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TRENDS IN CORPORATE PROFITABILITY AND CAPITAL COSTS IN THE UNITED STATES, 1947-79

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This is a preliminary version to which we plan to make substantial changes. Please do not quote for use the data in documents intended for publication.

The graphics (figures 1-6) in this draft are purely illustrative. They are taken from an earlier paper and do not plot the estimates presented in the tables of this draft.

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I. OBJECTIVES AND MAJOR CONCLUSIONS [1/]

One striking aspect of the U.S. economy's performance during the last decade is the decline in the rate of return on corporate capital. The potential significance of this "fact" is clear but its actual significance is not. The decline may or may not indicate a basic structural shift in the U.S. economy. It may reflect a serious weakness, a natural and benign result of market forces, or something in between. Which interpretation is is correct depends on several considerations, particularly the following:

1. Whether the decline is serious depends on the level from which it starts. If the mid-1960s was a period of unusually high profitability, then the subsequent decline may merely be a return to normal levels.

2. The "trend's" importance depends on whether the cost of capital has declined proportionally. If it has, then the falling rate of return need not, in itself, be cause for concern.

We have attempted to clarify the issues posed by declining corporate profitability over the last decade, to evaluate the evidence for longer-term trends in profitability, and to provide additional evidence about causes and consequences. Our essay is organized around two simple questions.

1. How have U.S. nonfinancial corporations (NFCs) fared? We ask the same questio question for manufacturing corporations (MCs) which are the major subsector of NFCs.

2. How have rates of return on real capital held by NFCs and MCs behaved relative to their respective capital costs?

We answer the first question by determining how well investors in NFCs and

Note: Footnotes and References appear on pages , following the text.

MCs have done. That is, we argue that the best measures of the performance of the NFC and MC sectors are based on changes in the capital market's aggregate valuation of the securities issued by the firms in that sector. We answer the second question by examining rates of return on the capital stock of NFCs and MCs. Our analysis is directed towards the postwar period from 1947 through 1979.

Our main conclusions are the following:

1. Nonfinancial corporations have fared poorly since the mid-1960s. That fact is evident from the most casual examination of stock market data, and it stands up to careful examination. On the other hand, NFC performance in the postwar period ending in 1965 was excellent.

2. When the market value of NFC securities is measured relative to the net reproduction cost of real capital held by NFCs, the mid-1960s is revealed as an unusually favorable period. However, today's market values are not unusually low compared to values prevailing in, say, the 1950s. Instead of asking why today's performance is poor, we might better ask why performance in the early and mid-1960s was so good.

3. Rates of return on real capital show the same pattern as market values: exceptional performance in the mid-1960s followed by a decline to levels more typical of the early postwar period.

4. Real costs of capital seem to have been stable since about 1956. Since then, fluctuations in the market value of nonfinancial corporations have been much more closely related to changes in operating profitability than to changes in capitalization rates.

The implication of our findings are discussed in the concluding section of this essay. There we also note a number of areas for further research.

II. INTRODUCTION

We are concerned with the rate of return on investments in the private sector of the United States economy. To this end we examine the profitability of nonfinancial corporations in the aggregate, and for a major subset thereof--corporate manufacturing.

Although NFCs by no means account for the entire private sector, they are the major part of it. More than half of the Gross Domestic Product (GDP) originates in the NFC sector. NFCs account for more than 90 percent of corporate GDP and more than 60 percent of total business GDP. The replacement costs of plant, equipment and inventories held by NFCs now exceeds $1.5 trillion. Thus, the past performance and current healty of this sector is a matter of interest and concern. Similarly, MC investment in plant, equipment and inventories currently is worth more than $500 billion.

NFCs encompass corporations engaged in a wide variety of economic activities--manufacturing, construction, transportation, gas and electric utilities, communications, retail and wholesale trade, etc. The Manufacturing Corporation (MC) subsector is larger than any other, comprising about half of the NFC total. For a number of the other countries involved in the rate of return project, estimates of rates of return for all NFCs are not feasible; estimates for the MC sector, however, can be undertaken in all countries participating in our project.

It is a widely accepted fact (a fact that we reconfirm later in our paper) that NFC and MC profitability, measured by the rate of return on corporate assets, has fallen sharply since 1965. Is this evidence of relatively poor performance conclusive and unambiguous? Not generally so. There are a number of difficulties.

1. The rate of return on capital can be computed in countless ways. Some indicate a more serious decline than others. The National Income Accounts

provide several different estimates of depreciation, for example. Each implies a different measure of income, a different value for net capital stock, and a different rate of return.

2. What is to be included in capital stock? Most estimates for NFCs include only the net replacement cost of inventory and physical capital (buildings, machinery and equipment). Land is usually excluded; its true value is extremely difficult to measure in any case. Net working capital is frequently left out.

3. What about intangible assets? These include, for example, the extra value of a going concern over a random collection of physical assets, and the value of cumulative expenditures on research, marketing, and employee training. The extra costs incurred in a period of learning-by-doing are a relevant asset that is almost never shown on corporate balance sheets. Firms acquire valuable investment opportunities by virtue of past activities.[2/] Monopoly power is an asset from the investor's viewpoint.

The difficulties implicit in these questions have absorbed many man-years of study. Despite this work, problems remain; rates of return calculated from accounting data will never be entirely free of errors of definition and measurement. Of course these statistics are indispensable for many purposes. But they are not ideally suited for determining how business forms faced over the last decade or some longer period.

There is a simple alternative. The value of the firm is not determined by the cumulative funds invested in it, or by the net replacement cost of its stock of real capital, but by the stream of earnings investors expect it to generate. The value of this stream at any time can be observed directly

by summing the market value of all of the firm's outstanding securities. That is the true value of all the firm's assets. The income realized in any particular period can be found by adding the cash payments received by investors to the change in the market value of the firm's securities over the period, computed net of any new issues of securities. The rate of return earned by investors in that firm is found by dividing income by start-of-period market value.

In short, we propose to answer the question, "How well have nonfinancial corporations and manufacturing performed?" by using two bodies of data: the measure of profitability derived by relating operating income to capital stock, on the one hand, and the returns earned by investors on the equity and debt claims to corporate earnings, on the other.

There may be some resistance to the idea of using stock and bond values to answer so fundamental a question. Many regard the stock market as irrational, and therefore an untrusworthy source of information about real phenomena. We believe such suspicions are unfounded.

Some make the elementary logical error of confusing volatility with irrationality. There is no necessary connection. The stock market is a major locus for risk-bearing. In our view the stock market's volatility accurately reflects the high degree of uncertainty acutally existing in the economy. In fact, we distrust accounting estimates of firm values precisely because they are so stable.

Some doubts may stem from conceit, in the form of an individual's belief that he or she has a more accurate assessment of value than capital markets can provide. Often this belief is based on hindsight. The belief is suspect anyway, because so few professional investors--who are presumably the most knowledgeable--have been able to outperform the market consistently.[1]

Some doubts may reflect the inability to explain the day-to-day or week-to-week movements of the stock market. Yet it is intellectual arrogance to assume that something that cannot be explained is irrational or meaningless. In any case, we are concerned not with short-term market fluctuations, but with market behavior over a period of many years.

There is good evidence that capital markets are efficient, in the sense of responding promptly and accuately to new information.[4/] That is the main reason why we use capital market data with confidence.

III. RATES OF RETURN TO INVESTORS IN NONFINANCIAL CORPORATIONS AND IN MANUFACTURING CORPORATIONS

Consider a portfolio containing all the debt and equity securities issued by NFCs. That portfolio's aggregate market value, MV, is the market's estimate of the present value of the stream of future earnings[5/] which investors expect NFCs to generate.

An investment in this portfolio would have generated income in the form of cash interest and dividend payments and also in the form of capital gains and losses. Thus we can calculate the rate of return earned by the portfolio in the year t by estimating total income for year t and dividing by MV_t, the portfolio's market value at the start of the year. Let this rate of return be R_t[6/].

Note that R_t is <u>not</u> the rate of return earned by NFC stockholders. We are concerned with the performance of the entire NFC sector, not with the return received by holders of a claim on part of that sector's earnings.[7/] Stockholders may have gained at the expense of bondholders, or vice versa, but that is not relevant here.[8/] It is also important that our profitability measure be unaffected by shifts in capital structure over time.

Not all NFC securities are publicly traded. Even for securities that are, price data are not always conveniently available. (This is the case for most corporate bonds, for example.) Therefore it was necessary to work out a procedure for estimating MV_t[9/] and R_t. Of course alternative procedures are possible, but we believe any careful estimates will show the same patterns across time.

Table 1 shows real (i.e., nominal R_{t_0} adjusted by the CPI) R_ts for various one- and four-year intervals between 1947 and 1979. The R_ts are extremely volatile when measured annually. However, hindsight reveals a pattern.[10/] Investors in NFC and MC securities fared very well indeed after World War II and up to about 1965, but poorly after that. The contrast between the first and second halves of the 1960s is dramatic, particularly when real rates of return are examined. The poor performance of the late 1960s continues into the 1970s. Table 1 shows that both nonfinancial corporations and manufacturing corporations have earned, on average, negative real rate of return from 1966 to 1979.

Figure 1 displays the returns in a different way. Suppose that at the start of 1947 you had invested $1.00 in the portfolio of all bonds and stocks issued by NFCs. That is, you started by owning a very small fraction of the portfolio of <u>all</u> NFC securities, which in aggregate was worth MV_{1947}. You then followed a buy-and-hold strategy, reinvesting all dividends and interest. The rate of growth in that investment's value indicates how well or poorly NFCs have fared and similarly for MCs.

Of course Figure 1 tells the same story as the right column of Table 1, but is told in a way that may be easier to appreciate. Both nominal and real values increased rapidly, with few interruptions, up to about 1965. After that there was

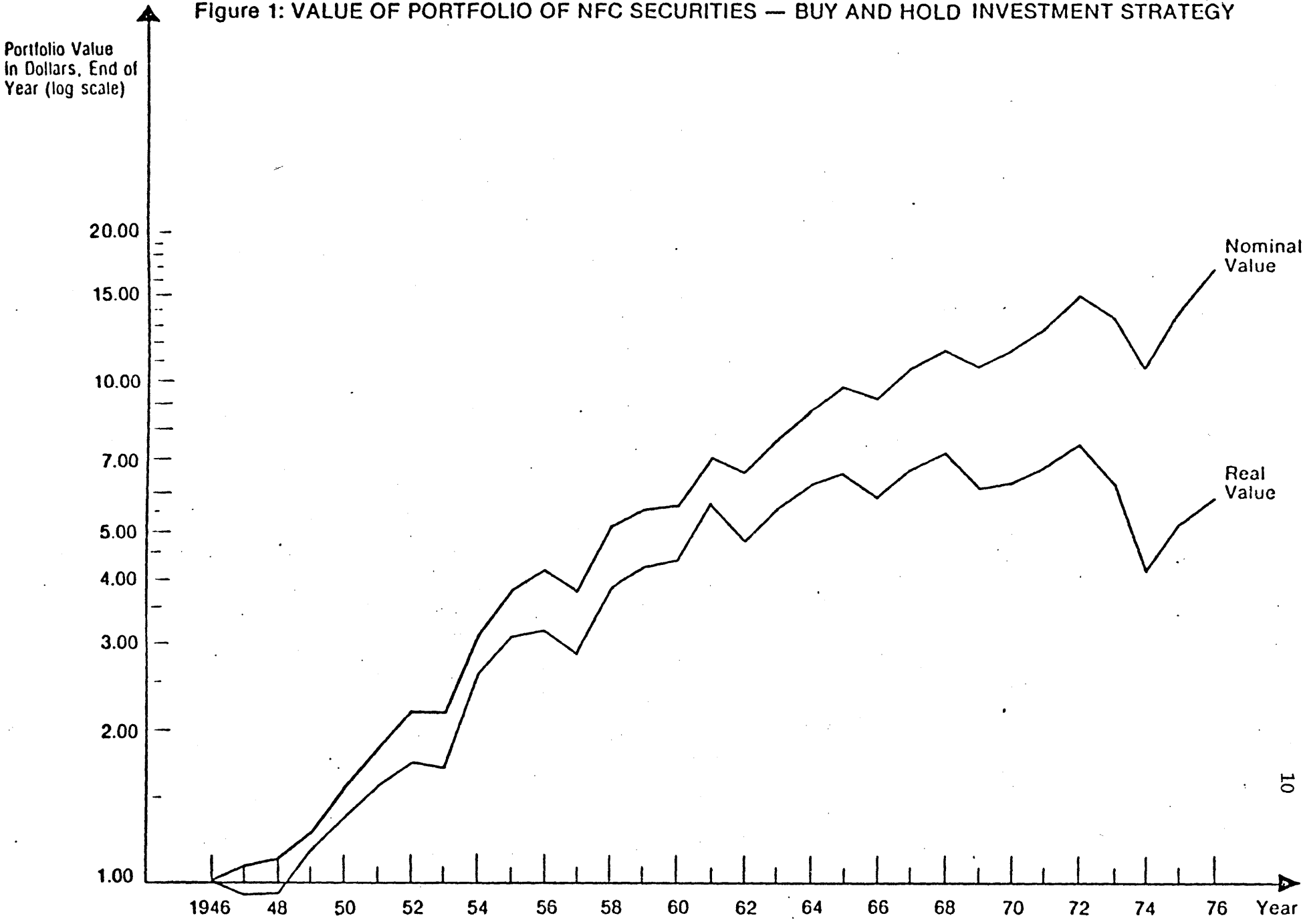
TABLE 1--ESTIMATED REAL RATES OF RETURN FOR MANUFACTURING CORPORATIONS AND ALL NONFINANCIAL CORPORATIONS, 1947-79
(Shown in Percent)

	Manufacturing				All Nonfinancial			
Year	Return to Investors (R)	After-Tax Return on Capital (ROC-BT)	Effective Tax Rate τ	Before-Tax Return on Capital (ROC-BT)	Return to Investors (R)	After-Tax Return on Capital (ROC-AT)	Effective Tax Rate τ	Before-Tax Return on Capital (ROC-BT)
1947	-0.3	9.1	50.4	18.3	-4.4	6.7	52.7	14.3
48	-0.9	11.2	41.8	19.3	-0.3	8.8	44.5	15.9
49	22.4	10.6	36.9	16.7	17.2	8.2	38.9	13.4
1950	34.0	9.6	54.6	21.1	20.5	7.2	55.4	16.2
51	18.8	8.5	60.9	21.8	12.1	6.0	61.4	15.6
52	11.9 11.9	7.6	55.7	17.1	10.8	5.8	56.7	13.3
53	-0.5	6.8	59.0	16.6	00.6	5.1	59.1	12.6
54	58.2	6.3	54.4	13.8	40.9	5.7	51.8	11.8
55	30.8	9.0	51.8	18.6	22.2	7.3	50.6	14.7
56	7.5	7.3	52.8	15.4	4.9	5.8	53.5	12.5
57	-15.0	6.7	51.2	13.8	-5.4	5.5	51.5	11.4
58	41.1	5.3	50.1	10.6	36.3	5.0	49.2	9.8
59	14.2	7.9	48.9	15.5	10.3	6.4	47.9	12.4
1960	-6.6	6.9	49.0	13.6	-0.3	6.0	46.9	11.3
61	23.4	6.9	48.5	13.3	22.2	6.2	46.2	11.5
62	-11.2	8.6	44.3	15.5	-8.0	7.7	41.1	13.1
63	21.0	9.8	43.7	17.5	16.9	8.4	40.7	14.1
64	14.6	10.9	41.4	18.6	13.2	9.4	38.1	15.1
65	16.1	13.0	40.0	21.6	10.3	10.4	36.9	16.5
66	-12.0	12.3	41.5	21.0	-9.8	10.2	37.1	16.2
67	27.8	10.7	38.7	17.4	19.7	9.2	35.7	14.4
68	5.6	9.6	43.9	17.2	6.0	8.5	40.0	14.2
69	-13.0	7.7	45.6	14.2	-12.7	7.2	41.1	12.4
1970	-4.9	5.5	43.4	9.7	-3.0	6.0	38.7	9.7
71	11.0	6.6	41.7	11.3	9.7	6.5	37.2	10.3
72	14.4	7.5	41.6	12.8	11.8	7.0	36.6	11.0
73	-19.0	7.2	44.5	12.9	-19.0	6.6	39.4	11.0
74	-21.2	4.1	52.0	8.6	-26.9	4.5	45.1	8.3
75	26.1	5.1	41.6	8.8	21.4	5.9	35.2	9.1
76	16.1	6.0	45.5	11.0	15.3	6.0	38.5	9.8
77	-11.6	6.2	45.4	11.4	-7.4	6.5	37.2	10.4
78	0.3	5.7	47.6	10.9	-1.0	6.2	38.6	10.1
79	2.2	4.4	50.1	8.8	-0.2	5.7	38.3	9.2
Four Year Averages								
1947-50	13.8	10.1	45.9	18.9	8.3	7.7	48.9	15.0
51-54	22.1	7.3	57.5	17.3	16.1	5.7	57.3	13.3
55-58	16.1	7.1	51.5	14.6	14.5	5.9	51.2	12.1
59-62	7.8	7.6	47.7	14.5	6.1	6.6	45.5	12.1
63-66	9.9	11.5	41.7	19.7	7.7	9.6	38.2	15.5
67-70	3.9	8.4	42.9	14.6	2.5	7.7	38.9	12.7
71-74	-3.7	6.4	45.0	11.4	-8.5	6.2	39.6	9.9
75-79	6.6	5.5	46.0	10.2	7.0	6.1	37.6	9.8
Average for the Period 1947-79								
Mean	8.1	7.9	47.2	15.0	6.8	6.9	44.3	12.5
Standard Deviation	17.8	2.2	5.9	3.9	14.8	1.5	12.5	2.4

Definitions: Return to Investors. Annual returns are weighted averages of return on debt and equity held from the beginning to the end of the year, adjusted for the annual change in the Consumer Price Index. Equity returns include both dividends and capital gains; debt returns consist of interest and capital gains.

Return on Capital (ROC). The before-tax rate of return is the ratio of (1) before tax operating income of nonfinancial and manufacturing corporations, to (2) the net replacement cost of inventory, plant and equipment of nonfinancial and manufacturing corporations.

Figure 1: VALUE OF PORTFOLIO OF NFC SECURITIES — BUY AND HOLD INVESTMENT STRATEGY



slower and more erratic growth in the portfolio's nominal value. Its real value has grown hardly at all since 1965.

Aggregate Market Value of NFC and MC Securities

Most of the volatility of the rates of return reflect capital gains or losses: that is, changes in MV_t, the aggregate market value of NFC securities. We are also concerned with the level of MV_t. Of course we expect MV_t to increase over time as corporations grow. Therefore we express MV_t relative to the stock of corporate capital which we define as the net replacement cost of NFC depreciable capital and inventory, expressed in current dollars.[11/] This adjusts for that part of the movement in MV_t caused by inflation and expansion in the scale of NFC operations.

The ratio of market value to net replacement cost of plant, equipment and inventory is usually referred to as "Tobin's q."[12/] This ratio is shown in Table 2 and is plotted in Figure 2 for 1947-1979, for NFCs and MCs.

A value of q = 1.0 means that the market value of the earnings stream generated by NFC assets is exactly equal to the net replacement cost of those assets. This is the value for q we expect to observe if the economy is in long-run equilibrium, if the definition of CS_t includes all income-producing assets, and if MV_t and CS_t are measured without error. (Incidentally, this is the value that annual q's averaged in the post-war period both for NCFs and MCs. See Table 2.) Recognizing these ifs, we should not read too much significance into the absolute value of q in any year. It is nevertheless odd to find q so far below 1.0 in the early post-war period and currently. If the estimates are anywhere near correct, it was far cheaper in the decade following the war and in the last five years for firms to add capacity by purchasing other firms, than by buying fresh plant, equipment and inventory. In 1953, for example, it was possible to purchase an "average NFC firm" for only 70 percent of the net replacement cost of its assets; while the "average MC corporation could be bought for 58 percent of what its assets were worth.

TABLE-2

q, CAPITALIZATION RATE (ρ), AND MARKET VALUE DEBT RATIO
FOR MANUFACTURING CORPORATIONS AND ALL NONFINANCIAL CORPORATIONS, 1947-79

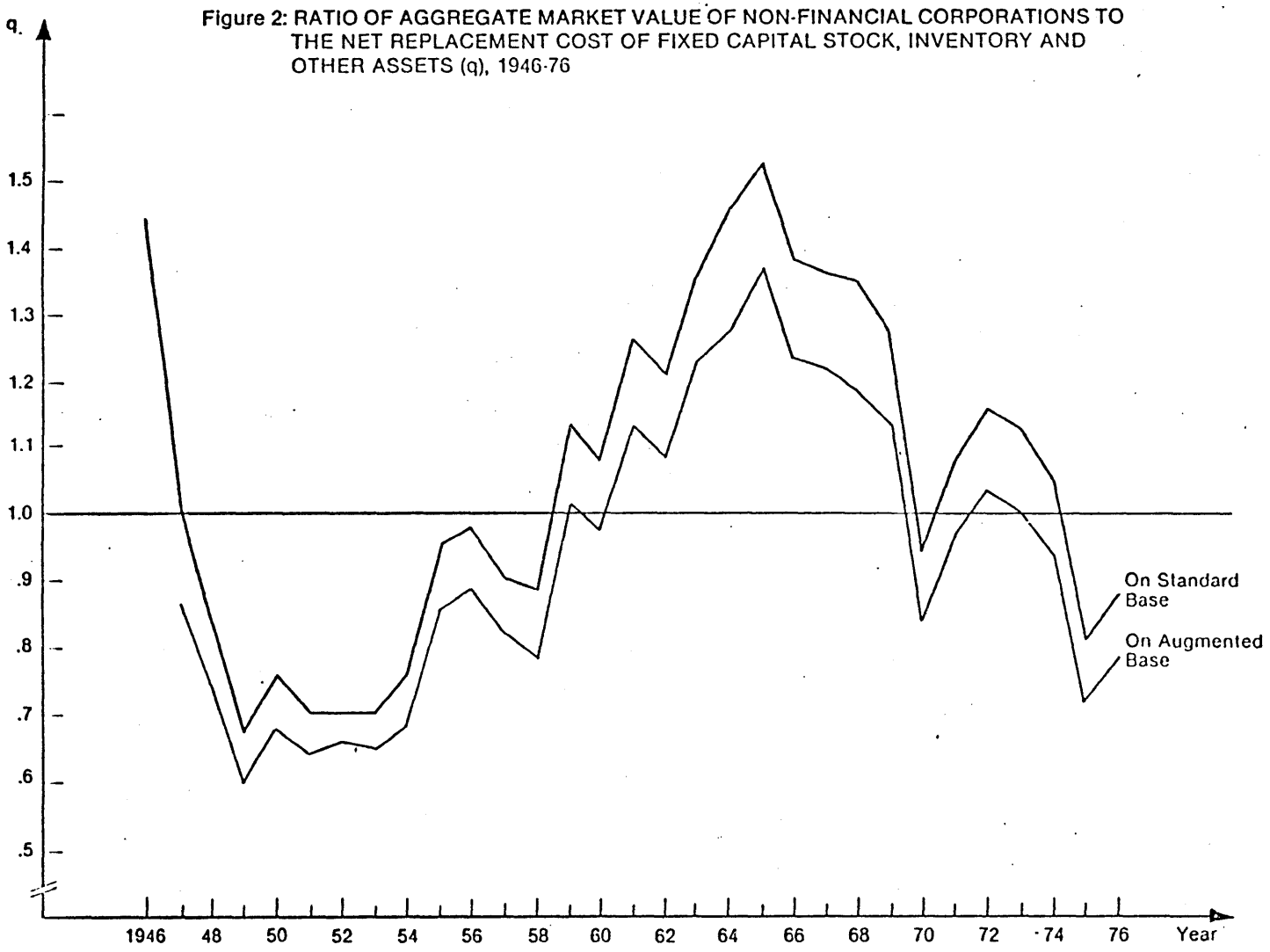
	Manufacturing					All Nonfinancial			
Year	q	Capitalization Rate (ρ)[a]	Standard Deviation[b]	Adjusted Standard Deviation[b]	Market Value Debt Ratio, (Midyear)	q	Capitalization Rate (ρ)[a]	Standard Deviation[b]	Market Value Debt Ratio, (Midyear)
1947	0.83	10.95			-.02	0.97	7.5		.17
48	0.55	20.58			-.01	0.86	10.5		.19
49	0.59	17.99			-.01	0.68	12.0		.24
1950	0.64	14.92			-.07	0.79	9.1		.19
51	0.65	13.07			-.04	0.78	8.4		.19
52	0.62	12.19			.00	0.76	7.7		.19
53	0.58	11.83			.00	0.70	7.4		.19
54	0.80	7.91			.01	0.76	7.4		.22
55	0.95	9.43			-.01	1.03	7.2		.17
56	0.91	7.97			.00	0.99	6.1		.16
57	0.72	9.40			.02	0.90	6.2		.16
58	0.95	5.54			.04	0.88	5.6		.19
59	1.16	6.84			.03	1.13	5.8		.16
1960	1.06	6.54			.03	1.07	5.7		.17
61	1.19	5.77			.04	1.18	5.2		.17
62	1.12	7.71			.15	1.07	7.3		.22
63	1.30	7.57			.04	1.28	6.6		.19
64	1.52	7.18			.04	1.39	6.8		.20
65	1.81	7.18			.05	1.39	7.7		.20
66	1.41	8.69			.09	1.37	7.7		.20
67	1.59	6.70			.09	1.43	6.6		.19
68	1.63	5.88			.09	1.34	6.5		.18
69	1.29	6.00			.14	1.17	6.4		.22
1970	1.12	4.93			.17	0.91	6.7		.29
71	1.15	5.77			.17	1.06	6.2		.25
72	1.26	5.95			.16	1.16	6.1		.24
73	0.83	8.57			.27	1.08	6.3		.30
74	0.36	11.54			.56	0.86	5.7		.38
75	0.66	7.75			.23	0.78	7.7		.33
76	0.69	8.67			.20	0.85	7.3		.31
77	0.61	10.17			.26	0.71	9.4		.35
78	0.56	10.22			.26	0.62	10.4		.38
79	0.48	9.14			.28	0.59	10.0		.38
Four Year Averages									
1947-50	0.65	16.1			-.03	0.83	9.8		0.20
51-54	0.66	11.3			-.01	0.75	7.7		0.20
55-58	0.88	8.1			.01	0.95	6.3		0.17
59-62	1.13	6.7			.04	1.11	6.0		0.18
63-66	1.51	7.7			.06	1.36	7.2		0.20
67-70	1.41	5.9			.12	1.21	6.6		0.22
71-74	0.90	8.0			.29	1.04	6.1		0.29
75-79	0.75	9.2			.25	0.71	9.0		0.35
Average for the Period 1947-79									
Mean	0.96	9.1				0.98	7.4		
Standard Deviation	0.38	3.5				0.24	1.6		

Definitions: q. The ratio of the total market value of nonfinancial corporations and manufacturing corporations to their net plant and equipment and inventories valued at replacement cost.

Capitalization Rate (ρ). The ratio of operating income, i.e., profits plus interest, to the total market value of nonfinancial corporations and manufacturing corporations.

Market Value Debt Ratio. The ratio of the market value of debt to the market value of debt plus equity for nonfinancial and manufacturing corporations.

Figure 2: RATIO OF AGGREGATE MARKET VALUE OF NON-FINANCIAL CORPORATIONS TO THE NET REPLACEMENT COST OF FIXED CAPITAL STOCK, INVENTORY AND OTHER ASSETS (q), 1946-76



Over the post-war period q traced out a long cycle, using from below 1.0 to well above it by the mid-sixties when it peaked; since then, it has followed an erratic downward course to its current values below 1.0. The high rates of return earned by investors in NFC securities over the 1947-1955 period can be largely attributed to the recovery of q to more "reasonable" levels.

Note finally, the greater validity of q for manufacturing. NFCs and MCs have the same average q over the post-war period, but the standard deviation is larger for MCs' q.

Interpreting q

Despite its interest and usefulness q is easy to misinterpret. Of course, there are problems of aggregation: the q for all NFCs hides substantial inter-industry and interfirm variation. There are also difficult problems of measurement and definition.

Consider for example, the following statement from the 1977 Economic Report of the President:[13]

> If.....assets are valued in the market significantly above their replacement cost, corporations will be encouraged to invest in new equipment and thereby create capital gains for the owners of their securities.

Properly interpreted this statement is correct, but it is nevertheless ambiguous if taken literally.

Consider how the level of an individual firm's q affects the firm's rate of investment. Figure 3a portrays the investment decision: the firm invests to increase capacity until V, the present value of forecasted net cash flows generated by an additional machine, declines to C, the cost per machine. Since all but the last machine have positive net present values, $(V - C > 0)$, the firm's q exceeds one. But the net present value of the

Figure 3a: The Firm's Investment Decision

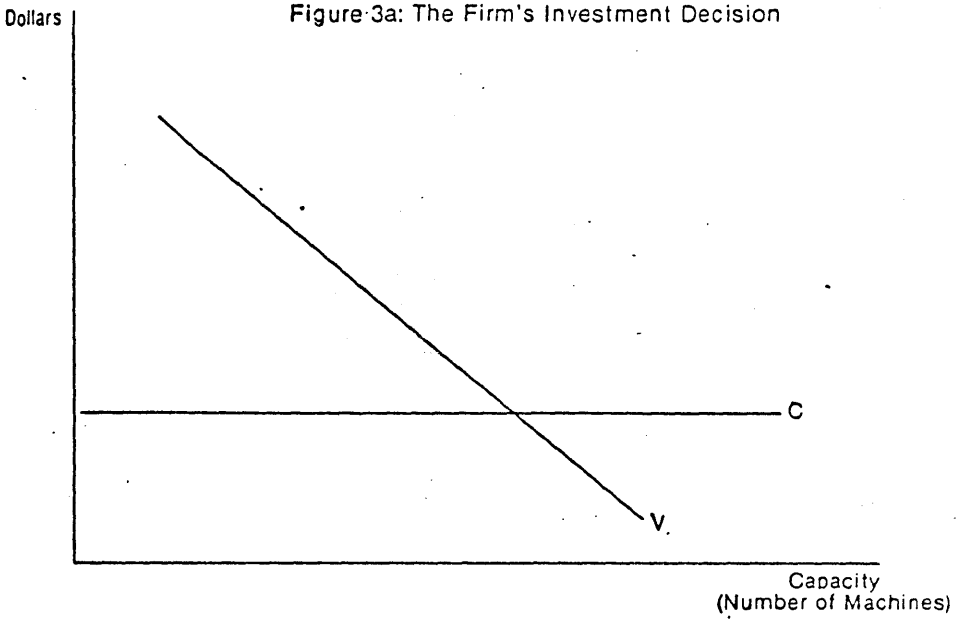
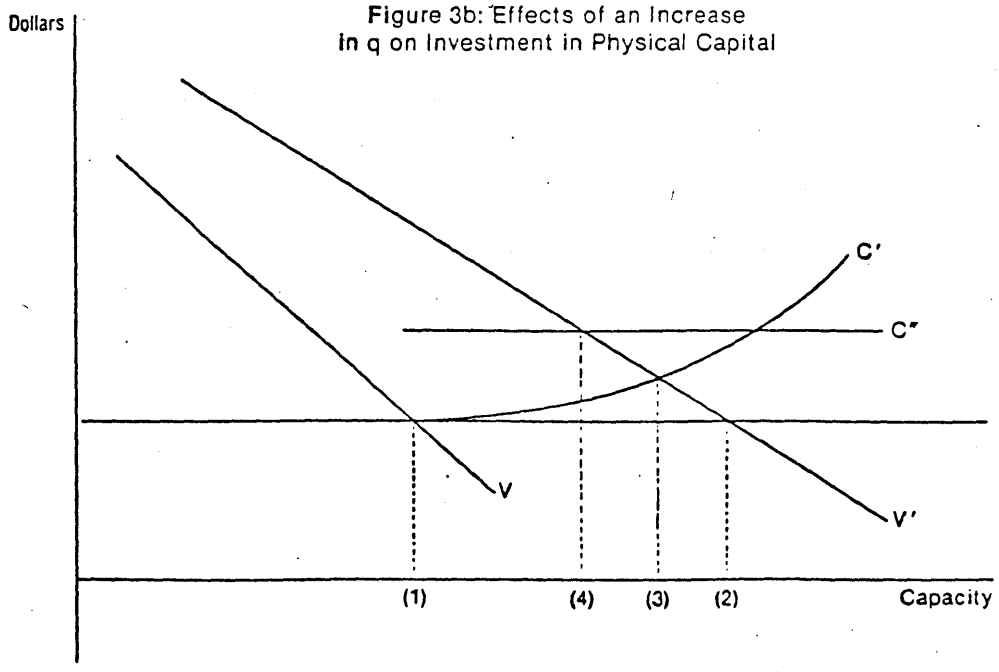


Figure 3b: Effects of an Increase in q on Investment in Physical Capital



marginal machine is zero. That is, the marginal q equals exactly 1.0. The quotation cited could be misinterpreted as a prediction that firms will continue investing so long as the average q (which is what we observe) is greater than one.

It is true that both the average and the marginal q equal one in a long-run equilibrium. If all industries are competitive, and if the denominator of q correctly measures the value of all assets, including intangible ones, then any opportunities to make investments having positive net present values must last only for the short-run. In this sense it is true to say that a q greater than one for some firms implies profitable investment opportunities for others.

On the other hand, an entrenched, profit-maximizing monopolist would have a continuing supply of positive net present value investments, and therefore would have a q greater than one even in long-run equilibrium. But not every firm with a high measured q is a monopolist: intangible assets, such as value created by expenditures on research and development or advertising outlays, are reflected in the numerator but not the denominator of q. The observed q for such firms is overstated.[14/]

The quotation we cited would be unambiguously correct if it referred not to the level of q, but to a rise in that level. An increase in q should predict an increase in the rate of investment. Consider a firm starting at the optimal capacity level as determined by V = C. In Figure 3b, the investment opportunity schedule shifts up to V', thus increasing q. Investment increases in response, lifting capacity to a new equilibrium above the initial level 1.

The actual adjustment might occur in a number of ways. If C, the cost

per machine, is constant, the firm moves directly to 2, perhaps with a delay. It is perhaps more realistic to assume that the firm faces and upward-sloping cost curve C' in the short run, with the steepness of the curve depending on the speed of adjustment. Still another possibility is that producers of machines will, at least in the short run, capture some of the excess profits created by the upward shift in V. This gives a cost curve C" and the equilibrium position 4.

But we can say the following regardless of the adjustment mechanism: because q reflects the expected profitabiliy of corporate investment relative to the opportunity cost of capital, an increase in q should signal increased corporate investment.[15/]

We have assumed in all of this that the denominator would always be determined by the initial cost level C. The adjustment costs in C' would not be picked up in capital stock as measured in the National Income Accounts, although one could argue that they should be. For example, if firms face adjustment costs, then the true secondhand value of all machines at the time of Figure 3b is not C, but C' at capacity level 3. Nor would the National Income Accounts pick up a short-run increase in costs to C". The denominator as we measure it has to be thought of as a long-run net replacement cost, given current prices and technology. It probably does not adequately reflect year-to-year changes in the marginal cost of adding new capacity.

Conclusions

The first 20 postwar years were a generally favorable period for NFCs and MCs. Investors in NFC and MC securities earned average rates of return on market value that seem, in hindsight, to be unusually generous. Starting in 1947

TABLE 3

THE SPREAD BETWEEN ROCs BEFORE AND AFTER TAX,
FOR NFCs AND MCs, 1947-79

Period	ROC-BT	ROC-AT	$\frac{\text{ROC-AT}}{\text{ROC-BT}}$	ROC-BT	ROC-AT	$\frac{\text{ROC-AT}}{\text{ROC-BT}}$
1941-50	15.0	7.7	0.51	18.8	10.1	0.54
51-54	13.3	5.7	0.43	17.3	7.3	0.42
55-58	12.1	5.9	0.49	14.6	7.1	0.49
59-62	12.1	6.6	0.55	14.5	7.6	0.52
63-66	15.5	9.6	0.62	19.7	11.5	0.58
67-70	12.7	7.7	0.63	14.6	8.4	0.58
71-74	9.9	6.2	0.63	11.4	6.4	0.56
75-79	9.8	6.1	0.62	10.2	5.5	0.54
Mean 1947-79	12.5	6.9	0.55	15.0	7.9	0.55

Source: Table 1

the aggregate market value of stocks and bonds which was about equal to the replacement cost of NCF inventories, plant and equipment, and about 4/5 of the replacement cost of their physical assets for MCs tended to drift down in relatively through the 1950s. A sharp relative rise in market value started in 1959. By 1965, aggregate market value was 50 percent larger than a greatly expanded base of inventory and real assets; for MCs the corresponding figure was even higher.

Of course we do not know why this all happened. Values observed in capital markets show us only the end result of a complicated process. Insights into earlier states of the process must come from other measures of profitability.

While q for NFCs and MCs moved synchronously over the period, it was more volatile for MCs, rising more rapidly and falling more rapidly than for NFCs.

IV. RATES OF RETURN ON CAPITAL STOCK

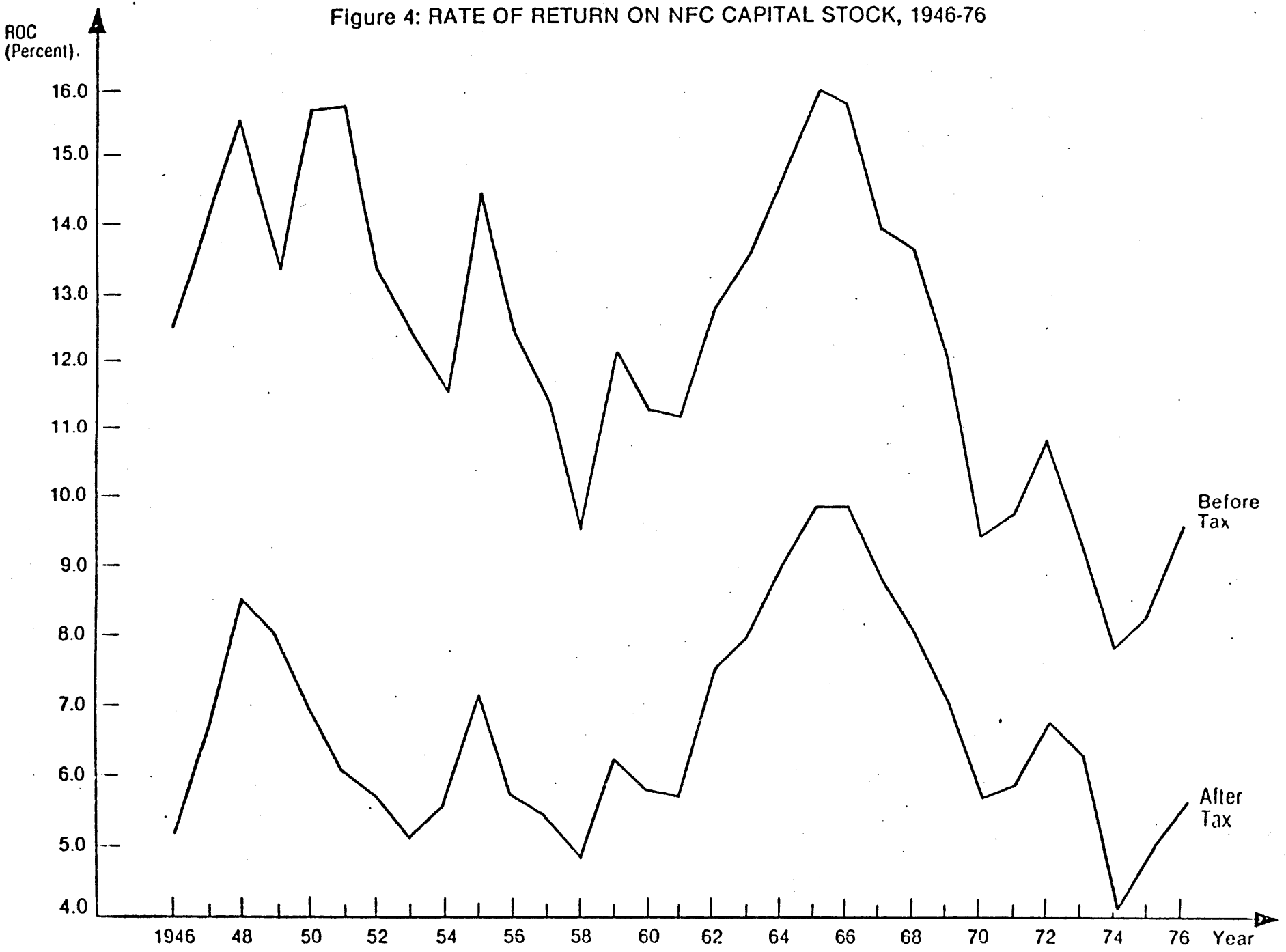
In this section we examine NFC profitability from a different point of view. In Section II we derived estimates of income and value from capital market data. The estimates in this section are based on annual measures of asset value and operating income developed by the Bureau of Economic Analysis of the Department of Commerce as part of the National Income and Product Accounts (NIPA). In effect we are moving from capital market measures of return to measures closer to the book or accounting measures utilized by business firms.

The capital market measures are sufficient to tell us how well NFCs have fared, but they give no clue to the reasons for good or bad performance. For example, we have no way of inferring from market value data whether the period of unusually high market values in the mid-1960s was due to high operating profits, to low capitalization rates for NFC securities, or to a combination of both. The interpretation of capital market data requires information from other sources.

Many measures of rate of return can be derived from NIPA data. The one we emphasize most is the rate of return on capital stock (ROC), defined as the ratio of NFC operating income, i.e., profits plus interest, to the net replacement cost of NFC depreciable capital stock and inventories. Our estimates are based on newly revised series prepared by the Bureau of Economic Analysis.[16/]

The numerator of our ROC is the sum of profits and net interest paid. In the determination of profits, depreciation and the cost of replacing inventory are both estimated at current year's prices. The denominator--plant equipment and inventories--is estimated at replacement cost. Their ratio, therefore, is a real rate of return.

Figure 4: RATE OF RETURN ON NFC CAPITAL STOCK, 1946-76



Thus following other investigators, we interpret ROC as the real rate of return on NFC capital stock. Of course, such an interpretation rests on a number of assumptions, some of which are not strictly true. Firms must invest in other assets besides inventories and plant and equipment, for example. (Later in this section we examine ROC computed on an "augmented" investment base.) Also, operating income equals real income only if there are no real holding gains on capital stock and inventories rise at exactly the same rate as prices generally. (Again, later in this section, we adjust ROC for holding gains or losses.)

Nevertheless, operating income is an important indicator of corporate performance and a decent first approximation of real operating income. Moreover, our conclusions are insensitive to the exact definition of income or ROC.

Before-Tax Rates of Return

Table 1 presents before-tax ROCs for the NFC and MC sectors for the period 1947-1979. They are plotted in Figure 4.

For both NFCs and MCs three distinct periods can be noted in the post-war results. From 1947 through 1970, the before-tax ROC tended to decline, but with sharp year-to-year fluctuations. For NFCs it averaged 13.2 percent, for MCs, 16.6 percent. There was an upward burst of profitability in the first half of the 1960s and a decline in the second half. The average for the period 1961-1969 was 14.2 percent for NFC and 17.4 for MCs. Finally for the most recent period 1970-1979, ROC averaged 9.9 percent for NFCs and 10.6 for MCs, noticeably lower than the other two periods.

The same pattern over time is evident in the four-year averages in the Table.

Was the decline from the peak of the mid-1960s so sharp as to carry the before-tax ROCs to a new low level? It appears so. But this result cannot be vigorously defended. It is based on a short run of years, and may be a transitory or cyclical phenomenon. Later in this section we make a more careful attempt to extract the trend, if there is any, from the before-tax ROCs.

After-Tax Rates of Return

Table 1 also presents after-tax ROCs. The after-tax ROC differs from its before-tax counterpart only in that corporate income taxes are subtracted from operating income.

It is after-tax income that counts in the determination of security prices. The after-tax ROC is the "book" counterpart to R (discussed in an earlier section), the market rate of return on all NFC securities.

The after-tax ROC is perhaps more pertinent than its before-tax counterpart as evidence in the current debate on profitability. It measures the actual reward to suppliers of capital (before personal income tax) or, as some view it, the amount available to finance new investment. Has the after-tax ROC tended to decline?

The three episodes observed for the before-tax ROC also characterize the after-tax figure. For NFCs there were wide fluctuations around a mean of 6.4 percent from 1947-1960, then a sharp rise and fall in the 1960s, averaging 8.6 percent. The average was only 6.1 percent for the period 1970-79.[17/] For MCs over the same three periods, the ROC(AT) averaged 8.1, 9.9, and 5.8.

Are the low after-tax ROCs for the most recent decade unique? The averages seem to suggest that they are not for NFCs since even lower values

were found for 1951-1958. For MCs, however, the most recent experience seems out of line with the historical record. We explore this more carefully in a later section.

A noteworthy feature of the postwar record of profitability both for NFCs and MCs and on both a before- and after-tax basis is the unusually high rate of return in the 60s. It could well be that what really requires explanation is not the unusually low profitability of the last decade, but the extraordinarily profitable experience of the 60s.

Note also that rate of return in the 60's compared with the plans that preceeded and followed, was relatively higher for the ROC after tax, particularly for NFCs.

V. CORPORATE INCOME TAXES

In Table 3 we compare ROCs before-and-after tax for NFCs and MCs. For MCs there is a slight tendency for the ROC-AT to rise relative to the ROC-BT. For NFCs a narrowing of the gap between before-and-after tax ROCs from the 60s on is more pronounced.

The narrowing spread between before-and-after tax ROCs since the end of the War is due to a downward drift in effective corporate tax rates. Although legislated rates of the Federal Corporation income tax (by far the largest component of NFC income tax liability) were substantially the same from 1951 and state corporation income tax rates moved up over these years, the effective tax rate particularly on NFC operating income has tended to decline (see the Effective Tax Rate columns of Table 1). Effective rates started to move down in the early 1960s, and the decline has tended to persist, although not without interruption.

Note that our effective tax rate measures tax liability as a fraction of operating income, i.e. real profits plus interest. But the corporation income tax base is nominal profits.

Some of the decline in effective rates is due to purposeful government policies, for example the introduction of accelerated depreciation, the tendency to shorten depreciable lives for tax purposes, permitting LIFO inventory accounting for tax purposes, and the investment tax credit. But the major part of the decline of effective rates in recent years reflects financing policy and rising nominal interest rates. The Market Value Debt Ratio Columns of Table 2 suggest that a major reason for the differentially heavier decline in effective rates for NFCs than MCs lies in the greater reliance of NFCs on debt finance.

Although the effective tax rate has drifted downward in the postwar period, that trend is only part of the story. Bursts of inflation have sent corporate income tax liabilities up and after-tax profitability down. The results for 1974 are particularly dramatic. Hankin has found a significant negative correlation in the post-war period between the after-tax ROC and the rate of inflation, after adjustment for a time trend and the rate of change in GNP. There was a strong positive link between inflation and the effective tax rate, but no significant association between inflation and before-tax ROC.[18/] We explore all this more carefully in a regression analysis presented in the next section.

Comparing MCs and NFCs

With respect to the estimated variables displayed in Tables 1 and 2--Returns to Investors, ROCs before and after tax, q, the capitalization rate (ρ), and effective tax rates--the pattern over time is similar for MCs and NFCs. The similarities of the time series for MCs and NFCs are more striking than the differences. This suggestion that a common set of forces are responsible for the outcomes for NFCs and MCs is reinforced by the similarity of the results of our regression analyses.

While their experience has been generally similar, we can observe differences between MCs and NFCs. The most obvious one is that MCs seem to have been more profitable. As shown in Table 4 the before-tax ROCs are consistently higher for MCs than NFCs. The absolute difference between the two peaked at over 4 percentage points from 1963-66, and reached its minimum most recently--1975-79--at four-tenths of a percentage point. MCs also had higher after-tax ROCs until very recently, but the difference between MC and NFC has tended to convergence, reflecting the heavier effective tax rates on MCs.

The higher profitability of MCs also shows up in higher average returns to investors, not in q, on average.

One possible explanation for higher returns is higher risks. The evidence we have favors that explanation. We note (see Table 2) that the MCs' standard deviations are a bit higher than the NFCs' except in the 1970s. The MCs' before-and-after tax ROCs are more variable, and more sensitive to the state of economic activity and the pace of inflation (see Table 3). MCs waxed fatter in the mid-1960s and suffered more in the 1974 crunch.

TABLE 4

A COMPARISON OF ROCs--BEFORE AND AFTER TAX--FOR MCs AND NFCs, 1947-79

	ROC - Before Tax			%	ROC - After Tax			%
Period	MC	NFC	MC-NFC	MC/NFC	MC	NFC	MC-NFC	MC/NFC
1947-50	18.9	15.0	3.9	1.26	10.1	7.7	2.4	1.31
51-54	17.3	13.3	4.0	1.30	7.3	5.7	1.6	1.28
55-58	14.6	12.1	2.5	1.21	7.1	5.9	1.2	1.20
59-62	14.5	12.1	2.4	1.20	7.6	6.6	1.0	1.15
63-66	19.7	15.5	4.2	1.27	11.5	9.6	1.9	1.20
67-70	14.6	12.7	1.9	1.15	8.4	7.7	0.7	1.09
71-74	11.4	9.9	1.5	1.15	6.4	6.2	0.2	1.03
75-79	10.2	9.8	0.4	1.04	5.5	6.1	-0.6	0.92
Average 1947-79	15.0	12.5	2.5	1.20	7.9	6.8	1.1	1.16

Source: Table 1

The lower debt ratio for MCs may be lenders' and managers' response to higher business risk. Similar q's for MCs and NFCs, on average, despite higher MC profitability, may reflect the greater volatility of the ROC for MCs. Finally, capitalization rates for MCs are generally higher than for NFCs. Greater risks ought to mean higher capitalization rates, other things equal.

VI Searching for Trends

With respect to ROCs our study, and a number of others follow the framework developed in an earlier paper by Nordhaus. He concluded that the return on capital in the postwar period (1948-70) showed "a definite downtrend from 1948 to the middle 1950s, a dramatic recovery from the late 1950s to the mid 1960s and a deterioration to a plateau by 1970."[19] Nordhaus interpreted the behavior of the ROC time series as a postwar downtrend in corporate profitability, reflecting a steady decline in the opportunity cost of capital.[20]

This is not so clear to us.[21] Inspection of Table 1 and its accompanying chart suggests that for NFCs the ROC is most appropriate interpreted as an irregular cyclical series. Note, for example, that while the after-tax ROCs for NFCs from 1970 on were "low" relative to the average for the whole period, in earlier sub-periods 1951-4 and 1955-58, the after-tax ROC was even lower. As we have noted, the real outlyer which requires explanation are the unusually high returns for 1963-66, averaging 9.6. The ROC before-tax for NFCs also is most appropriately interpreted as a cyclical series over most of the postwar period. But, here, visual inspection suggests that the last decade is distinctly below the range of values in earlier years.

The "visual impression" story is much the same for the ROC for Manufacturing Corporations. The after-tax ROC is a cyclical series, but here the last 10 years do average out lower than other sub-periods. And the same is true of the before-tax series.

"Visual inspection" of the data leads us to doubt a secular downtrend in the after-tax ROC over the period 1947-79, and to suspect a declining trend for the before-tax ROC. But it is difficult to "see" a downward drift (or lack thereof), if it existed, given the volatility and cyclicity

of the ROC time series.

We could "see" a trend (if any) more clearly if the ROC series were adjusted for the factors, other than time, that affect corporate profitability. To this end we have undertaken a set of statistical tests, reported in Tables 5 and 6, which draw on recent work by Roger Hankin.[22/]

TABLE 5

REGRESSION ANALYSIS OF RATE OF RETURN ON CAPITAL (ROC) - AFTER TAX FOR ALL NONFINANCIAL CORPORATIONS AND MANUFACTURING CORPORATIONS, 1947-79

Equation	Constant Term	Time	Level of Economic Activity[a]	Inflation[b]	Dummy[c]	R^2
			Variable			
			Panel A - Nonfinancial Corporations			
1	7.62	-0.04				.01
	(3.94)	(-0.47)				
2	6.55	-0.02	0.15			.31
		(-0.24)	(3.57)			
3	4.53	0.10	0.17	-0.19		.55
	2.42	(1.28)	(4.76)	(-3.85)		
4	--	0.16	0.17	-0.20	-1.41	.60
		(2.25)	(4.67)	(-4.15)	(-1.96)	
			Panel B - Manufacturing Corporations			
1	10.38	-0.14				.02
	(4.21)	(-1.32)				
2	8.65	-0.12	0.27			.45
	(2.77)	(-0.97)	(5.03)			
3	6.31	0.03	0.29	-0.22		.59
	(2.62)	(0.25)	(6.17)	(-3.39)		
4	5.70	0.11	0.28	-0.23	-1.96	.68
	(3.21)	(1.22)	(6.13)	(-3.75)	(-2.10)	

Note: t statistics appear in parentheses under the coefficients; values of 2 or more indicate significance. Equations fitted by standard Cochrane-Orcut procedure.

[a] Annual percentage change in real GNP.

[b] Annual percentage change in Consumer Price Index.

[c] Equals zero for all years 1947-69, and one in each year from 1970 to 1979.

TABLE 6

REGRESSION ANALYSIS OF RATE OF RETURN ON CAPITAL (ROC) - BEFORE TAX FOR ALL NONFINANCIAL CORPORATIONS AND MANUFACTURING CORPORATIONS, 1947-79

Equation	Variable: Constant Term	Time	Level of Economic Activity[a]	Inflation[b]	Dummy[c]	R^2
			Panel A - Nonfinancial Corporations			
1	15.35	-0.17				.13
	(8.98)	(-2.08)				
2	12.72	-0.12	0.37			.76
	(5.39)		(9.29)			
3	12.80	-0.13	0.37	0.01		.76
	(4.88)	(-1.19)	(9.29)	(0.16)		
4	--	-0.04	0.36	-0.01	-1.85	.79
	--	(-0.44)	(9.08)	(-0.15)	(-2.28)	
			Panel B - Manufacturing Corporations			
1	20.11	-0.30				.15
	(8.20)	(-2.56)				
2	16.23	-0.24	0.63			.76
	(5.45)	(-1.96)	(9.59)			
3	16.76	-0.28	0.62	0.06		.75
	(4.58)	(-1.81)	(9.45)	(0.65)		
4	15.09	-0.12	0.61	0.03	-2.96	.81
	(6.65)	(-1.03)	(9.39)	(0.30)	(-2.27)	

Note: t statistics appear in parentheses under the coefficients; values of 2 or more indicate significance. Equations fitted by standard Cochrane-Orcut procedure.

[a] Annual percentage in real GNP.

[b] Annual percentage change in Consumer Price Index.

[c] Equals zero for all years 1947-69, and one in each year from 1970 to 1979.

Lines 1 through 3 of Tables 5 and 6 report the results of successively regressing the after-tax ROC on time, then on time and annual percentage changes in GNP, and finally on time, annual percentage changes in GNP, and the inflation rate.[/] The change in GNP variable corrects for business cycle effects, and the rate of price change variable adjusts for inflation, correcting mainly for the impact of inflation on effective corporation income tax rates.

In Table 5, which summarizes the results for the ROC after tax, NFCs are covered in Panel A, MCs in Panel B.

The first equation of both Panels in Table 5 is the equivalent of a simple time trend. For both NFCs and MCs as a function of time alone, the after-tax ROC trended downward. But the equation "explains" virtually none of the variability in the ROC, and the coefficient is not significant. In the second equation, the ROC is related to time and the state of economic activity. The latter emerges as a significant explanatory factor, and time becomes less important. The third equation adds the rate of inflation. Inflation, too, turns out to be an important and significant determinant. The more rapid the rate of inflation, other things equal, the lower the after-tax ROC. Inflation exercises its effect primarily through the effective tax rate. (Note in Table 6 that the rate of inflation has no effect on the before-tax ROC.)

In the third equation of Panel A and B the time coefficient is positive. Adjusting for the state of economic activity and the rate of inflation, the postwar trend of after-tax ROC is slightly but insignificantly upward. The trend is still more strongly positive in the fourth equation, in which a

dummy variable picks up the low ROCs experienced in the 1970s.

We conclude that the after-tax ROC shows neither a downward nor an upward trend. Variations around its central tendency can be explained, in large part, by the changes in the level of economic activity and in the rate of inflation.[23/] Both these variables seem to have a stronger effect on the after-tax ROC for manufacturing corporations than for all NFCs.

Perhaps we should search not for long-term trends but also for sudden shifts in profitability. The economy of the 1970s may be fundamentally different than before. The poor profitability record of the last ten years is not fully explained by a slack economy and brisk inflation. The dummy variable for 1970-79 indicates that average ROC during this period was 1.4 percentage points and almost 2 percentage points lower than before for NFCs and MCs respectively, even after adjustment for inflation and the rate of growth of GNP. The coefficient of the dummy variable is statistically significant.

There has been a downward shift in profitability, bur our fourth equation does not prove it is permanent. We could have fitted dummy variables to other subperiods--the mid-1960s for example--and no doubt we could have obtained significant coefficients, particularly as the periods of abnormally high or low profitability can be picked by hindsight. None of these previous episodes was a permanent shift.

Our equations explaining ROC are effective but crude. Profitability responds to more than just inflation and the growth of GNP. Evidently these omitted variables have been unfavorable in the 1970s. We have no way of knowing whether they will continue unfavorable, but we are inclined towards

the longer view, and towards guessing that economists in 1987 will regard the first half of the 1970s as an unfortunate but transient period.[24/]

A similar explanatory exercise for the before-tax ROC is summarized in Table 6. With respect to time alone, the trend seems downward and is significant. However after adjusting for the other factors, the influence of time alone is less strongly negative and is insignificant. But there remains a "suggestion" for MCs that there has been a downward trend, since the time variable in equations 2 and 3 border on significance. In contrast with the ROC(AT), inflation is neither an important nor a significant determinant of the ROC(BT). Hence our conclusion is that inflation exercises its effect through an increase in corporate income tax liability.

With respect to declining trends in the before-tax ROC, we choose the option open to Scottish juries: "not proven."[25/] But we hold this view more strongly for NFCs than for MCs.

Additional Notes on the Regressions

1. What results from the Cochrane-Orcutt iterative procedure can depend importantly on the starting year. Therefore we ran the regressions in Tables 5 and 6 for NFCs also for 1946-79 and 1948-49. The coefficients and R^2 were virtually identical for all three runs.

2. For the pace of inflation we also tried the GDP deflator which shows a lower rate of price increase than the CPI. With the GDP deflator the results were substantially the same as reported in the Tables but inflation "explained" somewhat less of the variability of the after-tax ROC.

3. We tried an economically more meaningful specification for the Dummy variable in equations 5 and 6 restricting it to the period from 1974-1979 on the

presumption that the sharp rise in the price of energy following the formation of OPEC in 1974 could have made the capital stock, laid down with much lower prices of energy the expectation, "inefficient" with adverse effects on the ROC. Under this alternative specification the coefficient on the Dummy variable is lower and not significant.

VII Some Further Observations on ROCs

1. The reader we are sure will have been properly impressed with the limitations of and pitfalls in our estimates of returns to corporate investment and investors in corporations. In addition to all the caveats and cautions we have flagged every reader will bring his own reservations and concerns.

It is comforting to point out, therefore, that the numbers we have generated meet a basic test of logical consistency. Over the long pull (neglecting the special growth opportunities which may, in fact, be offset by negative counterparts in the aggregate) we would expect that investors in corporations would earn at a rate just about the same as what corporations earn on their investments. And that is just what our estimates show for the 33-year period they cover. Investors in NFCs averaged 8.1 percent over the period; the corporations they invested in earned 7.9 percent on their investments after meeting the prior claims of government. For NFCs our estimates show a long-period average return (after tax) of 6.9 percent on corporate investment and 6.8 percent on investments in the stocks and bonds of these corporations.

The congruence of these estimates of investor and corporate returns leads us to think that we must be doing something right.

2. Manufacturing seems to have taken a deeper profitability bath than NFCs in the last decade. We have not yet analyzed the reasons for this. One possibility that deserves careful exploration is that profitability in manufacturing more than the rest of the industries making up NFCs has been driven down by increasingly effective international competition. Simply to

list the industries under manufacturing--chemicals, petroleum products, motor vehicles, primary metal products, fabricated metal products, etc.--and then to compare them with the rest of NFCs--wholesale and retail trade, transportation, communication, electric, gas and sanitary services, construction, etc.--is strongly suggestive of different degrees of competition effective for the manufacturing sector, caught up in international competition, and the non-manufacturing nonfinancial corporations producing primarily for the home market.

3. If our estimates for NFCs were entirely accurate, and <u>if</u> our estimates for MCs were likewise we could, by subtraction, derive the non-manufacturing nonfinancial sector. But as we have noted frequently throughout our paper orders of accuracy that would permit this do not characterize our estimates. However, our estimates strongly suggest that two components that make up the nonfinancial corporate sector--manufacturing and non-manufacturing--are very different with respect to levels of profitability, effective tax rates, capitalization rates, etc.

VIII The Link Between Real and Financial Markets

Introduction

We have now examined both physical asset and financial asset measures of NFC and MC performance. To a great extent they tell the same story. But further insights depend on a link up of the physical and financial sectors. The most important specific issue is how real rates of return on corporate investment have behaved relative to capital costs.

It is difficult to measure the opportunity cost of capital directly, because it is defined in terms of expected returns on debt and equity securities. There is no simple way to infer expectations from historical returns.[26/]

But estimates of q can provide useful insights into whether the rate of return on corporate capital has declined relative to the cost of capital, which we denote as ρ. If, for example, we observe that q has declined, then we can infer that ROC has declined relative to ρ.[27/] Moreover, we can say this with reasonable confidence, since the market value of equity and debt and the current value of plant, equipment, and inventories the determinants of q are liable to less serious measurement errors than ROC or ρ.

We cannot use q to derive specific estimates of the rates of return or the cost of capital for any particular year. But the approach should permit us to identify changes in the spread between present and anticipated future profitability, on the one hand, and capital costs on the other. We believe this is the more relevant comparison. For example, it bears directly on the concern that the falling rate of return reduces the incentive to invest.[28/]

To summarize, changes in q over time for the NFC and MC sectors should provide a clear measure of how present and anticipated rates of return on

real capital have behaved relative to the cost of capital.

The Behavior of q and ROC over Time

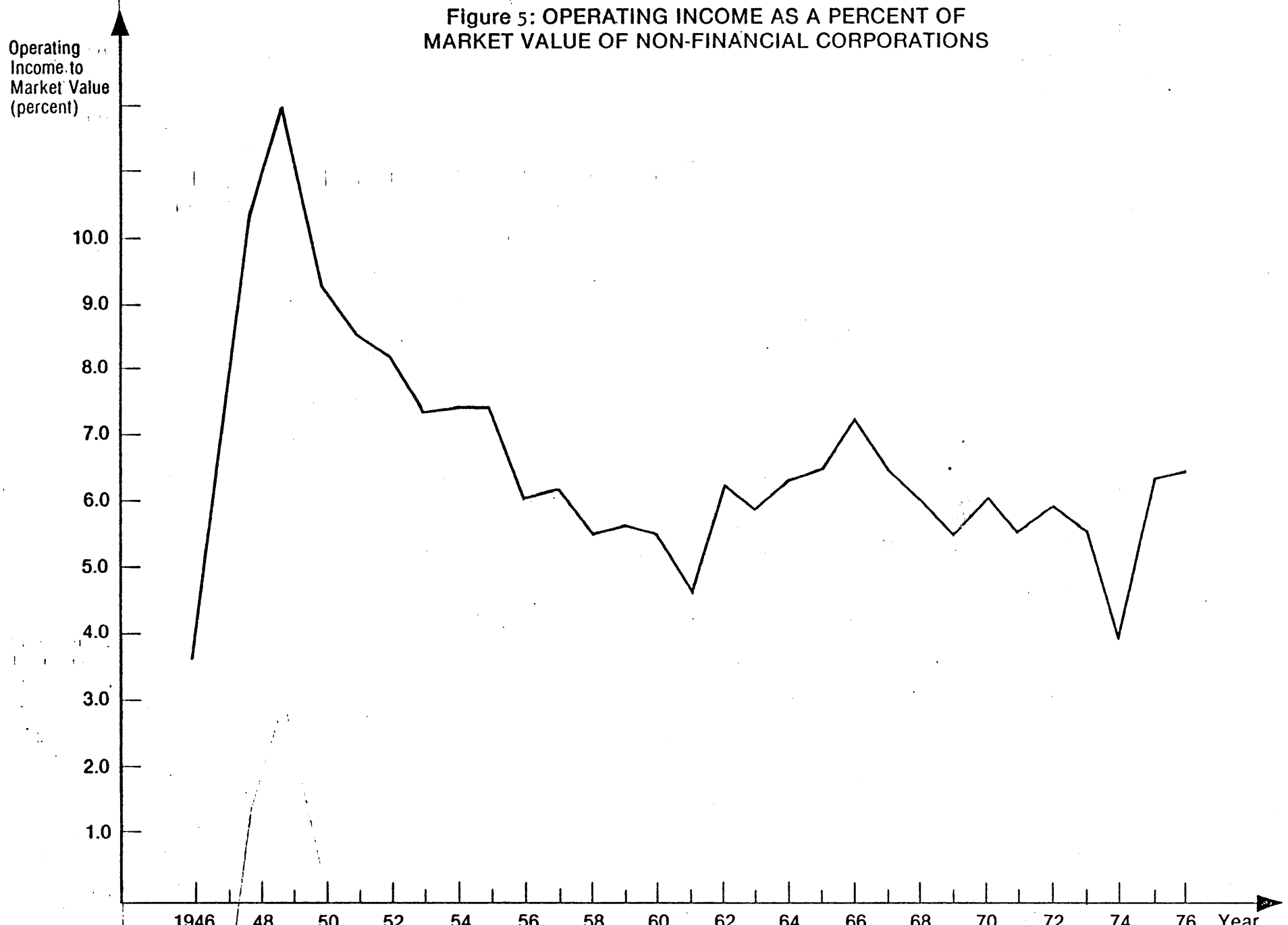
The time series of q_t for nonfinancial coporations and manufacturing corporations are presented and discussed in an earlier section. We note again that the early and mid-1950s were an unfavorable period relative to the mid-1960s, and that q has declined since the late 1960s.

Now, declining profitability does not depress stock and bond market values if capital costs decline proportionally. q depends not on ROC alone, but on the ratio of ROC to ρ. Therefore we interpret the last decade's down-trend in q as reflecting a decline in the rate of return earned by NFCs relative to the NFC opportunity cost of capital.

It is difficult to separate the effects of ROC and ρ on q, because we lack a reliable estimate of ρ. We can obtain a simple, rough measure, however. In Table 2 we show the ratio of NFC and MC operating income to market value for the period 1947-79 presented as a percentage. This ratio can be thought of as a generalized earnings-price ratio where "price" equals the market value of equity and debt and "earnings" equals real operating income.[29/] There is no evident trend in this ratio since the mid-1950s, and its volatility since then has been much less than in the first postwar decade. (See Figure 5.)

If we can take the ratio as a rough estimate of ρ, we must conclude that for NFCs that ρ declined steadily from its postwar peak in the late 1940s But since 1956 it has fluctuated in a range from five to seven percent, which matches the average after-tax ROCs over the postwar period and over the past 20 years. Our data strongly suggest that it is these fluctuations that account for the fluctuations in q over the last 20 years. As Figure 6 shows, the year-to-year movements in q and ROC correspond fairly well after

Figure 5: OPERATING INCOME AS A PERCENT OF MARKET VALUE OF NON-FINANCIAL CORPORATIONS



Source: Ratio of Operating Income to Market Value from Table 11

FIGURE 5

Figure 6: THE RELATIONSHIP OF ROC AND q

Source: q from Table 2 (standard q). ROC from Table 3 (after-tax).

FIGURE 6

1958. There is no evident relationship before then.

We conclude, therefore, that the decline in corporate real profitability (ROC) over the last decade has not been matched by a corresponding decline in the real opportunity cost of capital.[30/]

The evidence for MCs is less clear. The "cost of capital" has been more volatile; the relative rates of operating profitability and changes in capitalization rates in explaining fluctuations in market values remain more ambiguous.

The Absolute Value of q

As Table 2 shows, q has averaged somewhat less than 1.0 over the last few years. One is tempted to conclude that NFCs and MCs are not earning enough to cover the opportunity cost of capital (ROC = ρ). But any such conclusion must be cautiously held. For one thing our standard base does not include some assets. Although changes in q are, we believe, a reliable signal of changes in ROC relative to ρ, the absolute value of q is a less trustworthy statistic.

Nevertheless, it is difficult to see how the "true" value of q could be much in excess of 1.0.

Where are the intangible assets, the growth opportunities, and the monopoly rents? Apparently, in the last few years they have counted for very little when NFCs are examined in aggregate. We found this surprising. Financial economists are accustomed to pointing out the assets that accounts do not recognize--going-concern value, the fruits of past research and development, product reputation, and so on. They have come to think of growth firms as an important part of our economy. They believe that some

firms have monopoly power. In each case they can cite firms as examples to back up their beliefs. Yet these firms are evidently atypical. Judging from q, there is little evidence that intangible assets, growth opportunities, and monopoly rents have a significant impact on the current value of NFCs or MCs although one or more of these effects must have been important in the mid-1960s, and also in earlier periods, e.g. 1934-39.

IX. CONCLUSION

There is no question that NFCs have fared poorly since the mid-1960s. The fact is obvious from the low real rates of return realized by investors in NFCs. The poor performance is confirmed by declining operating profitability over the same period.

Whether the most recent data are viewed optimistically or pessimistically depends on which past period is taken as normal. The evidence is that in the mid-1960s the real profitability of NFCs was much higher, relative to the opportunity cost of capital, than it is now. On the other hand, NFCs are better off now than in the mid-1950s. Operating profitability (ROC) is about the same now as then, but the cost of capital is lower. (If there is a capital "shortage," it has as yet had no observable effect on the cost of capital.)

Over long periods--1947-79--, we have found no trend in the after-tax rate of return on corporate assets.

In the last few years the aggregate market value of NFCs was at most equal to the net replacement cost of all NFC assets. There was no evidence that capital markets in recent years perceived NFCs as having, in aggregate, substantial intangible assets or growth opportunities. The evidence we have presented gives no basis for concluding that current or anticipated ROCs

on NFC assets exceed the current opportunity cost of capital.

It seems reasonable to say that the real cost of capital for NFCs has been about 6 to 7 percent since the late 1950s. The average long-run real profitability of NFCs has also been 6 to 7 percent. In the period from 1946 up to the late 1950s, the annual cost of capital was a volatile series. Since then fluctuations in market value have been more closely related to variations in profitability than to shifts in the cost of capital.

Further Research

The primary objective of our research to date has been to develop measures of corporate profitability and capital costs that would permit meaningful comparisons over time. Our research strategy has been to present and discuss various measures of capital costs and profitability for the U.S. Nonfinancial Corporation sectors and the Manufacturing Corporation subsector. Many of our measures are rough; consequently we have restricted ourselves to broad questions. On the basis of our results we are inclined to be skeptical of trends or sudden permanent shifts in corporate profitability. But we may have been forced to this position by the inadequacy of our estimates, our limited understanding of the determinants of corporate profitability over time, and the lack of a formal model explaining aggregate market value in terms of operating income and other real variables.

Consequently we have an agenda for further research. We plan both to improve our measures and fomralize the analysis undertaken in this paper.

Improved Measures

1. Currently we define corporate capital to cost of plant, equipment and inventories. We need to augment net capital base to take

account of additional assets employed in business--monetary assets and land. This will entail an adjustment in operating income also.

The augmented capital stock would include cash and other assets on which NFCs earned "imputed interest." Therfore in computing the ROC on the augmented base, we should add monetary assets to the denominator and imputed interest to the numerator.

2. Presently we measure the return to capital by profits and net interest. However some capital is rented rather than owned, and a portion of what is called the rental payment is really interest. Capital whether rented or owned appears in the denominator of the ROC. But the interest component of the rental payment does not. To this degree our measure understates corporate profitability. Preliminary research suggests that this is not likely to be an important source of error. But more careful study is required before we can say this with confidence.

Extending the Period of Analysis

The estimates in this paper run from 1947 through 1979. For MCs 1947 is as far back as the data currently available permit us to go. For NFCs however, we can carry the estimates back to 1929. Preliminary work shows extremely high q's for the 30s compared with the period following World War II. Estimates for 1929-45 should be pursued more carefully. If the unusually high q's for this period are real, we may have something important to say about the macroeconomic history of that period.

Formalization

Aside from the section on "Searching for Trends," there is no formal

statistical analysis in this paper. In particular we have not attempted to specify or test a model linking real and financial variables.

There is a simple valuation model implicit in our conclusion that the real cost of capital has been stable at about 6 percent for the last 20 years. We assumed market value equals current operating income capitalized at the cost of capital. If this is true, then the cost of capital equals current operating income divided by market value.[31/] We did not test this model. When we do we will be forced to make changes and extensions, for example:

1. We should in principle use expected future operating income. Investors do not naively project current performance into the indefinite future. That means we must develop a proxy for expected profitability.

2. We used the standard definition of operating income. Would other definitions work better? The valuation model provides a basis for testing which earnings series comes closest to true economic income as perceived by investors. We think that we can show that the standard definition, which is based on replacement cost accounting, is more closely related to actual market values than income based on historical cost accounts, even though the replacement cost data were not directly available to investors over the period we studied.

3. What about growth opportunities? Our measure of the cost of capital is essentially an earnings price ratio, a mreasure well known to be inadequate for growth firms. We should be able to develop a proxy for growth opportunities based on q.

FOOTNOTES

1. This report incorporates the research supported by the Massachusetts Institute of Technology's Project on International Business, the Ford Foundation, the Sloan School of Management at MIT, the Lincoln Institute of Land Policy, and the Committee for Economic Development. We are grateful to the sponsors for their support and to Fischer Black, Jack Ciccolo, John Gorman, Everett Hagen, Robert Merton, and Allen Sinai for their help in acquiring necessary data and working out methodological issues. We thank Eugene Fama and Nicholas Gonedes for a careful review of our methodology and data, which we found very helpful. We are especially indebted to Sudipto Bhattacharya, Robert Jarrow, Richard Weiss, Bernard Horn, Peter Blanton and Douglas Swanson, our research assistants at various times on this project, and to Roger Hankin for permitting us to draw on his research on the link between corporate profitability and inflation [11]. The authors take full responsibility for errors, however.

2. The stock market's current valuation of growth firms like Hewlett-Packard or Digital Equipment Corporation can only be explained by the present value of profitable future investment opportunities. Current earnings are insufficient to account for these firms' values, even if capitalized at high-grade bond yields.

3. See, for example, Jensen's study of mutual fund performance [15] and other evidence summarized by Fama [8].

4. For evidence, see Lorie and Hamilton [18], Fama's review article [8], and the articles collected in Lorie and Brealy [17].

5. Earnings in this context are measured after taxes but before interest, since our portfolio contains debt as well as equity securities. Strictly speaking, we should subtract the present value of future investment outlays from the present value of the future earnings these outlays are expected to generate. In short, we are using "earnings" loosely here.

6. P_t can be expressed as a weighted average of returns to creditors and stockholders.

$$R_t = R_t(D)\left(\frac{MV_t(D)}{MV_t}\right) + R_t(E)\left(\frac{MV_t(E)}{MV_t}\right), \qquad (1)$$

where $R_t(D)$ = the rate of return earned in year t on a portfolio of <u>all</u> the net outstanding debt of NFCs. $R_t(D)$ includes interest receipts and capital gains or losses.

$MV_t(D)$ = the market value of that debt portfolio at the start of year t.

$R_t(E)$ = the rate of return earned in year t on a portfolio of all the equity shares of all NFCs. $R_t(E)$ includes both dividends and capital gains.

$MV_t(E)$ = the market value of that equity portfolio at the start of year t.

MV_t = the total market value of all NFC securities $(MV_t(D) + MV_t(E))$ at the start of year t.

Thus R_t is the rate of return earned on a portfolio of all securities issued by NFCs. It is the return to all bond- and stockholders considered as a group.

7. R_t does not, however, measure the return earned by the government via taxation. In a sense MV_t understates the value to society of NFCs, because it does not include the present value of future taxes.

8. There is no reason for the relative past performance of stocks and bonds to affect firms' future capital investment decisions, for example.

9. Our procedures for estimating MV_t follow those developed by John Ciccolo in [5]. We are grateful for his assistance.

10. We are <u>not</u> implying that there are meaningful trends or cycles in the rates of return shown in Table 1. It is not possible to predict future R_ts from the historical figures shown. No investor standing at any point in the 1947-75 period could have used the R_ts observed up to the point to predict future R_ts. It is only hindsight that allows us to interpret the history of rates of return.

11. CS_t, the denominator of q_t, is an average of starting and ending values of NFC capital stock and inventories. Thus CS_{1950} is a simple average of figures for the end of 1949 and the end of 1950. MV_t is estimated as of mid-year -- the end of the second quarter of year t. This convention facilitates comparison to the rate of return measures presented in Section III below. Unfortunately, it also makes it difficult to match year-by-year fluctuations in MV/CS and R, since R is based on market values computed at the <u>end</u> of calendar years. We do not attach much significance to any single year's value of MV/CS or R, however.

12. James Tobin has emphasized the importance of this ratio and employed it in theoretical and empirical work. See, for

19. [23], pp. 180-181.

20. [23], pp. 205-208.

21. We remind the reader that we are working with data that have been extensively revised twice since Nordhaus' work, and we have nine more years available.

22. Following Hankin [11] the equations were fitted by the Cochrane-Orcutt iterative technique to adjust for a serious positive auto-correlation of residuals.

23. Our conclusion rests on a larger statistical inquiry than the one reproduced in the Tables. We tried other variables--percentage utilization of capacity and lagged inflation--as substitutes for and in combination with the two in Tables 4 and 5 and ended up with the same general result. See also the additional notes on the regressions below.

24. We end up echoing Feldstein's and Summers' arguments, and refer the reader to [9], pp. 217-24 for a more extensive discussion. Their analysis and statistical tests were helpful in our work.

25. For a more rigorous verdict denying a declining trend see Feldstein and Summers [9].

26. We believe Nordhaus is the only investigator who has attempted to measure and compare trends in the rate of return and the cost of capital. But his cost of capital measure is flawed by (1) the use of book, rather than market values, for debt and equity in his weighted average cost of capital measure; (2) an inappropriate adjustment for the tax shield provided by interest; (3) using a risk-free rate to measure the expected rate of return on corporate bonds; and (4) using the earnings-price ratio for the expected market rate of return on equity. (See [18], esp. p. 199.) Assumption (4), or some equally simple rule of thumb, is perhaps unavoidable when dealing with aggregate data. But the first three assumptions can be improved upon.

27. Modern financial theory shows that the market value of a firm (MV) equals the capitalized value of the long-run average earnings from assets now in place (Y/ρ), plus the present value of growth opportunities (PVGO).

$$MV = \frac{Y}{\rho} + PVGO \qquad (2)$$

The capitalization rate ρ is the equilibrium expected rate of return established in capital markets for this firm and others of equivalent risk.

Earnings are equal to the return on capital times real capital (CS). Thus $Y = ROC(CS)$, and

example, [27] and [29]. See also the 1977 Economic Report of the President [7], pp. 28-29.

13. [7], p. 28.

14. Slippery issues are encountered as soon as one tries to specify exactly what assets should in principle go into the denominator of q. There is no reason for excluding assets just because they are intangible. But, as Fischer Black has pointed out to us, all of MV_t can in principle be traced to some tangible or intangible asset. If so, the true value of q equals 1.0 by definition.

    But we would exclude one type of intangible asset from the denominator, namely the ability to earn rates of return in excess of the opportunity cost of capital on investments undertaken by the firm. In other words, we would not capitalize rents or quasi-rents and include them in the denominator. We concede the difficulty of distinguishing intangible assets purchased by the firm from capitalized rents, but still maintain that q is a useful index of corporate profitability relative to the opportunity cost of capital.

15. This statement is strictly true only in a partial equilibrium analysis.

16. We are indebted to John A. Gorman, Assistant to the Associate Director for National Income Accounts, for supplying revised data prior to their publication in the Survey of Current Business.

17. Remember that the ROCs shown in Table are intended as measures of real, not monetary, rates of return. They should be compared to the Returns to Investors real rates of return in Table 1, and to real, not nominal, interest rates.

18. See Hankin [11].

19. [23], pp. 180-181.

20. [23], pp. 205-208.

21. We remind the reader that we are working with data that have been extensively revised twice since Nordhaus' work, and we have nine more years available.

22. Following Hankin [11] the equations were fitted by the Cochrane-Orcutt iterative technique to adjust for a serious positive auto-correlation of residuals.

23. Our conclusion rests on a larger statistical inquiry than the one reproduced in the Tables. We tried other variables--percentage utilization of capacity and lagged inflation--as substitutes for and in combination with the two in Tables 4 and 5 and ended up with the same general result. See also the additional notes on the regressions below.

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$$MV = \frac{Y}{\rho} + PVGO \qquad (2)$$

The capitalization rate ρ is the equilibrium expected rate of return established in capital markets for this firm and others of equivalent risk.

Earnings are equal to the return on capital times real capital (CS). Thus Y = ROC(CS), and

$$MV = CS\left(\frac{ROC}{\rho}\right) + PVGO \qquad (3)$$

PVGO is the present value of future opportunities to invest at rates of return in excess of the cost of capital. Growth is worth nothing if expected ROC on future investment just equals ρ. If ROC = ρ now and for the future, the market value of the firm just equals the value of its real capital.

Thus q, the ratio of MV to RC, depends on the ratio of ROC to ρ:

$$q = \frac{MV}{CS} = \frac{ROC}{\rho} + \frac{PVGO}{CS} \qquad (4)$$

where PVGO is a function of ROC/ρ and the rate of expansion of real capital stock.

Now, by identifying changes in q with changes in ROC/ρ, we are actually assuming a constant expected long-term rate of expansion in real capital stock. It is conceivable that q could vary due to changes in the expected rate of investment, even with ROC and ρ constant. But we consider this unlikely, for two reasons. First, if ROC and ρ are constant, there is no obvious mechanism to account for changes in the real investment rate. If the real rate of investment increases as ROC/ρ increases, then that merely strengthens the relationship between q and ROC/ρ. Second, Figures 4 and 6 below show that recent fluctuations in MV can be largely accounted for by changes in ROC.

28. We do not claim that this approach is without its own difficulties. For example, there are problems in defining and measuring real capital, and in estimating market values. These problems are likely to be particularly severe in cross-sectional comparisons. There is little meaning in comparing the q's of the drug and steel industries, for example, since so much of the drug industry's assets do not show on blance sheets. (Comparisons of the industries' ROCs would be just as suspect--perhaps more so.) At best one could make rough adjustments such as capitalizing and amortizing advertising and outlays on research and development. On the other hand, biases in estimating CS or MV are not likely to be volatile <u>over time</u>. Thus a change in q can be clearly interpreted even though the absolute value of the ratio cannot.

29. The ratio of operating earnings to MV is as close as we can get to a direct estimate of the real cost of capital ρ. In principle we should estimate

$$\rho_t = \rho_t(D)\left(\frac{MV_t(D)}{MV_t}\right) + \rho_t(E)\left(\frac{MV_t(E)}{MV_t}\right). \quad (5)$$

Eq. (5) corresponds to Eq. (1) (fn. 6), except that the ρ's are expected rates of return -- e.g., $\rho_t = E(R_t)$. Now, if the total expected dollar return to debt and equity is just equal to Y_t, i.e.,

$$\rho_t MV_t = \rho_t(D)MV_t(D) + \rho_t(E)MV_t(E) = Y_t, \quad (6)$$

then $\rho_t = Y_t/MV_t$, which is the ratio plotted in Figure 6. Unfortunately, Eq. (6) makes a number of implicit assumptions. For example, it holds only if growth opportunities are absent (PVGO = 0) and if Y_t equals investors' expectations of average future earnings generated by assets held at t.

30. Remember that we have estimated ρ in real terms. The current perception of high capital costs is based on nominal rates.

31. If $MV_t = Y_t/\rho_t$, then $\rho_t = Y_t/MV_t$. Here ρ_t is the cost of capital, MV_t market value, and Y_t is current operating income.

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APPENDIX A

CALCULATING OPERATING INCOME FOR MANUFACTURING CORPORATIONS

This appendix explains how we obtained before- and after-tax operating incomes for manufacturing corporations. The goal was to obtain figures comparable to those published in the National Income and Product Accounts (NIPA) for all nonfinancial corporations (NFCs). Therefore, we wanted income on an establishment basis--that is, income attributed to manufacturing establishments, not manufacturing companies. Manufacturing companies often have activities outside manufacturing. Also, companies classified outside of manufacturing may do some manufacturing on the side. Figures derived for establishments therefore reflect manufacturing activity more purely. Capital stock figures for manufacturing are for establishments.

We faced two major obstacles. First, many of the building blocks for operating income are available only for manufacturing companies. Second, no capital consumption adjustments were available for either manufacturing companies or establishments.

Table A1 summarizes how we circumvented these difficulties. Look first at the left-hand column headed "Variable," which shows the figures we need. We start with book (i.e., historical cost) income, after interest but before taxes (BY). An inventory valuation adjustment (IVA) is added to remove inventory profits. (Note: Positive inventory profits imply a negative IVA.) Then a capital consumption adjustment (CCADJ) is added to adjust for the excess of tax return historical cost depreciation over estimated economic depreciation. (Economic depreciation is expressed in current dollars. When it exceeds tax return historical

cost depreciation, as it has during most of the 1970s, CCADJ is negative. Adding it reduces book income.) Next, interest (INT) is added back to obtain before-tax operating income (YBT). Finally, income taxes (TAX) are subtracted to give after-tax operating income (YAT).

None of these variables is directly available for manufacturing establishments. The figures that are available are not precisely the ones we want. BY, IVA, INT and TAX are published for manufacturing companies.

We now examine Table A1 line by line.

1. The NIPA do give "profit-type return" for manufacturing establishments. This figure includes inventory profits, and it covers all manufacturing, not just corporations. However, book income comparable to BY is given for non-corporate manufacturing.

Thus, we calculate BY by first reversing the inventory valuation adjustment. That is, the IVA for all manufacturing is subtracted, thus putting inventory profits back to "profit-type return." Then the profit-type return for non-corporate manufacturing is subtracted. The result is book income for corporate manufacturing establishments.

2. IVA is given for manufacturing companies. We assumed the IVA for establishments was the same proportion of book income before interest and taxes, i.e., to BY + INT, as for companies. Note that INT for establishments is calculated in line (4).

3. The NIPA capital cost adjustment adjusts tax return historical cost depreciation in two ways:

a. To bring tax return depreciation allowances, which reflect an accelerated pattern of writeoffs, into conformity with the historical cost basis equivalent of economic depreciation.

b. To convert the historical cost equivalent of economic depreciation to a replacement cost basis. The sum of (a) and (b), therefore adjusts tax return depreciation to real economic depreciation.

The adjustment under (a) is usually a subtraction from tax return depreciation. The adjustment under (b) is usually an addition to economic depreciation at historical cost. When (a) exceeds (b) as in 1967 (see our example below), the sign of the capital consumption adjustment is positive; adding it back adjusts income for the excess of tax return depreciation over "true" depreciation. When, as since 1974, (b) exceeds (a) by a sufficient margin to make the sign of the capital consumption adjustment negative, adding the capital consumption adjustment corrects income for the excess of "true" depreciation over tax return depreciation.

The NIPA contain no capital consumption adjustment for manufacturing. We are only given the capital consumption allowance (CCALL), which is historical cost depreciation from tax records. We were forced to assume that the ratio of CCADJ to CCALL was the same for manufacturing as for all NFCs. This is an extremely strong assumption.

4. Companies, not establishments, pay interest. However, we allocated a fraction of company interest to establishments. The fraction is based on book income after taxes but before interest

(BY - TAX + INT) for companies and establishments. (The same ratio was used later in estimating market values to allocate company dividends to establishments.) Note that TAX is calculated in line (7).

5. YBT equals BY + IVA + CCADJ + INT.

6. A fraction of corporate taxes is allocated to establishments. The fraction is based on taxable book income, that is BY, for establishments and companies.

7. YAT equals YBT - TAX.

TABLE A1

Calculating Operating Income for Manufacturing Corporations on an Establishment Basis

Variable		Symbol		Procedure[a]
(1)	Book income, after interest but before tax[b]	BY	=	Profit-type return for all manufacturing (after interest, incorporating IVA but not capital consumption adjustment) − IVA for all manufacturing − Profit-type return for non-corporate manufacturing
(2)	Plus: Inventory valuation adjustment[b]	+ IVA	=	IVA, company basis, for manufacturing corporations $\left(\frac{\text{BY + interest (INT) from (4)}}{\text{BY, company basis} + \text{interest, company basis}}\right)$
(3)	Plus: Capital consumption adjustment	+ CCADJ	=	$\left(\text{Capital consumption allowance (CCALL), all manufacturing} - \text{CCALL, non-corporate manufacturing}\right)\left(\frac{\text{CCADJ for all NFCs}}{\text{CCALL with CCADJ for all NFCs} - \text{CCADJ for all NFCs}}\right)$
(4)	Plus: Interest[b]	+ INT	=	Interest, company bais $\left(\frac{\text{BY + INT − Tax from (5)}}{\text{BY, company basis} + \text{INT, company basis} - \text{Tax, company basis}}\right)$
(5)	Equals: Operating income before tax	= YBT	=	BY + IVA + CCADJ + INT
(6)	Less: Tax[b]	− TAX	=	Tax, company basis $\left(\frac{\text{BY}}{\text{BY, company basis}}\right)$
(7)	Equals: Operating income after tax	= YAT	=	YBT − TAX

NOTES: a. All variables on establishment basis unless otherwise noted.
b. Directly available on a company basis.

TABLE A2

Calculating Operating Income--
Illustration Using Data for 1967

(Figures in Billions of $)

Variable		Non-Financial Corporations	Manufacturing Corporations		
(1)	BY	55.2	34.2	=	35.2 - (-0.8) - 1.8
(2)	IVA	-1.6	-.7	=	$-.8\left(\frac{34.2 + 1.9^{a}}{39.3 + 2.2}\right)$
(3)	CCADJ	4.0	2.0	=	$(18.1 - 0.4)\left(\frac{4.0}{38.9 - 4.0}\right)$
(4)	INT	8.7	1.9	=	$2.2\left(\frac{34.2 + 1.9 - 14.5^{b}}{39.3 + 2.2 - 16.6}\right)$
(5)	YBT	66.3	37.5[c]		
(6)	TAX	27.7	14.5	=	$16.6\left(\frac{34.2}{39.3}\right)$
(7)	YAT	38.6	23.0		

NOTES: a. From line (4).
b. From line (6).
c. Column does not add up exactly because of rounding.