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CHAPTER 1

Introduction

ECONOMISTS of the classical period divided the factors of production into land, labor, and capital. By the end of World War I, land had lost its autonomy, partly because the progress of economic analysis had enveloped it in a broader conception of capital, but probably even more because land had lost its quantitative importance in the developing industrial economy. We were left with labor and capital.

It would be difficult for the most uninformed person to say that the study of either labor or capital has been neglected by economists, however much one might quarrel with the directions of study. But it is possible, and correct, to say that the empirical analysis of capital has begun only recently, and is today far less well developed than that of labor. The difference in treatment does not represent a policy of neglect of capital, but simply the fact that until recently comprehensive information on the quantity of capital possessed by American industries was lacking and indeed, outside the areas predominantly corporate in organization, is still lacking.

We have sought in this study to construct a basic set of data, comprehensive over the universe of manufacturing and comparable over a period of almost two decades. Our capital concept is almost all-inclusive: it equals total assets, excluding investments in other companies; and our rate of return concept correspondingly includes returns to both lenders and equity holders. Our concepts and procedures, and the very serious limitations of the underlying data, are described briefly in section 2 of this chapter, and in detail in Appendix A. Selective summaries of the structure and trend of investment and rates of return are given in Chapter 2.

1. *The Problem*

In the period of our study there was an almost unbroken growth of capital in manufacturing, from $48.8 billion in 1938 to $203.3 billion in 1956, or by 8.2 per cent a year. Even in 1947 dollars the growth was from $94.2 billion to $175.9 billion, or by 3.5 per cent a year. The varying pace of that growth is examined in Chapter 2, where the wide impact of World War II and the subsequent demobilization and the investment boom of the 1950's are observed.

No industry is wholly sheltered from the impact of a major war or even a moderate depression, but these fortunately infrequent events are almost

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the least of the forces for change with which an industry has to cope. The market for its goods is in constant flux—growing with consumer incomes, gaining or losing from its shifting competition with foreign producers or with new kinds of goods designed to satisfy the same consumer desires. Its organization of production must continually adapt to changes in prices of inputs, the westward migration of population, the discovery of new resources or production techniques.

All these impacts and the adjustments made to them are portrayed in two basic data of each industry: its capital stock, and the rate of return on this capital. In a world of perfect anticipation of the future, there would be hardly any dispersion of industry rates of return (with qualifications that need not be noted here), for every opportunity for gain would be seized and every threat of loss evaded. The entire impact of the changes would be registered in the shifting rates of investment of the various industries.

And in the opposite world, where no change would ever be expected, the first impact of every change would be on rates of return: every surge of demand would find the industry unprepared, and its prices and profit rates would rise; every cessation of demand would find the industry overexpanded and its output selling at distress prices. Even in this case there would be large differences among industries in rates of investment, but they would lag behind the signals provided by the rates of return.

The facts suggest, on the whole, that the former assumption contains the larger fraction of truth. The industry rates of return are indeed far from identical—in a typical year (say 1955) a range of from —2 to +14 per cent is observed. But there is a strong central tendency in these rates: in that same year, half the industries earned between 4.8 and 8.8 per cent on capital. The rates of investment, on the other hand, were immensely more varied: from 1954 to 1955 the stock of capital fell 13 per cent in one industry, and rose 28 per cent in another. In that period one-fourth of the industries increased their capital by more than 15 per cent, another quarter had decreases or increases of less than 4.7 per cent.

These differences in rates of investment are of course the fundamental mechanism by which the capital of the economy is moved from where it is less needed to where it is more needed. There is some movement of specific capital resources: even in a prosperous postwar year an average of 10 out of 98 industries had actual decreases of capital, and in the postwar depression years fully half the industries suffered declines. But the main method of adapting the growing stock of capital to the changing distribution of needs has been by differential growth. Table 1 gives the

average annual rates of growth of capital over the last nine years of our period, and these persistent differences are very large. Industries that grew at one standard deviation less than the average rate fell in a decade to half their initial size relative to industries that grew at a rate one standard deviation above the mean.

TABLE 1

AVERAGE ANNUAL PERCENTAGE CHANGE IN CAPITAL IN
MANUFACTURING INDUSTRIES, 1947–56

Average Annual Percentage Change	Number of Industries
−3 to −1	2
−1 to +1	7
1 to 3	11
3 to 5	20
5 to 7	14
7 to 9	20
9 to 11	17
11 to 13	4
13 to 15	3
Total	98
Mean	6.14%
Standard Deviation	3.67%

SOURCE: Tables A-36 to A-59.

The belief that a large part of the ever-shifting pattern of industry demands for capital is anticipated with tolerable accuracy is not proved by this simple comparison of dispersion of rates of return and rates of investment.[1] There are two other lines of investigation, elaborated in Chapters 3 and 4, which give more cogent evidence.

On the one hand, the rates of return have no persistent tendency to remain in a fixed industrial pattern. It is true that, if we know the rates of return in a given year, we can predict the hierarchy of rates of return with considerable confidence the next year; the coefficients of correlation of successive annual rates of return are usually .7 to .9. But within a period of about six years the correlation has vanished: knowing which industries are prosperous or unprosperous in year T is of no assistance in predicting what they will be (say) seven years later. The positive correlation coefficients suggest that anticipations are not perfect; their decline

[1] If we visualize the supply curve of capital to each industry as being horizontal at a rate of return appropriate to the industry's risk, accounting practices, etc., the correct comparison is indeed between relative changes in capital (rates of investment) and relative *changes* in rates of return, not their absolute level. As we shall notice shortly, the short-run changes in relative rates of return are very small.

over time suggests that over a period of years the differences among industries in the (marginal) demand for capital are eliminated. This finding, it may be added, is of course wholly in keeping with the classical economic theorem that under competition the rates of return tend to equality. (This theorem receives reinforcement, indirectly, from the fact that in industries where a few large firms are dominant the correlations of rates of return between distant years remain fairly high.)

On the other hand, direct study of investment rates reveals a close, consistent relationship between these rates and the contemporaneous shifts of demand (measured by receipts). In the postwar period, the correlation coefficient between changes in receipts and investment rates averages about .7, even on an annual basis. Profit rates in the preceding year are also usually significantly related to investment rates. And when the period is lengthened to a decade, almost all the differences among industries in rates of investment are accounted for by the combination of changing receipts (sales) and profit rates.

We have no historical criteria by which to judge the efficiency with which investment responds to the shifting demands of our manufacturing industries. If we accept—or better, define—the dispersion of industry rates of return as the measure of the disequilibrium in any year, we can at least make several comparative statements. Dispersion is relatively greater in years of depression: industries cannot adapt to sudden decreases in demand as well as they can to expansions—in part, perhaps, because fixed capital is easier to increase than to decrease in the short run.[2] Dispersion is larger (as well as more stable) in concentrated industries: whether because of monopoly power (of which we find no reflection in average rates of return) or because of lesser flexibility of response to changing conditions, the industries dominated by relatively few firms are somewhat less efficient in adjusting their capital stocks.

The relationship between capital and labor, and between their rates of remuneration, are in the center of scientific and public policy interests. We find that in 1954 labor received approximately four-fifths of the income of manufacturing industries, and capital the remainder. The share of income going to capital decreased substantially in most industry categories between 1939 and 1954. The share of wages in the total income varies among industries chiefly with the greater variation in capital per laborer (which ranged from $3,200, for the least capital-

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[2] It may be noted, however, that a test of Marshall's theory that the rate at which an industry approaches long-run equilibrium depends upon the amount of its fixed plant yielded no confirmation.

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intensive tenth to $27,800 for the most capital-intensive tenth of industries in 1954).

Various procedures have been contrived by economists to measure the extent to which entrepreneurs can substitute capital for labor when the cost of labor rises relative to that of capital. One procedure compares trends in the relative use of capital and labor with trends in their costs, although independent changes in technology seriously becloud these findings. Our industry data, which are of course subject to this same ambiguity, show that industries experiencing relatively large wage increases increase capital per worker by larger amounts. Another type of comparison—that of small and large firms in the same industry—seems more appropriate to measure long-run substitution possibilities, because the differences in wage rates (and perhaps also the cost of capital, which we could not measure) among small and large firms are persistent. Our exploration of this approach leads to the tentative conclusion that capital per worker is highly responsive to wage rates.

This sketch of the problem of allocating capital among industries may serve to orient the reader to the analyses which follow. He will find elaborations and extensions of many points, but mostly he will also find large gaps in our discussion. Some are due to a lack of data, although on the whole the scientific investigator is hampered much more by lack of imagination than by lack of data. But the limitations of the data will be common to all economists, and they are sufficiently important to merit a brief discussion here.

2. *The Data*

A lengthy description of the method by which the basic data were constructed is given in Appendix A, but most readers will find this material unenticing. Yet no one should read our interpretations of the capital and rates of return material, let alone make independent use of it, without some appreciation of the very substantial limitations to which the data are subject. These limitations are of at least four sorts.

COMPREHENSIVENESS OF THE DATA

The basic data upon which everything else is erected are the compilations of corporation income-tax reports of the Internal Revenue Service. Aside from presumably minor problems of nonreporting and postaudit revisions, this material is comprehensive in scope, if not always in detail.

The tax reports, however, do not include the noncorporate enterprises, which in some industries are relatively large—so large in one case (furs)

that nearly half the industry's output is noncorporate. This deficiency should not be exaggerated: in more than half the industries the noncorporate share of value of output is less than 4 per cent, and in four-fifths it is less than 12 per cent.

The estimate of the noncorporate sector is based upon the ratio of capital to receipts in small corporations (which resemble noncorporate enterprises more closely than they resemble all corporations). The main bench marks are provided by the *1939*, *1947*, and *1954 Census of Manufactures*, but the interpolation of intercensal years is modified by partnership and single proprietorship tax returns.

The rates of return are based upon corporate returns; no estimate for the noncorporate sector seemed feasible.

THE INDUSTRIAL CLASSIFICATION

The basic IRS data are classified into so-called three-digit industries. These classes were considerably revised in 1948, and a fair amount of estimation is required to construct 1947 figures on the 1948 industry classification.

The more important problem, however, is that, broad as the three-digit industries are, many companies operate in several such industries. In the first census of companies, in 1954, it was found that almost one-fourth of the establishments in manufacturing belonged to companies operating in two or more three-digit industries. Since a company is necessarily allocated to one industry, our data have an intrinsic element of heterogeneity.

Some quantitative notion of the fuzziness of industry boundaries at the three-digit level is given by Table 2. Ownership specialization is the term

TABLE 2

Distribution of Industries, by Ownership Specialization and Industry Specialization of Companies in Manufacturing, Measured by Payroll, 1954

Industry Specialization (per cent)	Ownership Specialization (per cent)					
	90–100	80–90	70–80	60–70	50–60	40–50
90–100	20	12	1			
80–90	8	7	11	1	2	
70–80	3	2	2		2	1
60–70	1	2	1	1	1	1
50–60		1				

Source: *Company Statistics, 1954 Censuses of Business, Manufactures, and Mineral Industries*, Bull. CS-1, Washington, 1958, Table 2.

used to describe the percentage of payroll expenditures of an industry made by companies classified in that industry. For example, 91.1 per cent of the payroll of plants making soap was paid by companies classified in the soap industry. Industry specialization refers to the percentage of payroll of companies classified in an industry that was paid by plants operating in that industry: in the example of the soap industry, 80.6 per cent of the payroll of soap companies was paid in plants making soap.[3] The mean ownership specialization ratio was 83.6 per cent, and the mean industry specialization ratio was 85.8 per cent. These ratios imply appreciable margins of fuzziness in the industry boundaries. What is even more troublesome, the companies often shift among industries, and an erratic element is introduced into the annual changes in assets. Our endeavors to cope with this problem at best eliminate the most extreme fluctuations.

ACCOUNTING CONCEPTS

The concepts permissible in income tax accounting are not always appropriate to the measurement of income. Accelerated depreciation, especially during World War II, sometimes represented the realistic recognition that a capital good had only wartime usefulness, but sometimes it ignored large postwar usefulness. Ordinary depreciation, especially before the statutory liberalization of 1954, generally wrote down asset values too slowly. Research expenditures (and for that matter, advertising expenditures) have capital values which are ignored when these items are charged against current income. Capital adjustments are frequently belated recognition of changed market situations.

On closer scrutiny one could no doubt find a hundred other differences in concept between tax accounting and economic income concepts,[4] and we have no basis for asserting their importance or unimportance. In this respect, all we can say is that our data are no less or no more vulnerable than other uses of business accounting records, such as the national income accounts.

THE UNIT OF VALUE

The dollar figures for assets and income are book values. Many represent current prices; if a firm sells its output at a uniform rate during the year, the unit of value is the mean price for the year. But many prices of the

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[3] Since plants in turn are classified according to the value of their most important product, there is a second level of overlap of industries.

[4] One, excessive withdrawal of salaries by officers of small corporations, is discussed at length in Appendix A.

past are involved in book values—ranging from costs of durable assets purchased many years ago to inventory acquisitions of the recent past.

It cannot be doubted that book value data have a substantial ambiguity, not only in comparisons over time but also in comparisons among industries. Yet it seems impossible to make adjustments of the three-digit industry data which would be defensible: a set of quite extreme assumptions would be necessary with the available price information. We have deflated the broader two-digit industry data in order to get some estimate of the effects of deflation, and the results are analyzed in Chapter 2. Our general conclusion is that the pattern of investment and rates of return among industries is probably tolerably accurate, at least when large differences or changes are involved, but that the temporal pattern of investment is much distorted by price changes.

The reader will observe some variation in the periods covered by the various analytical studies. The chief reason is that this study has taken regrettably long to bring to completion, so considerable additional data accumulated while it was in preparation. Continuous recomputation on the basis of a longer period was not feasible, but it seemed unwise to omit from late analyses data not available for those carried out earlier.

Our basic tables (given in Appendix A) end in 1957. In 1958 the industry classification was substantially changed, so direct comparisons with earlier years are not possible. A reconstruction of 1957 data on the 1958 classificatory basis is given, with the 1958 data, in Appendix E.