERAGE EBIT/IE FOR 21 INDUSTRIES, 1962-1969, CLASSIFIED BY AVERAGE ASSET SIZE

AVERAGE ASSET SIZE	AVERAGE EBIT/TA 1962-1969	AVERAGE EBIT/IE 1962-1969
TOP GROUP (6 INDUSTRIES)	12.71	20.11
MIDDLE GROUP (9 INDUSTRIES)	10.59	17.20
BOTTOM GROUP (6 INDUSTRIES)	8.40	13.33

Table 6 presents a summary of average EBIT/TA and average EBIT/IE for the 21 industry sample divided into two market concentration groups: industry concentration ratio above 70 percent and industry concentration ratio below 70 percent.

TABLE 6

AVERAGE EBIT/TA AND AVERAGE EBIT/IE FOR 21 INDUSTRIES, 1962-1969, CLASSIFIED BY INDUSTRY CONCENTRATION

INDUSTRY CONCENTRATION	AVERAGE EBIT/TA	AVERAGE EBIT/IE
ABOVE 70% GROUP (9 INDUSTRIES)	12.01	19.29
BELOW 70% GROUP (12 INDUSTRIES)	9.50	15.15

On the basis of both average EBIT/TA and average EBIT/IE powerful firms as measured by both average asset size and market concentration, could have supported more debt than less powerful firms. As Table 4 and Table 5 reveal, powerful firms enjoyed a higher return on assets and covered their interest expense more times than other less powerful firms. The empirical evidence suggests that powerful firms could have supported greater amounts of debt than they actually did with little danger of debt payment default. The possible reasons why they did not have been suggested in the previous section.

CHAPTER VI

METHODS AND RESULTS

Chapter VI is organized into two parts. Part A examines the empirical evidence concerning market power and return on equity. Part B examines the empirical evidence concerning risk and return.

A. Evidence Concerning Market Power and Return

The data were obtained from the same sources as those described in Chapter V. The method of market power classification used in this section is the percentage of industry shipments by the largest four firms. Ceteris paribus, the smaller the number of leading firms which account for a large proportion of an industry's output, the more highly concentrated is the industry and the more economic power it enjoys. Highly concentrated industries have this power because the presence of only a few competitors enables them to behave inter-dependently.

The percentage of industry shipments by the largest four firms for each industry was computed for the average of the years between 1962 and 1969. Then arbitrarily selecting 70 percent as the cut-off point, each industry was assigned to one of two groups depending on whether its concentration ratio was above or below the cut-off point. This procedure suffers from the same drawback noted earlier

in Chapter V.

Following the studies reviewed in Chapter II, the measure of profitability is Net Income/Stockholders' Equity (NI/SE). The rationale behind such a measure was also noted in Chapter II. The one-way analysis of variance was the statistical test employed.

Table 7 presents a summary of mean profitability ratios for the 21 industry sample divided into two market power groups based on industry concentration ratios: industry concentration ratio above 70 percent and industry concentration ratio below 70 percent.

TABLE 7

AVERAGE NET INCOME/STOCKHOLDERS' EQUITY FOR 21 INDUSTRIES, 1962-1969, CLASSIFIED BY INDUSTRY CONCENTRATION

INDUSTRY CONCENTRATION	AVERAGE NI/SE
ABOVE 70% GROUP (9 INDUSTRIES)	10.54
BELOW 70% GROUP (12 INDUSTRIES)	8.15
COMPUTED F-RATIO	6.32
DEGREES OF FREEDOM	1;19
CRITICAL F-RATIO	
1% LEVEL	8.18
5% LEVEL	4.38

As Table 7 indicates, the mean profit rates of the above 70 percent market concentration group (10.54) is significantly greater than that of the below 70 percent market concentration group (8.15). The statistical technique of analysis of variance tested for, and confirmed the significant differences at the 5% confidence level.

B. Evidence Concerning Risk and Return

This section of the study is based on the analysis of 84 leading firms for which data are recorded on the TSE tape. The TSE tape contains monthly data on prices, dividends and investment relatives for all common stocks listed on the Toronto Stock Exchange from July 1961 through June 1973. In computing the investment relatives, all dividends are assumed to be reinvested at the end of the month in which they were paid and the prices are adjusted for stock dividends and splits. In addition, the TSE tape also contains five market indices. The data in this section cover the time period 1962 through 1969 inclusive.

The method of market power classification used in this section is similar to the previous section, i.e., the percentage of industry shipments by the largest four firms. Since there were 9 industries in the above 70% market concentration group, there were 36 firms in this group. The monthly investment relatives of the 36 firms were averaged to obtain the monthly group mean over the period

the concentrated group and 0.02 for the unconcentrated group) and the Durbin-Watson statistics (2.51 for the concentrated group and 1.84 for the unconcentrated group) suggest that the market is a significant variable affecting returns.

The results suggest that the concentrated industries have relatively lower systematic risk than the unconcentrated industries as indicated by their estimated betas. It was established in the previous chapter that concentrated industries have less debt in their financial structures than the unconcentrated. One explanation given was that concentrated industries sustained high business risk. While the investment decision determines the basic business risk of a firm, the financing decision determines its financial risk. Financial risk encompasses both the risk of possible insolvency and the variability in the earnings available to common stockholders. As a firm increases the proportion of fixed-income obligations in its capital structure, the financial risk to stockholders rises. In addition, the relative dispersion of income available to common stock-holders is less for a firm with no debt.

With relatively less debt in their financial structures, concentrated industries are less likely to be insolvent and the relative dispersion of income available to investors is smaller, and therefore incur lower financial risk. The lower financial risk more than compensates for the high

If the CAPM is right, empirical tests would show that on the average, and over long periods of time, the firms with high rates of return should have high systematic risk. It has been established in the previous section that the concentrated industries have, on the average, higher rates of return than the unconcentrated industries.

Table 8 indicates that the concentrated industries on the average, have a relatively lower estimated beta (0.9158) than that of the unconcentrated industries (0.9402). The estimated betas for the two groups are both significant at the 1% confidence level, and indicate that, on the average both groups were less risky than the market index. The estimated alpha for the concentrated group is 0.09 percent per month, indicating that the excess return for the group averaged 1.08 percent per year over the 8-year period. For the unconcentrated group, the estimated alpha is 0.06 percent per month, indicating that the excess return for the group averaged 0.72 percent per year over the 8-year period. The concentrated group has a coefficient of determination of 0.45 suggesting that the market explains 45% of the return variation of the group. The unconcentrated group, on the other hand, has a coefficient of determination of 0.72 suggesting that the market explains 72% of the return variation of the group. The remainder is due to factors unique to the group.

The low standard errors of the two groups (0.03 for

1962 through 1969. As a result, there were 96 monthly group means. These group means were then regressed against the TSE industrial index over the same 1962-1969 period.

Similarly, for the below 70% market concentration group, a second regression was run. With 12 industries in this group, there were 48 firms. The monthly investment relatives of the 48 firms were averaged to obtain the monthly group mean over the period 1962 through 1969. These group means were then regressed against the TSE industrial index over the same 1962-1969 period.

Table 8 presents the results of the regression of the monthly group mean return on the TSE industrial index over the period 1962 through 1969.

TABLE 8

RESULTS OF THE REGRESSION OF THE MONTHLY GROUP MEAN RETURN ON THE TSE INDUSTRIAL INDEX OVER THE PERIOD 1962 THROUGH 1969*

REGRESSION	α	β	R^2	F-RATIO	S.E.	D.W.
ABOVE 70% GROUP	0.0902 (0.8561)	0.9158 (8.7552)	0.4507	77.13	0.0369	2.51
BELOW 70% GROUP	0.0566 (0.9229)	0.9402 (15.4235)	0.7184	239.81	0.0215	1.84

*t - statistics shown in parentheses below the coefficients:
$t_{0.005} = 2.861$, $t_{0.01} = 2.539$, $t_{0.05} = 1.729$.

business risk sustained by the concentrated industries . This is evident by the relatively lower estimated beta for the concentrated group of industries.

The relatively higher estimated alpha suggests that, on the average, concentrated industries have higher excess return that is not explained by the market. In other words, the return on the concentrated group is higher than that predicted by the Capital Asset Pricing Model.

Appendix D and Appendix E have been prepared to provide more detailed insights into the behavior of individual firm betas of the different groups.

Appendix D is a histogram of the frequencies of 36 firm betas of the concentrated group over the period 1962 through 1969. The mean for the group is 0.9158 and the standard deviation is 0.1438.

Appendix E is a histogram of the frequencies of 48 firm betas of the unconcentrated group over the same 1962-1969 period. The mean for the group is 0.9402 and the standard deviation is 0.1592.

As indicated by Appendix D and Appendix E, the estimated mean beta for the concentrated group is relatively lower than that of the unconcentrated group. In addition, the relative dispersion of the betas of the concentrated group is less than that of the unconcentrated group. As a result, the mean betas of the different groups are a "good" measure of risk.

To throw more light on the results, a different procedure was used. The largest four firms were separated from the fringe firms for each industry. The percentage of industry shipment by the largest four firms for each industry was computed for the average of the years betweenn1962 and 1969. Then arbitrarily selecting 70 percent as the cut-off point, each industry was assigned to one of two groups.

Table 9 presents a summary of mean equity ratios and mean profitability ratios of the top-four and the fringe firms for the 21 industry sample classified by industry concentration.

TABLE 9

MEAN EQUITY RATIOS AND MEAN PROFITABILITY RATIOS OF THE TOP-FOUR AND THE FRINGE FIRMS FOR 21 INDUSTRIES, 1962 - 1969, CLASSIFIED BY INDUSTRY CONCENTRATION

INDUSTRY CONCENTRATION	TOP-FOUR FIRMS AVERAGE NI/SE	TOP-FOUR FIRMS AVERAGE EQUITY RATIO	FRINGE FIRMS AVERAGE NI/SE	FRINGE FIRMS AVERAGE EQUITY RATIO
ABOVE 70% GROUP	10.54	58.03	8.69	50.74
BELOW 70% GROUP	8.15	48.35	7.78	48.26

As Table 9 indicates, the dominant firms in the concentrated industries have a relatively higher profit margin and a lower financial leverage than the non-dominant firms, thus providing greater support to the earlier findings that powerful firms employ less debt in their financial structures.

The results also indicate that the profit margin and the financial leverage employed by the dominant firms and the fringe firms in the unconcentrated group appear to be similar.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The purpose of this study has been to examine statistically a frequent question in financial theory pertaining to the existence of an optimal financial structure. The main hypothesis is that there is no significant difference between the financial structures of powerful firms and that of less powerful firms. A secondary hypothesis is that powerful firms are associated with a greater return on their stockholders' equity.

The technique employed to test the hypothesis was a combination of analysis of variance and regression analysis of a sample cross-section of the Canadian economy. The data for the study were obtained from CALURA, CFS, CTS and the TSE tape. Despite several limitations in the data, it was felt that the data were sufficiently accurate to justify analysis.

The powerful firms examined in this study, as measured by both market concentration and asset size, earned a greater return on their stockholders' equity (NI/SE) than other less powerful firms. These powerful firms used relatively less debt in their capital structures which refutes the suggestion that their higher observed return could be the result of great amounts of financial leverage. With relatively less debt in their capital structures,

powerful firms therefore incurred lower financial risk which more than compensates for the high business risk. As a consequence, the estimated systematic risk of the powerful firms, on the average, is relatively lower than that of the less powerful firms. The relatively higher estimated alpha suggests that the powerful firms, on the average, have a higher excess return that is not explained by the market.

The results of this study therefore support the traditional condemnation of higher oligopoly profits as indicative of allocative inefficiency. The higher return of these firms presumably came from restricted output and non-competitive pricing --- practices made possible by the small number of market participants. Powerful firms then violate the dual objectives of public policy: efficient production and reasonable prices and profits. By restricting output, society did not receive the highest valued output its limited input stock was capable of producing and the prices and profits of powerful firms were greater than those competitive markets would permit. Powerful firms would earn these excessive returns since entry barriers prohibited them from being bid away. As such, this study supports the theoretical economic predictions that market prices, profits and output are a function of the structure of the market --- particularly the number of sellers and ease of entry into the market.

The results indicate an inverse relationship between market power and financial leverage. This finding is important because it suggests a conscious policy on the part of financial managers to adjust the composition of their sources of funds to the business risk to which the firms were exposed. The evidence further suggests that powerful firms did have the capacity to support greater financial leverage but did not because of the inherent risk. This study also represents a first attempt to apply a finance model, viz. CAPM, to a problem in industrial organization, viz. concentration.

If the conservative capital structures of powerful firms are less than optimal, then they present important public policy implications. The output prices of powerful firms would be sufficiently high to produce superior profits despite inflated expenses. As such, these superior profits would represent only a portion of the inefficiency associated with market power. The managements of powerful firms could maintain the benefits and flexibility associated with a conservative capital structure and pass the cost of that conservation to their customers in the form of excessive prices. Clearly these conservative capital structures require additional research.

APPENDIX A

SAMPLE SIZES BY INDUSTRY AND YEAR

INDUSTRY SIC CODE	INDUSTRY	1969	1968	1967	1966	1965
145	Beverages	393	391	408	411	443
374	Chemicals	916	906	938	980	1058
243	Clothing	1660	1630	1675	1788	1849
335	Elec Prod	617	627	591	625	595
101	Food	2518	2549	2474	2771	2892
261	Furniture	924	927	896	860	958
231	Knitting	292	299	314	327	337
172	Leather Prod	375	382	382	381	394
311	Machinery	854	829	778	838	830
302	Metal Fab	3122	3093	3045	2854	2777
381	Misc Manuf	1822	1732	1751	1771	1849
341	Non-Metallic	940	952	1006	986	1027
271	Paper	441	447	437	447	440
365	Petroleum	55	60	67	78	79
291	Primary Metal	444	386	357	393	384
286	Printing	2549	2481	2356	2239	2285
163	Rubber Prod	102	96	93	89	88
183	Textile	631	686	665	667	714
153	Tobacco Prod	26	27	23	29	37
323	Transport Equip	711	691	647	609	626
251	Wood	1690	1662	1723	1790	1843
	TOTAL	21082	20853	20626	20934	21505

APPENDIX A - Continued

INDUSTRY SIC CODE	INDUSTRY	1964	1963	1962	CONCENTRATION RATIO
145	Beverages	149	149	150	47.69
374	Chemicals	373	371	362	72.24
243	Clothing	501	497	468	25.47
335	Elec Prod	268	265	274	56.31
101	Food	939	962	877	58.07
261	Furniture	215	223	215	48.65
231	Knitting	132	126	126	28.36
172	Leather Prod	146	150	144	65.24
311	Machinery	274	268	266	73.46
302	Metal Fab	641	633	624	47.94
381	Misc Manuf	347	342	332	21.62
341	Non-Metallic	275	279	274	50.35
271	Paper	236	237	241	76.98
365	Petroleum	35	35	36	92.16
291	Primary Metal	138	129	132	78.23
286	Printing	316	335	327	13.21
163	Rubber Prod	44	46	44	75.41
183	Textile	237	239	242	80.23
153	Tobacco Prod	21	25	26	87.36
323	Transport Equip	221	217	206	74.73
251	Wood	578	589	586	42.07
	TOTAL	6086	6117	5951	

APPENDIX B

MEAN COMMON EQUITY RATIO (COMMON EQUITY/TOTAL ASSETS) FOR 21 INDUSTRIES, 1962-1969, CLASSIFIED BY AVERAGE ASSET SIZE

TOP GROUP INDUSTRIES	MEAN COMMON EQUITY RATIO 1962-1969
Paper	56.73
Petroleum	65.74
Primary Metal	55.75
Rubber Prod	54.38
Tobacco Prod	55.36
Transport Equip	53.39
AVERAGE FOR TOP GROUP	56.89

MIDDLE GROUP INDUSTRIES	MEAN COMMON EQUITY RATIO 1962-1969
Beverages	50.69
Chemicals	53.38
Elec Prod	51.33
Food	50.07
Machinery	50.52
Metal Fab	50.04
Non-Metallic	51.73
Textile	51.03
Wood	48.65
AVERAGE FOR MIDDLE GROUP	50.83

APPENDIX B-Continued

BOTTOM GROUP INDUSTRIES	MEAN COMMON EQUITY RATIO 1962-1969
Clothing	43.14
Furniture	46.88
Knitting Mills	46.48
Leather Prod	44.60
Misc Manufacturing	46.23
Printing & Publishing	46.95
AVERAGE FOR BOTTOM GROUP	45.71

APPENDIX C

AVERAGE OF PROFIT RATES (EBIT/TA) FOR 21 INDUSTRIES, 1962-1969, CLASSIFIED BY AVERAGE ASSET SIZE

TOP GROUP INDUSTRIES	AVERAGE (EBIT/TA) 1962-1969
Paper	12.06
Petroleum	13.04
Primary Metals	11.33
Rubber Prod	9.31
Tobacco Prod	18.61
Transport Equip	11.88
AVERAGE FOR TOP GROUP	12.71

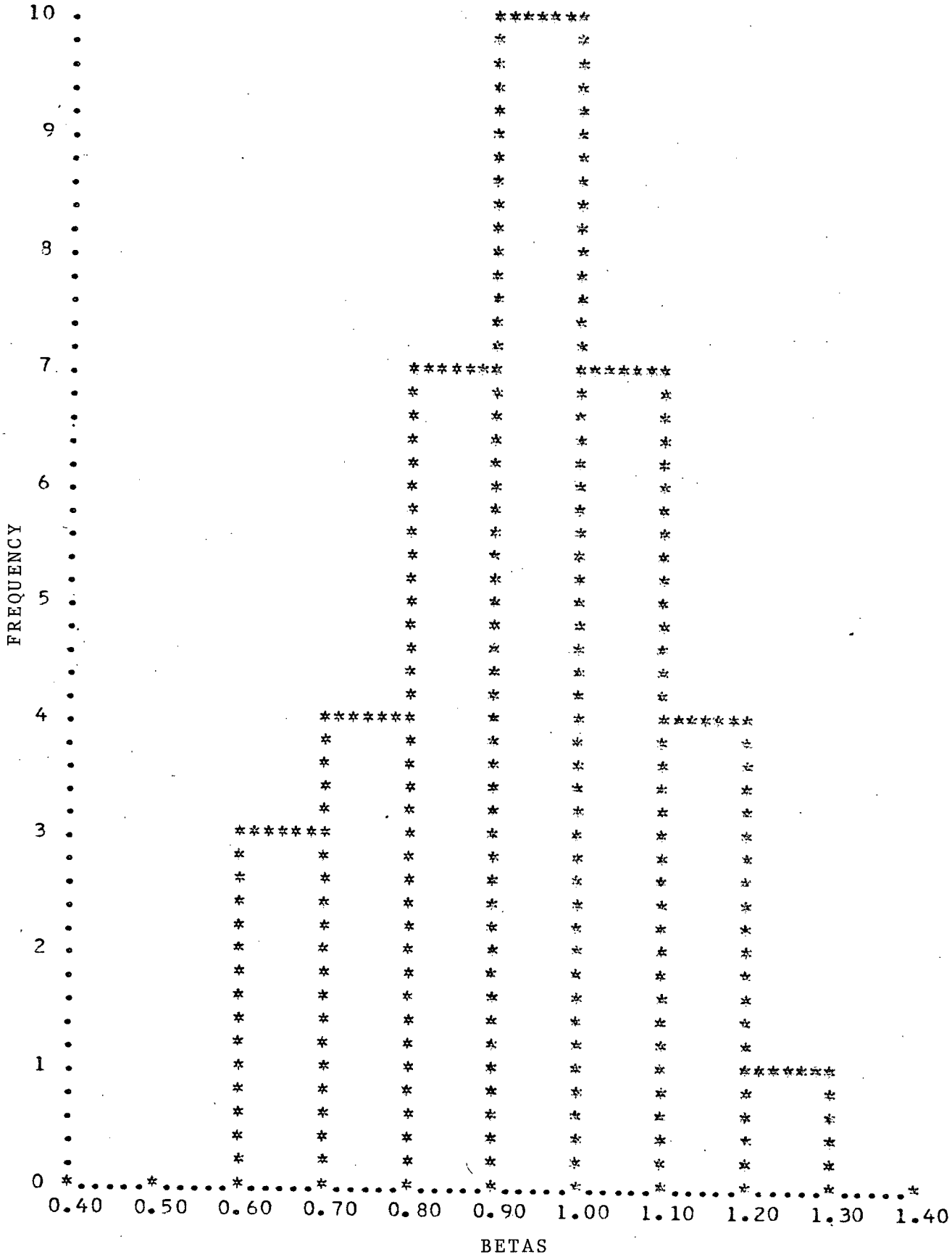
MIDDLE GROUP INDUSTRIES	AVERAGE (EBIT/TA) 1962-1969
Beverages	18.96
Chemicals	10.96
Elec Prod	8.69
Food	9.57
Machinery	11.16
Metal Fab	9.79
Non-Metallic	8.85
Textile	9.61
Wood	7.75
AVERAGE FOR MIDDLE GROUP	10.59

APPENDIX C-Continued

BOTTOM GROUP INDUSTRIES	AVERAGE (EBIT/TA) 1962-1969
Clothing	6.65
Furniture	7.00
Knitting Mills	7.45
Leather Prod	6.66
Misc Manufacturing	10.01
Printing & Publishing	12.65
AVERAGE FOR BOTTOM GROUP	8.40

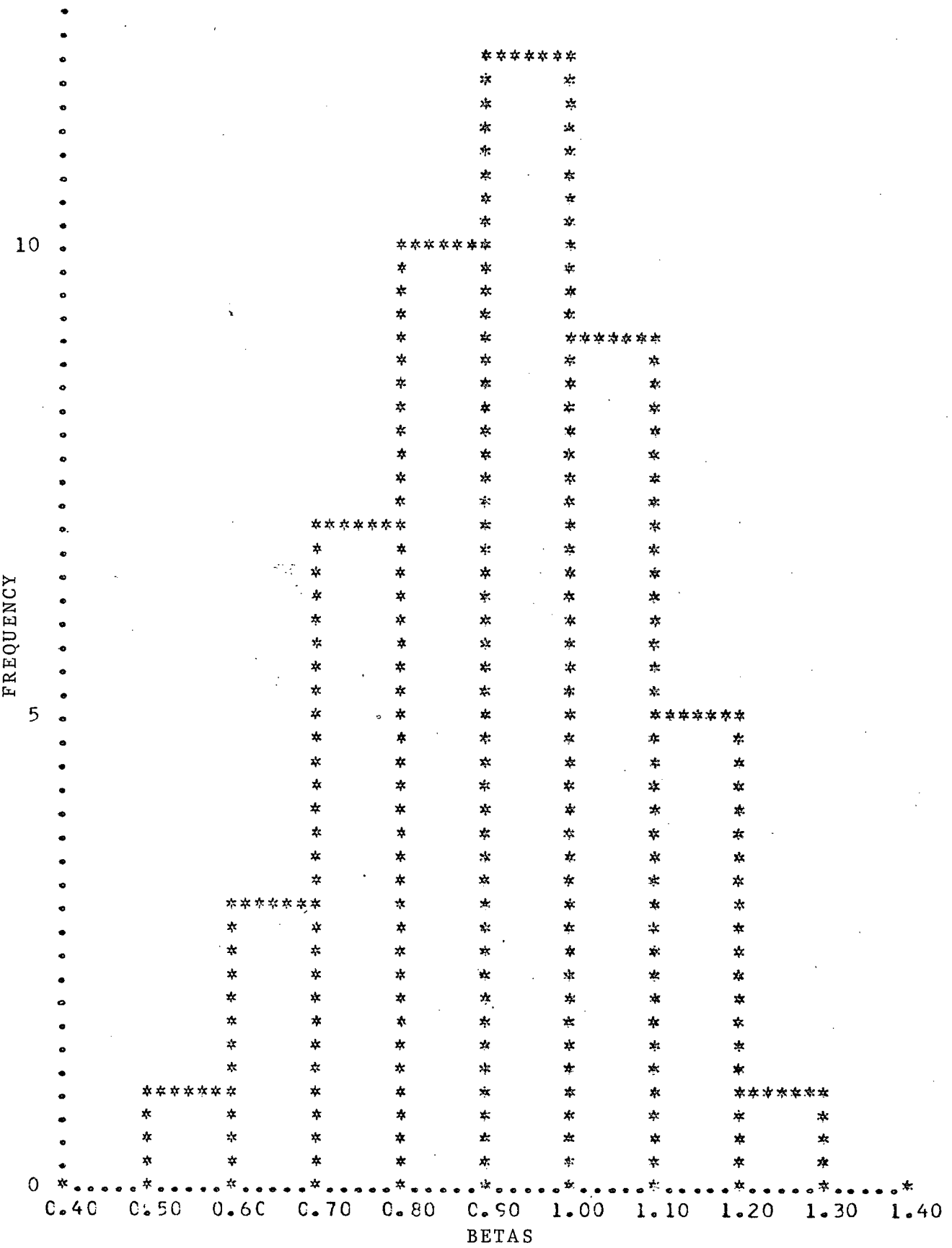
APPENDIX D

Appendix D is a histogram of the frequencies of 36 firm betas of the concentrated group over the period 1962 through 1969.


10
9
8
7
6
5
4
3
2
1
0
FREQUENCY
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
BETAS

APPENDIX E

Appendix E is a histogram of the frequencies of 48 firm betas of the unconcentrated group over the period 1962 through 1969.


10
5
0
FREQUENCY
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
BETAS

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