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Volume Title: Regularization of Business Investment

Volume Author/Editor: Universities-National Bureau Committee for

Economic Research

Volume Publisher: Princeton University Press/NBER

Volume ISBN: 0-87014-195-3

Volume URL: http://www.nber.org/books/univ54-1

Publication Date: 1954

Chapter Title: The Cyclical Behavior of Investment

Chapter Author: Millard Hastay

Chapter URL: http://www.nber.org/chapters/c3019

Chapter pages in book: (p. 1 - 36)

Part 1

THE REGULARIZATION OF BUSINESS INVESTMENT BY THE INDIVIDUAL FIRM

THE CYCLICAL BEHAVIOR OF INVESTMENT

MILLARD HASTAY
NATIONAL BUREAU OF ECONOMIC RESEARCH

ECONOMISTS today are agreed on the central role of investment in the working of our economy. In this they differ from their predecessors not so much in the substance of their beliefs as in their approach to a consensus. Certainly the classical school understood the connection between investment and economic growth, though their interests were such that they saw this connection chiefly as the rationale of saving. Moreover, well before the First World War, a number of perceptive students of economic fluctuations attempted to delineate the role of investment in the drama of the business cycle—notably Knut Wicksell, A. Spiethoff, Joseph Schumpeter, and Wesley C. Mitchell. It remained for our own period, however, to crystallize these insights into a doctrine of the preeminence of investment in an enterprise economy, and to extract from it a distinctive slogan of economic policy—the promotion of stability and economic growth.

For a time, however, stability threatened to become the exclusive issue, and the implications drawn for policy favored state, as distinct from private, initiative. Correspondingly, it seemed less important to study the behavior and determinants of private investment than to examine the possible ways to promote stability by public expenditure. Thus, although prosperous times and the specter of new wars have again brought the problem of growth to the fore, and with it a new interest in private investment, our knowledge of this vital area is but little advanced over a decade ago. To cite a single telling illustration, comprehensive annual estimates of private investment in manufacturing based on budget or accounting data cannot be had for the years before 1940, and acceptable quarterly estimates on this basis are available only for 1945 and after. For earlier years we must have recourse to crude estimates based on commodity flows, which require interpolation for intercensal years and adjustment from an output basis at producers' prices to an installed basis at cost to ultimate users. Anyone who has examined successive versions of such estimates is familiar with the considerable margins of uncertainty surrounding them. Yet for periods of time adequate for business cycle analysis they are what we must work with, and they can be made to tell a sensible if tentative story. In this paper, therefore,

3

I bring together—chiefly in graphic form—the principal bodies of information now available on the magnitude and course of investment, public as well as private, covering a period of years long enough to yield insights into the behavior of investment during business cycles.

Evidence from the National-Product Accounts

The most comprehensive view of the role of investment in our economy is provided by the framework of statistics on gross national product and its components. For present purposes we use Simon Kuznets' estimates, because they cover the full span of the interwar period, and because Kuznets has extended them forward to 1949, chiefly on the basis of Department of Commerce estimates, and backward to 1869, largely on the basis of William H. Shaw's estimates of commodity flow at producers' prices. The two extrapolations are of unequal reliability, and Kuznets himself uses the estimates from 1869 to 1919 only to compute nine-year moving averages. But while one must take care lest the wish be father to the thought, it seems to me that those national-product components which are closely tied to Shaw's commodity series from 1889 to 1919, for which period they are available annually, have some claim to attention in annual form. These are the series. presented in chart 1, which provides a perspective on investment activities for more than half a century.[1]

Though Kuznets warns us that the movement of his estimates may be deficient in amplitude prior to 1919, the cyclical instability of investment activities compared with consumption or national product as a whole is unmistakable throughout the period. Consumer commodities, however, run about three times as high as construction and durable producer commodities combined, and despite their smaller relative variations contribute more to the fluctuations in total output than the two major components of investment goods. For most peacetime cycles, such a finding is not inconsistent with regard-

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[1] In chart 1 and all succeeding charts, white areas represent periods of general business expansion; shaded areas, periods of general business contraction. These periods are determined from an appropriate chronology of the troughs and peaks of successive business cycles, as identified by the National Bureau of Economic Research. In chart 1 a calendar-year chronology is used, and expansion is assumed to run from the middle of a trough year of business to the middle of the succeeding peak year of business, with contraction following until the middle of the next trough year. Except that a quarterly chronology is used instead of an annual one, an exactly similar interpretation applies to charts of quarterly data.

Chart 1

Gross National Product and Selected Components
1929 Prices, 1891-1949
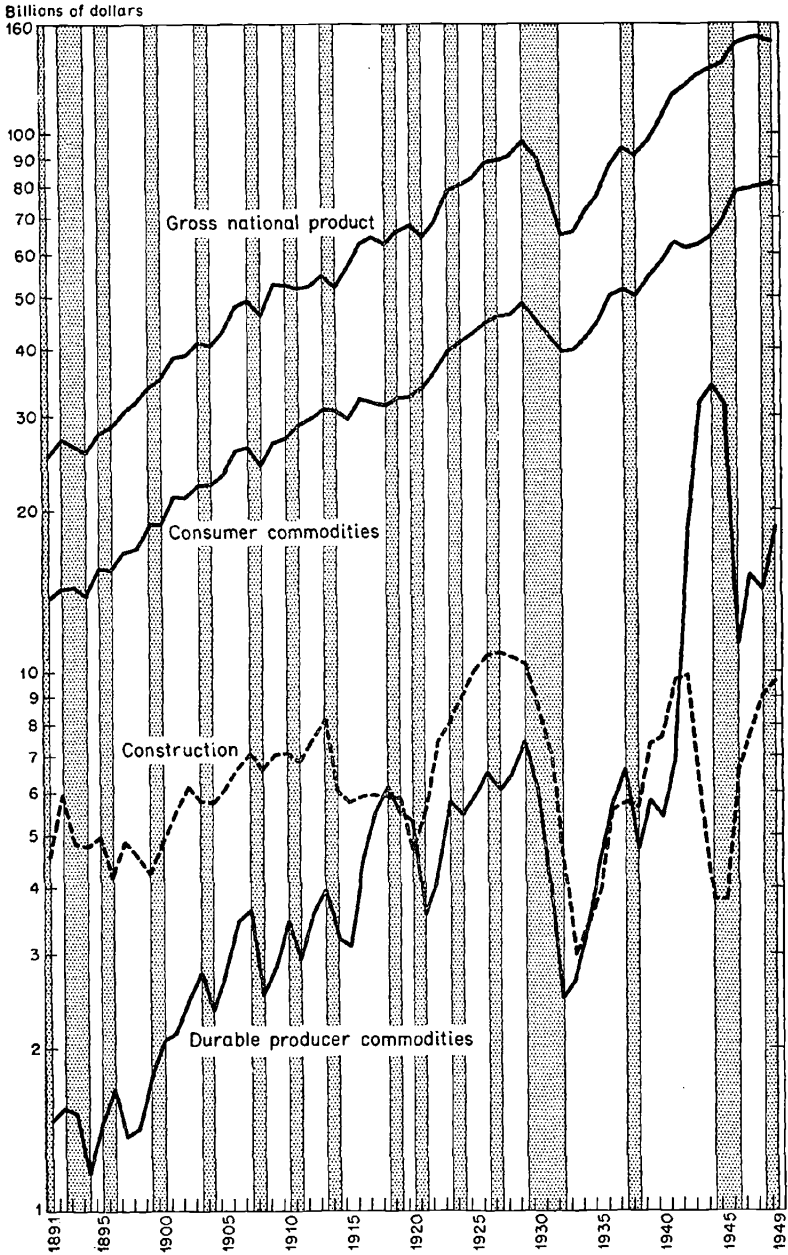
Billions of dollars

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

ing investment as the central factor in cyclical devlopments, but it accounts for the leverage of consumption when its pattern is sharply altered as in wartime or its immediate aftermath. Chart 1 also confirms much other evidence that construction has experienced long waves of fifteen to twenty years' duration, on which shorter business cycles have been superimposed; but these short cycles seem to have impressed themselves on the longer waves much more strongly before World War I than after, while producer durables reflect chiefly these short movements apart from a vigorous upward trend. These contrasts must of course remain tentative in view of our reservations about the pre-1919 data, but later findings will show them to be credible.

A figure like chart 1 makes it clear that investment activities have

Chart 2

Gross National Product and Selected Components At Constant and Current Prices, 1919–1949
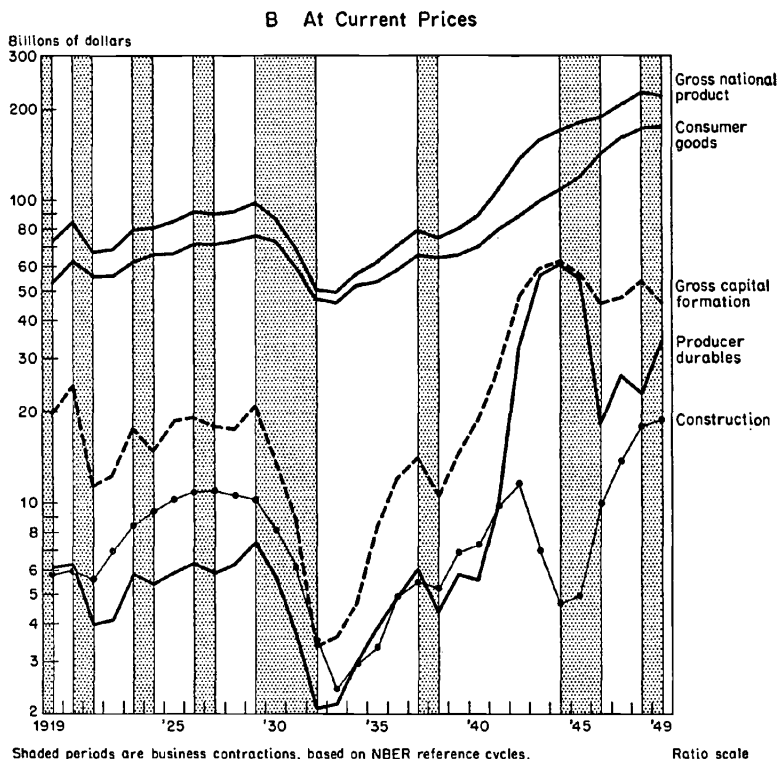
A   At 1929 Prices

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale
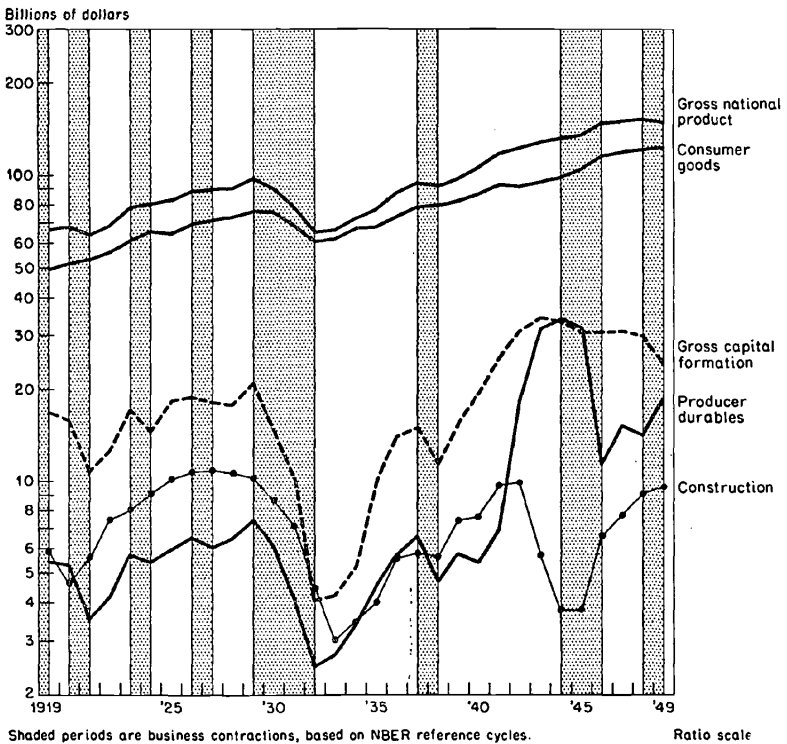
a strong affinity for business cycles. They may in fact be the essence of such fluctuations, and a respectable and still vital tradition of analysis hopes to flush the essential secrets of the cyclical mechanism on this aggregative level. It seems probable, however, that a deeper understanding both of investment and of the cycle can be had by looking beneath these aggregates for the different functions served, and the different sources of initiative, in investment undertakings. This kind of disaggregation is possible only for estimates in current prices. The purpose of charts 2 and 3, therefore, is to serve as a bridge from the constant-price estimates of chart 1 to the current-price estimates of chart 4 and its successors. Their coverage is limited to the period 1919-1949 because reliable current-price estimates are not available for earlier years.

Differences between the two sections of these charts are those

Chart 2 (concl.)
Gross National Product and Selected Components
At Constant and Current Prices, 1919-1949

B   At Current Prices

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

7

which might be anticipated. Because prices tend to move up and down with the cyclical procession, the amplitude of swings in the current-price estimates substantially exceeds that of the constant-price series. Even so, the pattern of year-to-year changes is markedly altered only at times of serious price inflation such as took place after both World Wars. This fact provides a kind of general insurance against gross contradictions between the world of real phenomena and its counterpart measured in cyclically unstable prices, but we cannot rule out the possibility that important issues may turn on the distinction between real and dollar magnitudes.
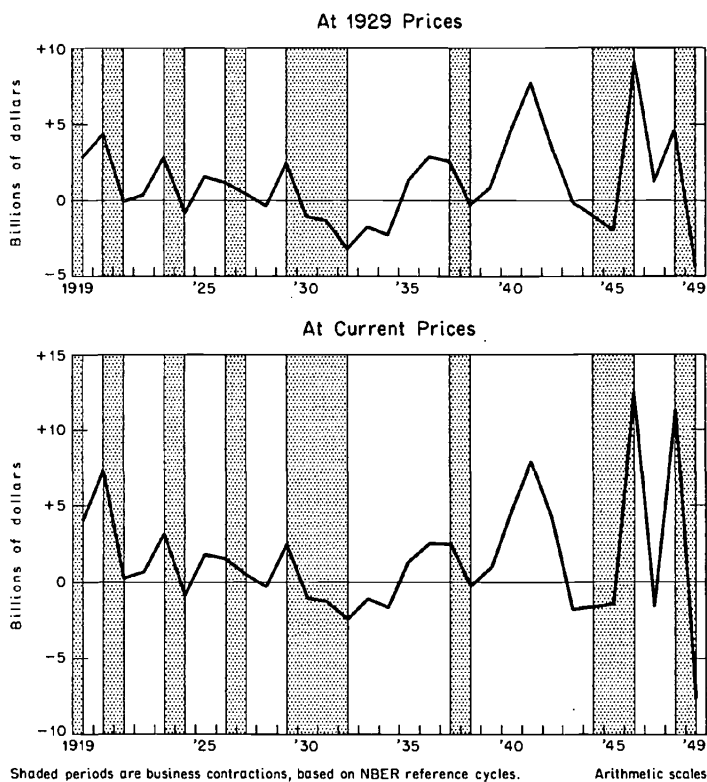
Fixed Capital Expenditures in the Large

With chart 4 we contract our attention from the whole of gross capital formation to the part represented by fixed capital facilities, namely, construction and durable producer goods. Special interest attaches to these components as types of investment highly responsive to businessmen's intentions. Neither of the neglected categories of capital formation, inventory investment and net change in claims against foreign countries, is responsive in like degree. For, on the one hand, there is an important but as yet unmeasurable component of unintended change in the cyclical fluctuations of inventories, which makes an interpretation of the role of inventory investment in business cycles difficult and diminishes its susceptibility to regularization; and, on the other, net change in foreign claims is so markedly influenced by forces outside the country that it is not closely responsive to the intentions of any identifiable agent. The reader should note, however, that the sum of the series in chart 4 is not conceptually identical with the sum of Kuznets' construction and durable producer goods. The present estimates include no expenditures for munitions, and they omit some part of government expenditures for electric and gas utilities and for wartime equipment used in munitions production. They also omit expenditures for business motor vehicles except for the part used in farming and in contract and common-carrier transportation by highway, and a further but unknown proportion comprised in the equipment of industrial and commercial establishments. Even so they cover the great bulk of fixed capital expenditures in all except war years, and I believe they are tolerably representative of the four great divisions of expenditure into which they are divided.

Primarily chart 4 stands as a challenge to those who think of all fixed investment in terms of the business model. For the pattern of
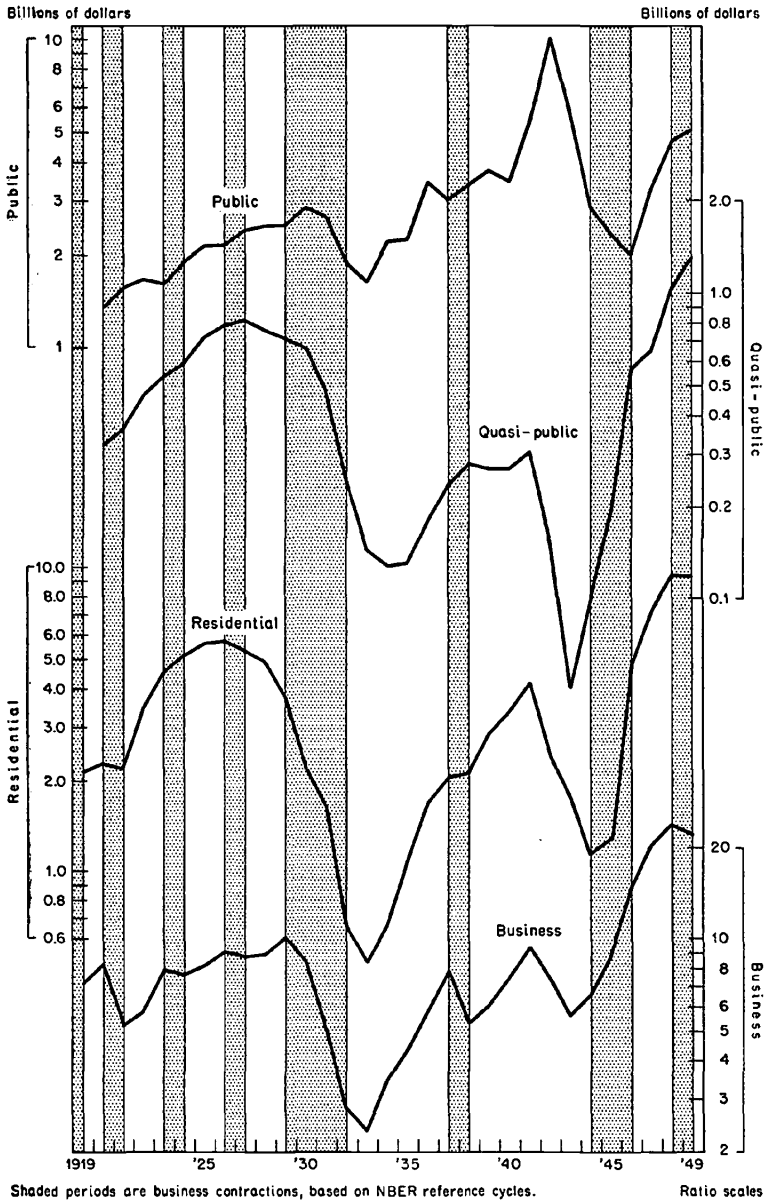
Chart 3
Inventory Investment
At Constant and Current Prices, 1919-1949

At 1929 Prices

At Current Prices

Shaded periods are business contractions, based on NBER reference cycles.　　　Arithmetic scales

business fixed investment is the peculiar product of the dominance of business motivation. Where this dominance is clear, invest-ment moves in virtual synchronism with business cycles; but where it is attenuated, as in public undertakings, investment is notably affected only by cycles of exceptional severity. To this rule, how-ever, a qualification should be added: in the milder cycles since World War I, public capital expenditures show an interesting tendency to move contrary to the cyclical tides, slowing their rate of growth or actually declining in expansion and reviving strongly in the following contraction. Residential construction seems to stand somewhere between; though much residential building is on invest-ment account for either rental or resale purposes, the typical buyer of housing is a consumer rather than an entrepreneur and his reac-

9

Chart 4
Functional Breakdown of Fixed Capital Expenditures
Current Prices, 1919 – 1949

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales

tion to short-run changes in markets is less sharp than the business-man's. A similar explanation covers in large degree the category of quasi-public capital expenditures, for though privately financed, they are chiefly concerned with urban development—schools, hospitals, recreational facilities, churches, and so forth—and are closely keyed to the growth of residential areas. Of course, even larger expenditures for urban development are made by government agencies and are included in the series for public outlays.

One striking feature of chart 4 can hardly have escaped notice. This is the marked similarity between the movement of residential building and the course of Kuznets' series on total construction (chart 2-B). This parallelism bears witness to the unprecedented dominance of residential building in total construction activity between the wars, and contrasts sharply with experience in the period before World War I, when industrial building, especially by railroads, was much more important and left a clearer imprint on the cyclical course of total construction. Thus, not only does our chart reveal the diversity of investment behavior that results from different sources of initiative, it helps remind us that these determinants vary in importance with time and circumstances, of which wars provide only the most dramatic example.

Business Fixed Capital Outlays

While business investment is the area in which purely economic motives play a decisive role, charts 5 and 6 make it clear that even these work themselves out against a background of circumstances which varies from industry to industry. In manufacturing and mining, which in all years absorb the largest part of business fixed capital expenditures, we find the closest conformity of investment outlays to the course of general business and a virtual duplication of the peacetime movement of producer durables. Similar, though much damped, movements appear in the capital outlays of commercial and miscellaneous enterprises, which cover trade, service, finance, communication, and transportation other than railroads and local transit. Though these enterprises are broadly representative of business at large, they include some—notably telephones and highway transport—which enjoyed a vigorous growth during the interwar period that moderated the effect of business recessions on investment activity. A contrasting case is provided by the heat, light, and power industry, which is dominated by electric utilities. During the twenties a phenomenal expansion in the demand for electric

Chart 5
Business Fixed Capital Expenditures, by Industrial Group
Current Prices, 1919-1949

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales
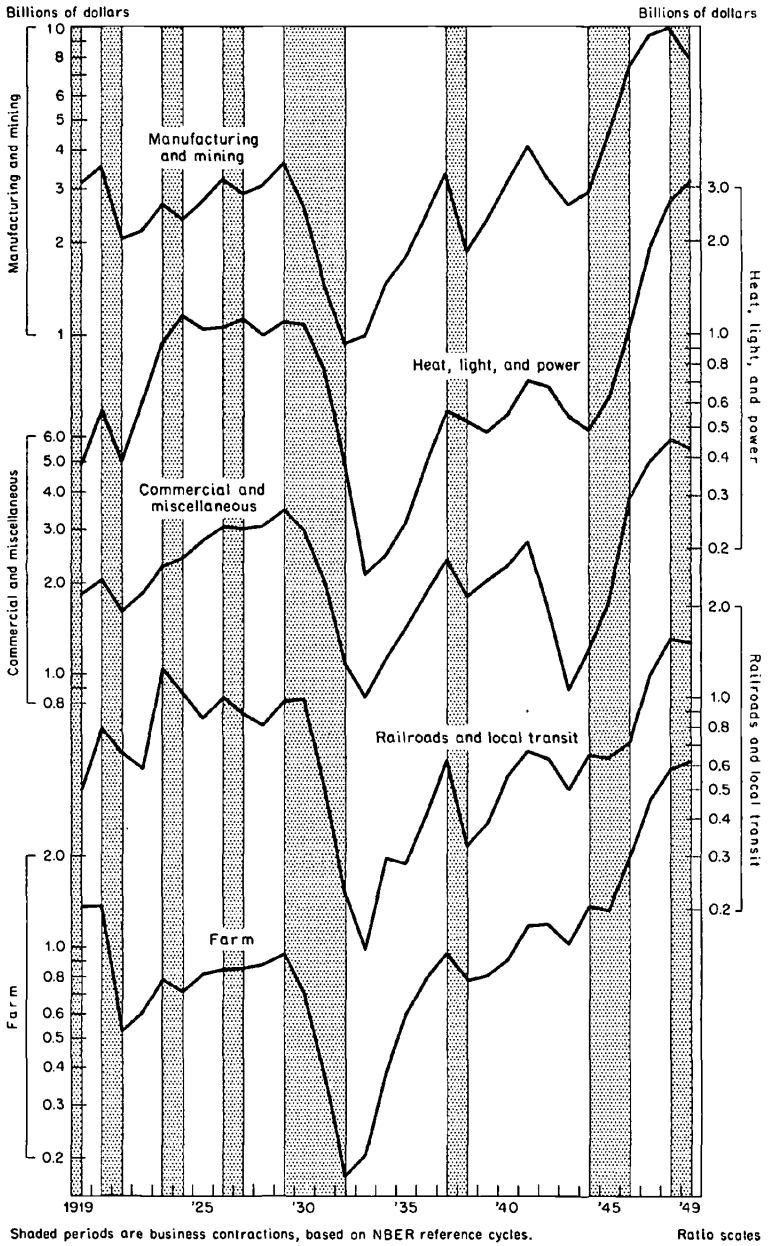
energy was accompanied by heavy and continuous outlays for generation, transmission, and distribution facilities. The chart shows that these reached and sustained peak levels half a decade earlier than the capital outlays of any other industry save railroads and local transit—two industries under heavy pressure from competitive forms of transport. However, even the vigorous growth of electric-power investment was not immune to short-run cyclical influences; it merely resisted them by responding late and mildly and, except in the thirties, promptly returning to peak levels.
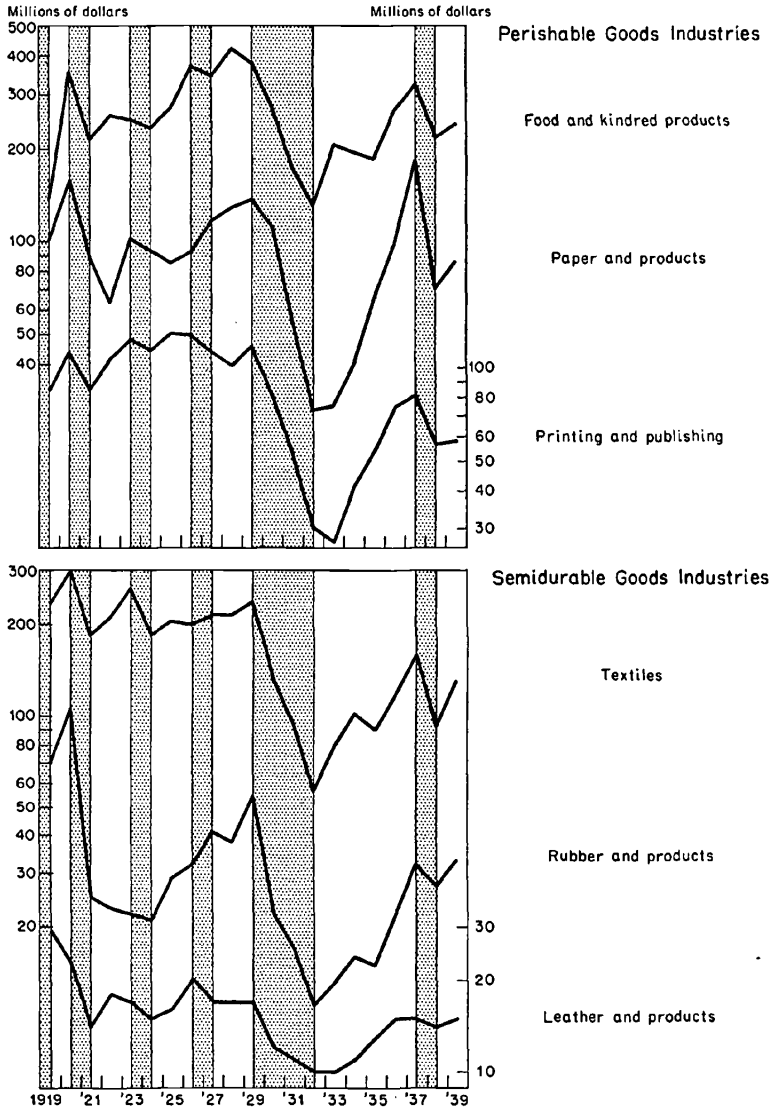
The case of railroads and local transit is interesting because of the surface similarity to heat, light, and power. But where the peak in the early twenties is in the one case a mark of vigor, in the other it is a sign of weakness. Ever since World War I railroads and electric transit have been subject to increasing competition from automotive transport, and little or no over-all expansion of facilities took place in the interwar period. Thus from 1923 capital expenditures in transportation undergo a slow decline, and exhibit a further contrast with heat, light, and power in responding promptly to business recession and experiencing longer declines. More recently, however, under the pressure of war and a greatly enlarged peacetime output, the railroads have entered on a new period of physical expansion.

The final series reminds us that the nation's farmers are still an important segment of the business population. As such their fixed capital expenditures fall into the pattern of those dominated by business influences. But farming is a unique business in that its physical output conforms but poorly to business cycles; hence the cyclical regularity of farm investment testifies to the marked sensitivity of farm income to business cycles.

In chart 6 we profit from the enterprise of Lowell J. Chawner, who employed the commodity flow approach to estimate fixed capital expenditures in manufacturing as a whole and in some dozen of its minor commodity groups.[2] Only ten of the product-group estimates cover the full period 1919-1939, and these we group into three classes—the outlays of perishable, of semidurable, and of durable goods industries. It might seem that this degree of disaggregation of capital outlays is still moderate by comparison with analytical needs

[2] Lowell J. Chawner, "Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940," in Dept. of Commerce, *Survey of Current Business*, March 1941; and "Capital Expenditures in Selected Manufacturing Industries," *ibid.*, December 1941 and May 1942.
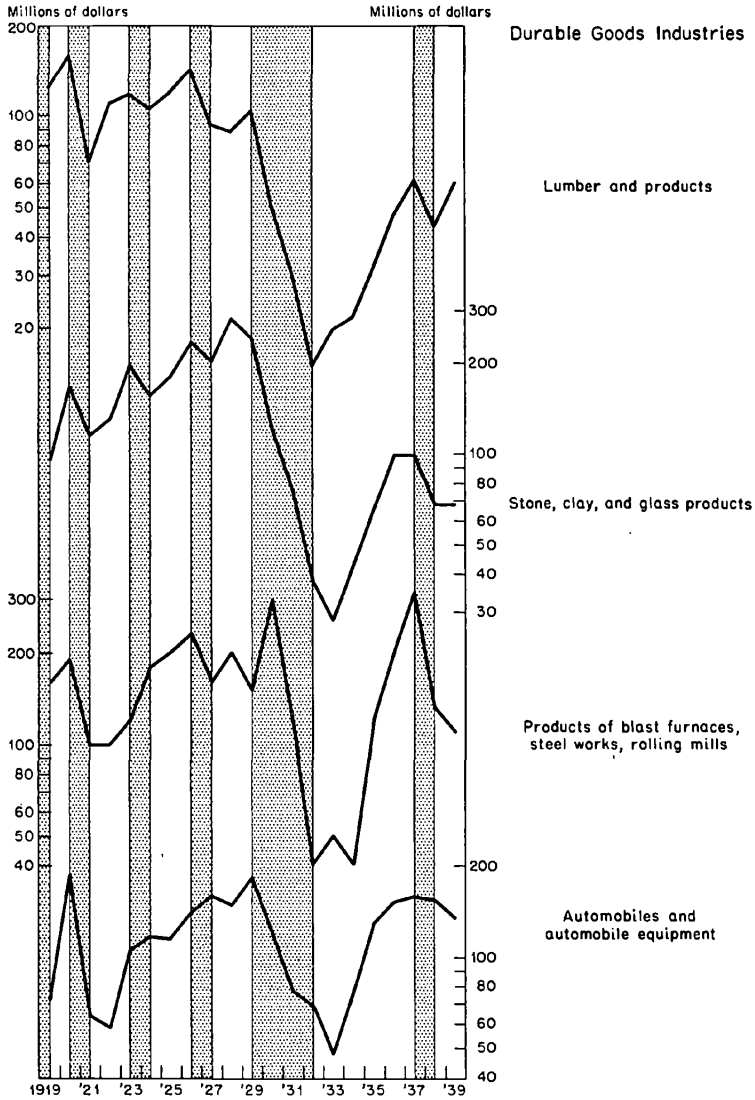
Chart 6
Fixed Capital Expenditures in Manufacturing, by Product Group
Current Prices, 1919-1939

Millions of dollars   Millions of dollars

Perishable Goods Industries

Food and kindred products

Paper and products

Printing and publishing

Semidurable Goods Industries

Textiles

Rubber and products

Leather and products

1919 '21 '23 '25 '27 '29 '31 '33 '35 '37 '39

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales

Chart 6 (concl.)

Fixed Capital Expenditures in Manufacturing, by Product Group
Current Prices, 1919-1939

Millions of dollars   Millions of dollars

Durable Goods Industries

Lumber and products

Stone, clay, and glass products

Products of blast furnaces,
steel works, rolling mills

Automobiles and
automobile equipment

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales

—indeed, Chawner regards two of his groups, one being textiles and the other stone, clay, and glass, as too miscellaneous for ready analysis. Even so, differences in the course of capital outlays among these manufacturing groups are as considerable as those among major industries in chart 5. Our analysis, in fact, has reached a level where the course of investment is only roughly explained by the course of general business, and where special factors—historical, technological, financial, and governmental—are often dominant in the decision to invest or not to invest. Thus four of the commodity groups are alike in producing durable goods; yet investment in three of them shows characteristically large amplitudes of fluctuation, while that in the fourth has amplitudes matching those in perishable and semidurable goods industries. Again, output in all three of the perishable goods industries enjoyed a generally upward movement during the period; yet fixed capital outlays reached an absolute peak as early as 1925 in printing and publishing, but not until near the end of the decade in food and paper production. As a final puzzle, of the ten manufacturing industries shown only lumber and products experienced a declining output trend; yet not only this industry, but also textiles, rubber and products, and leather and products—the first two with growing, and the third with stable, output—show declining trends of capital outlays.

As Chawner's instructive discussion of these series makes clear, this seeming lack of order in manufacturing investment is not inexplicable, but satisfactory explanations take the form of industry case studies rather than routine correlations of investment with a few standard variables such as output or industry profits. Of course, in such case studies, output and profits play their proper roles, but those roles are often subordinate to the development of new products or processes (as in food and kindred products), a great geographical shift of the industry (as in textiles), a period of serious overinvestment (as in rubber and products), or the competition of new sources of supply (as in paper and products). Generally speaking, however, the broad movements so determined will be conditioned by short-term cyclical influences; and investment even in the most vigorous industries will usually be retarded, if it does not actually decline, during recessions of general business.

The Distinction between Plant and Equipment

The distinction between producer durables and construction in Kuznets' national-product estimates has revealed striking differences

in their behavior, especially since 1919. Tentatively I have identified
these differences with the predominance of residential building in
total construction after World War I, and have argued that such
building is less influenced by short-run business considerations than
is investment in productive equipment. This argument implies that
business construction behaves much more like the output of pro-
ducer durables than does construction as a whole. Furthermore, I
have been content to discuss business fixed capital expenditures in
sum without distinguishing between plant and equipment, and this
too implies that the distinction between these business categories is
much less important than the corresponding distinction between
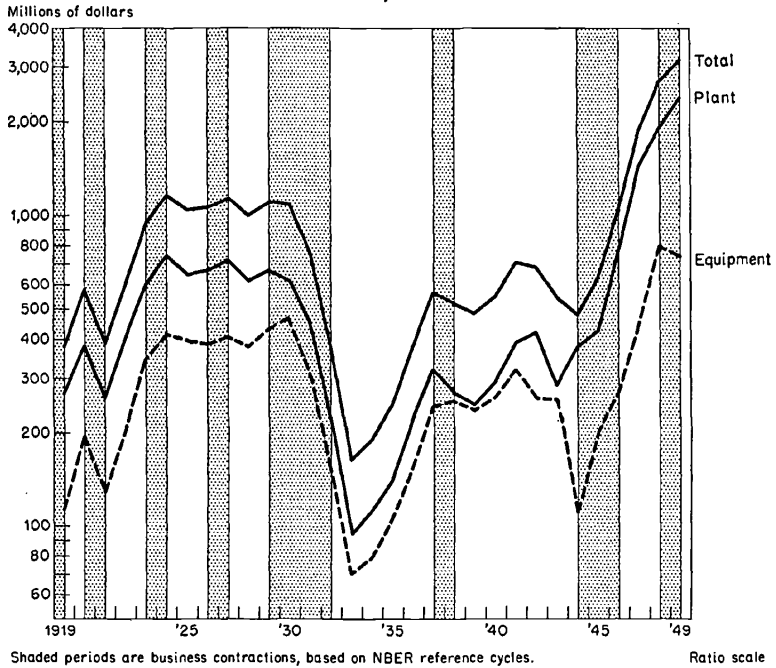durable producer goods and total construction.

For all but one of the industries represented in chart 5 a tolerable
breakdown of total fixed capital expenditures between plant and
equipment is possible. These breakdowns, together with the totals,
are presented in charts 7 through 10; and I think it will be agreed
that the two components show generally similar movements, both
in the large and in their short-run responses to business cycles. There

Chart 7
Capital Expenditures for Plant and Equipment
Manufacturing and Mining
Current Prices, 1919-1949

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

17
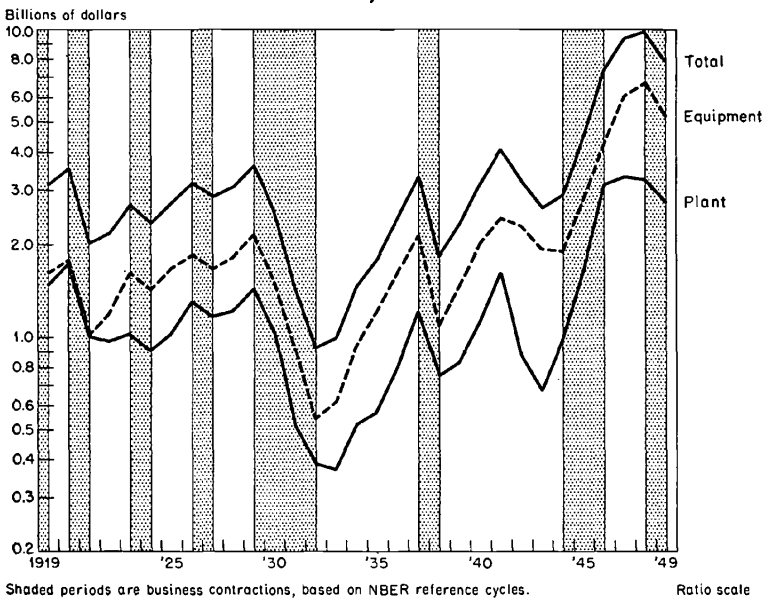
Chart 8

Capital Expenditures for Plant and Equipment
Heat, Light, and Power
Current Prices, 1919–1949

Millions of dollars

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale
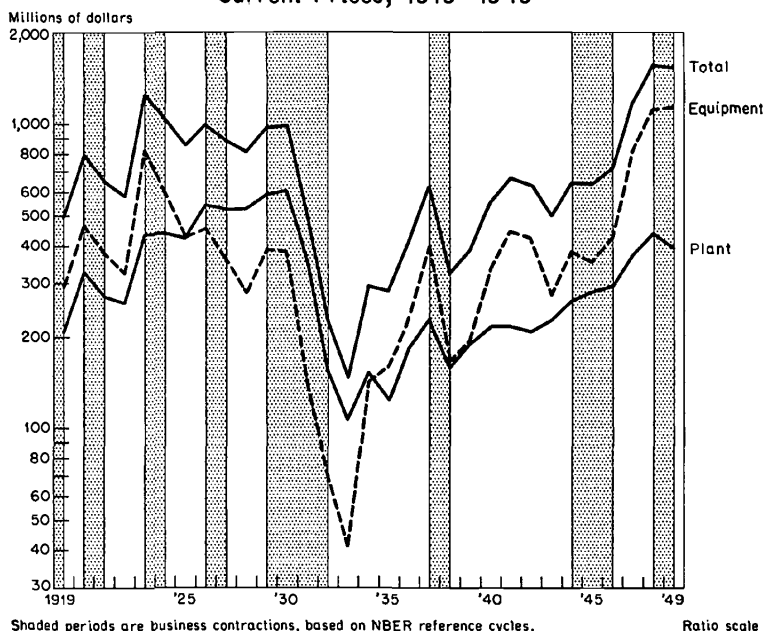
is a suggestion in manufacturing and mining that plant was laid down in advance of needs in 1920-1921, but the parallelism of plant and equipment movements is seriously distorted only by restrictions on building during World War II and by the heavy competition of residential building immediately thereafter. The case of heat, light, and power presents a contrast in that plant expenditures are the larger component of fixed capital outlays; but these expenditures, too, follow the business rather than the residential pattern. Even in railroads and local transit, the peculiar timing of cyclical responses shown by total capital outlays is reflected in both components; however, the distinction between plant and equipment provides interesting contrasts which we should otherwise have missed. For we see that despite the pressure of competition, gross investment in rails, buildings, and repair facilities—chiefly by railroads—increased throughout the twenties, and that the decline of total capital outlays is due wholly to a falling-off of purchases of equipment. However,

18

the growth of plant reflects, not an increase in mileage of new track, but the replacement of old line with heavier rails and the reduction of grades and curves to accommodate heavier loading and faster trains. These developments were required by the kind of new equipment purchased: larger and more powerful steam locomotives and freight cars of steadily rising capacity.
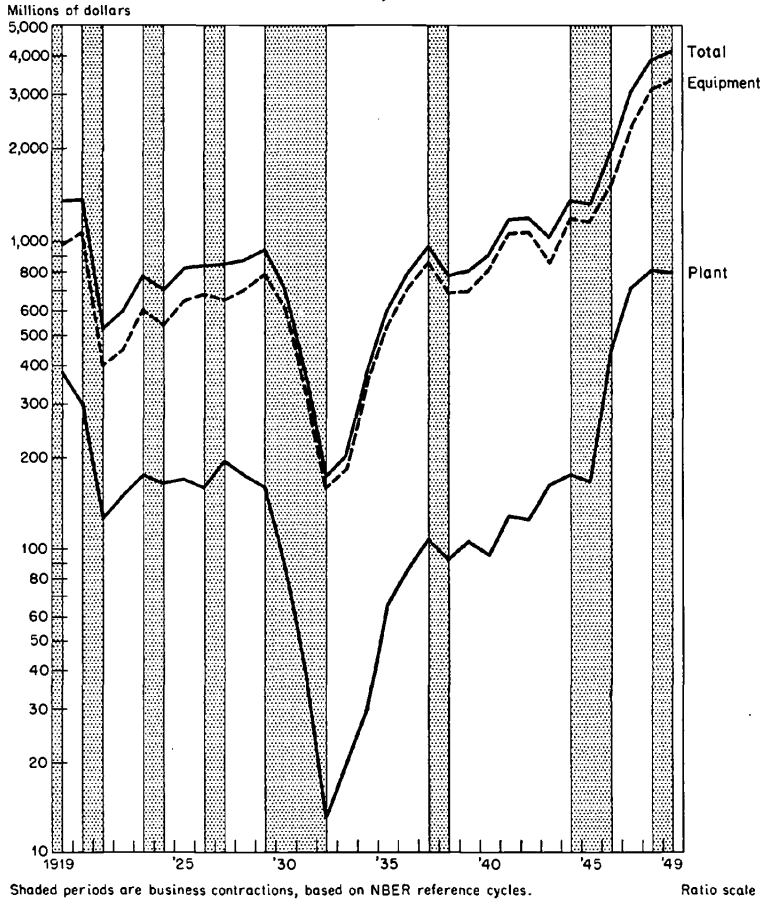
Finally, in farm outlays we find interesting evidence of a relative neglect of farm service buildings in favor of production machines and implements. This neglect has long been characteristic of farmers, and such building as takes place adheres more closely to the pattern of total construction than that of any other industrial group. Farming, however, is a special concern of public policy, and, particularly in wartime, the expansion of farm plant has been more vigorous than that permitted to other industrial groups.

Chart 9
Capital Expenditures for Plant and Equipment
Railroads and Local Transit
Current Prices, 1919–1949

Millions of dollars

Total
Equipment
Plant

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

19

Chart 10

Capital Expenditures for Plant and Equipment, Farm
Current Prices, 1919-1949

Millions of dollars

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

Relative Importance of Large Firms[3]

Perhaps the most interesting breakdown of business investment
from the point of view of regularization would be by size of firm.
Such a breakdown would permit us to compare the cyclical behavior
of investment by large firms with that by small, and beyond this, to
estimate the relative importance of large concerns in the business

[3] This section has been added in response to discussion at the Conference.
See, for example, the appended comment of B. G. Hickman on the original draft
of this paper. I am indebted to Alexander Pitts for the basic compilations in
table 1.

20

investment picture. But it is in this area that our information is least satisfactory. Only for manufacturing and trade has a start been made in compiling such data, and the evidence is tolerably representative only for large firms. For business as a whole, we must have recourse to a distribution, not of investment, but of net fixed capital assets. Such a distribution can be developed for nearly the whole corporate universe from *Statistics of Income* data for 1945, and this we extend to the entire business universe on the basis of corporate capital-receipts ratios together with gross operating receipts of the noncorporate business population (table 1).

The procedure as it applies to unincorporated firms is crude, but it suffices to permit a rough judgment of the importance of large concerns in the management of the nation's stock of business fixed property. We find that in mining and manufacturing about two thirds of such property is controlled by large firms having total assets of $5 million or more, that in utilities the share is substantially larger, and that in most other industrial groups it is decidedly smaller. For the private business community at large, the share is about three fifths.

To pass from the holdings of business capital assets to the share of fixed capital expenditures made by large firms, we must speculate. We know, in the first place, that profitable, long-lived concerns are predominant among large firms, and that these concerns can and do invest more heavily in proportion to size than do small firms.[4] It thus seems clear that, on the average, large firms make somewhat more than 60 per cent of business fixed capital expenditures. But small firms might still contribute more to the *fluctuations* of business investment than their average outlays suggest if the cyclical instability of their outlays were notably greater than that of large firms. We must investigate this question before we conclude that large firms share in investment variations to the full extent of their holdings of fixed capital.

Our best approach to this question is indirect: a comparison of the cyclical variability of manufacturing investment by large firms with that of all manufacturing firms. We may reason that if the total is notably less stable than the part due to large firms, then the cyclical

[4] See, in particular, A. R. Koch's finding that a sample of eighty large manufacturing concerns, accounting for a quarter of all manufacturing sales and less than a third of corporate manufacturing assets, made 40 per cent or more of gross fixed property expenditures in manufacturing. *The Financing of Large Corporations, 1920-39*, National Bureau of Economic Research, 1943, pp. 12, 13, 22.

TABLE 1

GROSS OPERATING RECEIPTS AND NET FIXED CAPITAL, CORPORATE AND NONCORPORATE, AND PERCENTAGE OF SUCH CAPITAL HELD BY LARGE CORPORATIONS, BY MAJOR INDUSTRIAL GROUP

1945

(dollar figures in millions)[a]

Industrial group	Gross operating receipts[b] CORPORATIONS WITH BALANCE SHEETS All (1)	Small (2)	Medium-size (3)	Large (4)	Unincorporated firms (5)	Net fixed capital[c] CORPORATIONS WITH BALANCE SHEETS All (6)	Small (7)	Medium-size (8)	Large (9)	Unincorporated firms (10)	All enterprises[d] (11)	PERCENTAGE HELD BY: Large firms (12)	Large and medium-size firms (13)
All industry[e]	$240,527	$64,838	$40,610	$135,079	$125,971	$78,770	$7,802	$6,777	$64,190	$27,863	$106,633	60.2	66.6
Mining and quarrying	3,740	968	849	1,923	963	2,906	492	628	1,786	490	3,396	52.6	71.1
Manufacturing	138,000	24,516	23,217	90,267	15,780	25,145	2,846	3,203	19,096	1,832	26,977	70.8	82.7
Public utilities	21,549	2,157	1,083	18,309	2,058	41,955	860	1,077	40,018	820	42,775	93.6	96.1
Trade	64,769	31,292	13,066	20,411	69,711	3,532	1,472	633	1,427	3,278	6,810	21.0	30.2
Services	5,558	3,193	1,237	1,128	10,966	2,240	989	690	561	3,398	5,638	10.0	22.2
Finance and insurance[e]	3,038	320	322	2,396	2,548	1,934	582	268	1,084	4,634	6,568	16.5	20.6
Construction	2,827	1,807	635	384	4,631	291	171	60	60	438	729	8.2	16.5
Agriculture, forestry, fishery	905	477	176	252	16,373	662	330	179	154	11,328	11,990	1.3	2.8
Not allocable	141	109	24	8	2,940	105	61	40	5	1,645	1,750	0.3	2.6

Sources:

Column

1-4, 6-9 From *Statistics of Income for 1945*, Treasury Department, part 2, table 6.

5 Data for proprietorships, *ibid.*, part 1, table 15; data for partnerships from Treasury Department Press Release no. S-2253 (February 16, 1950), table 1.

10 (Col. 5 ÷ col. 2) × col. 7, except that figure for all industry is the sum of figures for the several industry groups.

11 Col. 6 + col. 10.

12 Col. 9 ÷ col. 11.

13 (Col. 8 + col. 9) ÷ col. 11.

[a] They may not add to totals because of rounding.

[b] Gross sales and/or gross receipts from operations.

[c] Capital assets less reserves.

[d] Omits corporations not filing balance sheets with the Treasury for the year 1945. Such corporations had 1 per cent of gross operating receipts of all corporations in that year, and less than 3 per cent of such receipts in every industry group.

[e] Excludes real estate industry.

Corporate size is based on net holdings of all assets: small corporations are those with total assets under $1 million; medium-size, those with total assets between $1 and 5 million; and large, those with total assets above $5 million. All unincorporated enterprises are assumed to be small, their holdings of net fixed capital being estimated from the relation of net fixed capital to gross operating receipts of small corporations.
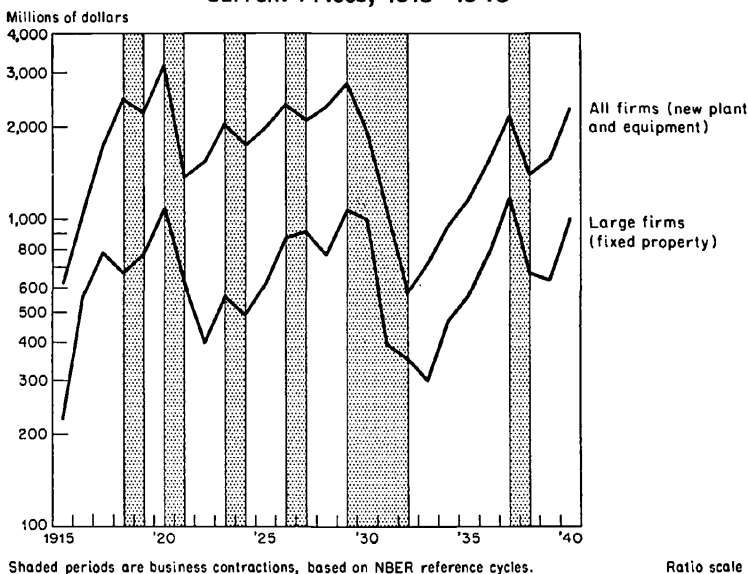
instability of small-firm investment must be substantially greater than that of large firms. For all firms we use Lowell J. Chawner's series on total new capital expenditures for plant and equipment in manufacturing. For large firms we use the National Bureau's series on fixed property expenditures by a sample of manufacturing corporations most of which have assets of $10 million or more.[5] This sample accounted for 28 per cent of all corporate manufacturing assets in 1933 and for 43 per cent of the assets of manufacturing corporations with total assets over $10 million. The weight of such corporations in Chawner's series falls somewhere between a half and a third—not so high as to dominate the behavior of both series, yet high enough to be representative of investment by large manufacturing concerns. The two series are presented in chart 11, and what we find is that the fluctuations of investment by large firms are about as violent as the fluctuations of all manufacturing investment. To the extent, therefore, that manufacturing provides trustworthy evidence of the influence of firm size in other industries, it appears that small firms contribute little more to the fluctuations of total investment than they do to the average level of investment and perhaps somewhat less than their share of all fixed capital assets.

Speculative as this digression has been, it is warranted by the widespread belief that private regularization of business investment is feasible only for large firms. If this be true, the question arises whether the area of effective private regularization does not shrink to insignificance in the scale of investment fluctuations. Any judgment on this question must be superficial until we know more about the concrete measures of regularization that are feasible and the repercussions of these measures on other areas of investment where direct private regularization seems unpromising. But as a first approximation one may guess that in talking about private busi-

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[5] Chawner's series appeared in his article "Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940," *op.cit.*, p. 10. The National Bureau of Economic Research series is based on a sample of fifty manufacturing corporations in ten minor industry groups for the years 1915 to 1922, linked to a sample of seventy-four manufacturing corporations in the same ten minor groups for the years 1922 to 1940. NBER estimates of "fixed property expenditures" differ from Chawner's estimates of "new expenditures for plant and equipment" in that the former contain expenditures for used facilities and for such natural resources as land, oil fields, and mines, and in that they are also net of disposals of property. These conceptual discrepancies prevent us from subtracting the NBER series from Chawner's to study the residual series directly, but they do not jeopardize our basic finding about the relative amplitude of investment fluctuations of large and small firms.

Chart 11
Capital Expenditures in Manufacturing
Current Prices, 1915-1940

Millions of dollars

All firms (new plant and equipment)

Large firms (fixed property)

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scale

ness regularization we are at the worst discussing policies that, to the extent they prove efficacious, are directly relevant to about three fifths of the level and range of variation of business fixed capital expenditures.[6]

The Fallibility of Annual Data

For manufacturing as a whole Chawner achieved a breakdown of capital expenditures between plant and equipment, but I have reserved discussion of this breakdown to the present point because it is available in both annual and quarterly form. We are thus permitted to make a direct comparison of quarterly with annual estimates for an important segment of industry, and to form an impression of the losses which result from the need to use annual data rather than estimates for shorter time periods. In general, these losses are of two sorts: annual data understate amplitudes of cyclical variations, and they obscure precise timing relations. At times the loss of amplitude is so great as to obliterate cycles that would be

[6] Our criterion of size is arbitrary. If we take assets of $1 million as defining a large corporation, the share of investment subject to the direct effects of private regularization may be as high as two thirds.

revealed in monthly or quarterly data, or so unequal as to make it difficult to distinguish the cycles that do appear from irregular disturbances of noncyclical origin.

In view of the hazards to which annual data are subject, I think the basic similarities in the picture of manufacturing investment revealed by the two sections of chart 12 are reassuring. The reduced amplitude of the annual data is apparent; but every cycle in the quarterly data has an unmistakable counterpart in the annual, and no spurious or misleading movements occur in the annual series. Moreover, the implication of annual data that cyclical turns in the several series are synchronous with each other and with business cycles, while something of an idealization, is a reasonable summary of the picture provided by quarterly data. It is quite possible, of course, for annual data to differ from quarterly with respect to the year in which a turning point occurs; but when this tendency appears in time series covering a wide range of economic processes, as in the 1932-1933 period, a similar difference may characterize annual and quarterly reference-cycle turns. In such a case, the question whether a particular economic process leads, lags, or moves synchronously with business cycles may well be answered similarly from annual and quarterly series.

A considerably more stringent comparison between annual and quarterly data is provided in chart 13, which presents Department of Commerce estimates of gross national product and certain of its components. The comparison is more stringent because it relates to a period in which the contrast between business cycles marked off in annual and quarterly form is striking. In terms of annual data the war contraction lasted two years; in terms of quarterly data, only three quarters. However, this difference has its counterpart in the time patterns of important economic variables during these years; and making use of the appropriate reference chronology in each case, one would draw conclusions from quarterly data which differ in detail from those based on annual data, but would not conclude that the picture provided by annual data had been grossly misleading.

These comparisons give me some confidence that the lessons to be drawn from the annual series on investment presented in this paper would not be upset, though they would certainly be refined, by corresponding time series in monthly or quarterly form.

Chart 12
Capital Expenditures for Plant and Equipment in Manufacturing
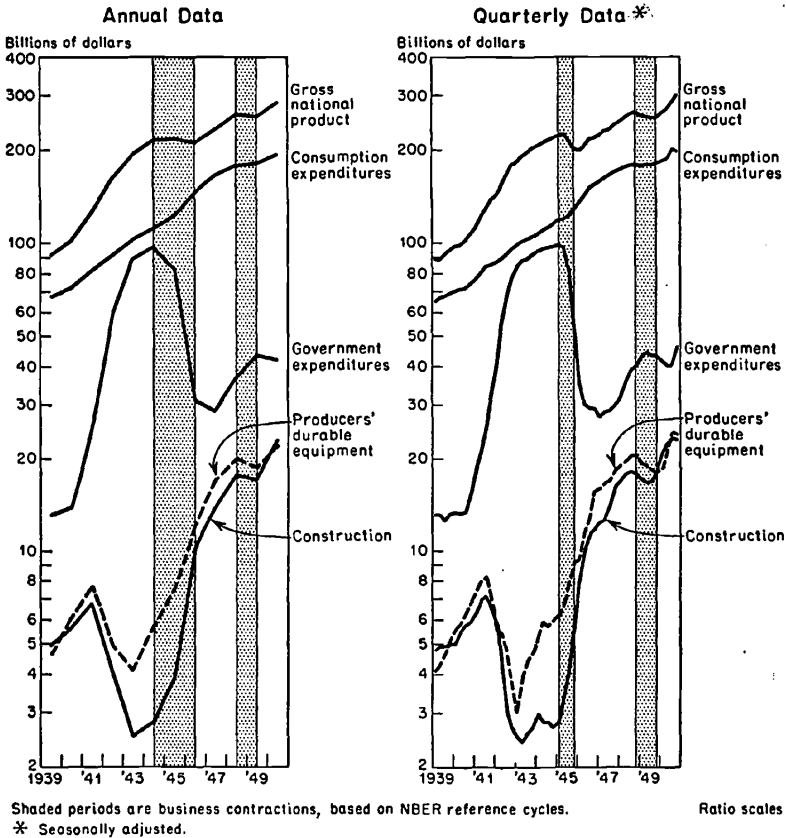## Current Prices, by Years and by Quarters, 1915-1940

Annual Data

Quarterly Data *
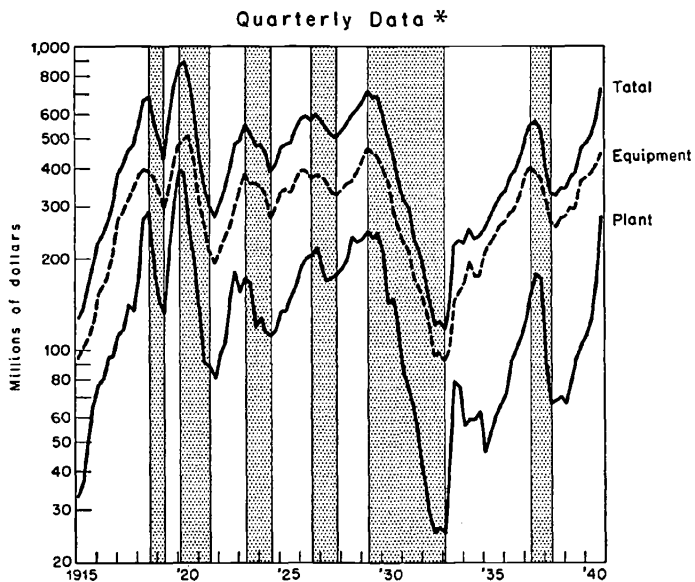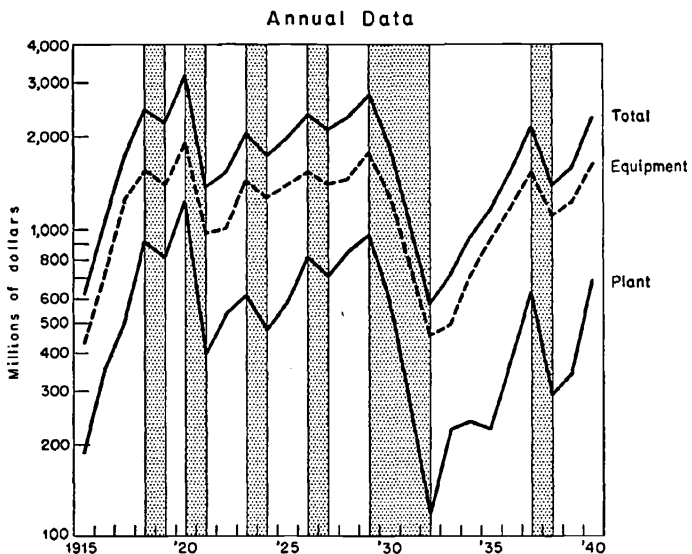
Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales
* No seasonal adjustment required

Chart 13

Gross National Product or Expenditure and Selected Components Current Prices, by Years and by Quarters at Annual Rates
1939 – 1950

Annual Data   Quarterly Data ✻

Billions of dollars   Billions of dollars

Shaded periods are business contractions, based on NBER reference cycles.   Ratio scales
✻ Seasonally adjusted.

Summary

What, briefly, are the lessons to be drawn from these series? In the nature of the case they must be simple, for in this paper we have looked only at the end results of investment. But even at this level of analysis, one can begin to put together a picture of the investment process which differs in important respects from working impressions still widely held about the subject.

1. The most striking lesson, of course, is that we must not think of all investment in terms of the business model, or feel that we have sufficiently refined our analysis by distinguishing government invest-

27

ment, regarded as independent of business cycles, and private investment, regarded as determined by narrow business interests. When the data permit us to distinguish sources of initiative, we see at once that many points of vantage lie between these extremes and that they are occupied by significant groups. Thus, while a portion of public investment may be independent of business cycles, what we find when we take all government investment together is a series which responds less regularly to business cycles than any category of private investment, but which nevertheless declines in severe cycles and reacts in a distinctive way to cyclical forces in mild ones. It is easy to forget that a good deal of government investment is subject to the same kind of accounting scrutiny as private, and that a government administrator may pay close attention to costs and financial markets. That government investment behaves as uniquely as it does bears witness to the type of function which it serves, and to the complex mixture of political and economic factors at work in the decision-making process. This political leavening, however, is stronger in some undertakings than in others; and when we can differentiate among public functions, we shall find types of government investment that are economically indistinguishable from private investment.

The importance of the function served by investment shows up clearly in areas where public and private initiative overlap. What I have called quasi-public investment is made for facilities the demand for which is loosely, and in some cases perversely, related to business cycles. Such buildings as schools, hospitals, and recreational centers depend on the growth and age-composition of local populations, take many months to plan and finance and still more months to complete, and when completed will serve for years or even decades. They are not intended to satisfy short-run changes in demand, and even when privately financed they cannot be managed on strict business principles. To some extent these outlays will respond to the current business situation because costs are important even to the managers of endowments, but the response will be more like that of public agencies providing comparable facilities than that of business enterprises providing a service for profit.

One stage beyond is the vantage point of the residential investor, who behaves more like a consumer than an entrepreneur even though his demand is swelled by that of true entrepreneurs. In him we meet an investing agent who is not equipped to follow the short-run business situation, and who builds from a sense of need at times

when his resources are adequate to permit it. Nor is he a negligible factor in the investment total, for during the interwar period the outlays on his behalf were second only to those of private business enterprises. It is thus necessary to find a place for him in the investment picture, and it must differ in important respects from any we have so far identified.

2. Our second lesson is related to the first in that it points to complexities within the business investment sector. Whether we deal with major industries or with minor industries within the manufacturing group, the sensitivity of investment to fluctuations in general business is a common feature. But these general business influences appear to dominate the course of investment only at times of severe crisis. In other seasons more important influences can be traced to circumstances in the history, technology, or profitability of the particular industry, or even of particular firms within the industry. Taken over the economy as a whole the effects of many of these influences cancel out, but these effects are not individually negligible and the cancellation can seldom be more than partial. Thus many of these special influences leave their trace on even the broadest aggregates. The classic case appeared in the era of railroad building, when the peculiar vitality of the railroad industry put its mark on investment as a whole.

3. The one industry influence which has seldom been neglected by students of investment is fluctuations in output. When carefully conceived, this influence is assumed to work through the rate of change in output, with investment moving in step with this rate, perhaps with a lag. However, the long history of attempts to confirm the acceleration principle yields little evidence that this factor plays an important role in the short-run variations of investment. No doubt over long periods one can show some average correspondence of output and capital facilities, and future demand is clearly one of the factors which entrepreneurs take into account in laying down investment schedules. But this future would not be the immediate future even if it could be accurately forecast, and ideally is some sort of moving average of the near and remoter future. To the extent that future demand is estimated from past sales, some connection between output changes and investment may result; but unless entrepreneurs project the immediate past much more naively than seems likely, this connection cannot be close.

4. What, then, accounts for the almost universal imprint of business cycles on the course of business investment? On this question

it is impossible to hope for agreement until our evidence is much more complete. In my judgment, however, the most cogent explanation of this trait is that it reflects the timing of investment commitments to take advantage of the state of markets, both for capital goods and for products. These immediate market states do not determine investment plans, which in fact look beyond them over many future market states. But they do determine whether existing plans will be executed now or postponed to a later date. When costs are low and financing is easy, many long-deferred investment plans are taken up for consideration; let the outlook in product markets also turn favorable and these plans will be freely executed. On the other hand, when costs rise and financing becomes more difficult, investment programs are examined much more critically; if product markets also turn weak, even the most urgent plans will be shelved until a more favorable season. Since these conditions appear and evolve with business cycles, a corresponding rhythm appears in the various lines of investment. But such factors chiefly control timing; magnitudes have their own explanation, and must be traced to their origins in particular firms and industries.

5. Businessmen who look at the investment process have always been more impressed by the special influences at work than by the common forces that weld investment plans into a nationwide system. From what we have learned at successive steps in the disaggregation procedure, we can see that there is an important element of truth in this point of view. It is a proper account of what the businessman sees from his point of vantage. But we can also appreciate that it is an incomplete account. What appears as a secondary influence on investment at the level of particular industries builds up an impressive dominance when many industries are combined because it affects all of them alike, whereas the special factors tend to be offsetting. This is a fact of enormous importance from the point of view of investment regularization. Quite probably what can be accomplished at the level of individual firms and industries will strike many as a frail reed on which to rest the stability of the economy. But these minor accomplishments, taken over all firms and all industries, may add up to a major contribution to the stability of total investment.

Appendix: Note on Concepts and Data

The concepts used in this paper are those made familiar in national-product accounting. Thus investment in a given period is the part

of current national output that does not pass into direct consumption; and it is considered gross, i.e., without allowance for depreciation of the preexisting capital stock. In Simon Kuznets' terminology this notion is called gross capital formation; it consists of (1) total construction other than maintenance or repairs, (2) all acquisitions of newly produced industrial equipment, including munitions, (3) the change in inventories of business enterprises and farmers, and (4) net change in claims against foreign countries. With some violence to standard accounting usage, the sum of (1) and (2) is referred to as fixed capital expenditures.

The object of the following notes is to identify the time series used in the charts presented in this paper. For fuller details on the construction and coverage of these series, the reader is referred to the sources cited.

CHARTS 1, 2, AND 3

The basic data are those covering the period 1919-1938, the fundamental source for which is Simon Kuznets' *National Product Since 1869*, National Bureau of Economic Research, 1946. The same source presents comparable estimates by overlapping decades for the full span 1869 to 1938. From these, decade averages centered at five-year intervals are derived, and provide basing points for interpolating annual movements from 1891 to 1918. These interpolations will first be described, after which the extrapolations for 1939-1949, based on Department of Commerce data, will be outlined.

The interpolation of *gross national product* is accomplished in two ways. For 1909-1918, Willford I. King's annual estimates of national income, adjusted to include imputed rent, are used to interpolate the annual movement of *net* national product, to which is added a rough annual series on capital consumption derived by linear interpolation of decade estimates. For 1891-1908, the sum of W. H. Shaw's annual estimates of total commodity flow destined for domestic consumption and a newly compiled series on the annual excess of merchandise exports over imports is used to interpolate the annual movement of gross national product directly. For *consumer commodities* and *durable producer goods*, 1891-1918, the interpolators are Shaw's corresponding series on commodity flow destined for current consumption; and for *construction* over the same period, from Shaw's series on the output of construction materials for domestic use. All interpolations are made in terms of 1929 prices.

The extrapolations for 1939 to 1949, in both current and 1929

prices, employ Department of Commerce data in such a way as to preserve continuity in the concept of national income. This problem chiefly concerns the government sector, which in Kuznets' scheme contributes to consumption to the extent of direct taxes and to investment to the extent of additions to stocks of all kinds in the hands of government. Thus total *consumer goods* and its principal commodity components are extrapolated by corresponding Department of Commerce series, each adjusted to the level of Kuznets' estimates in the overlapping years 1936-1938. The total and components of investment are extrapolated similarly: *gross domestic capital formation*, by the sum of Department of Commerce series on gross private domestic investment and new public construction, together with an estimated series of munitions output; *construction*, by the Department of Commerce total of new private and new public construction; *inventory investment*, by the corresponding Department of Commerce series; and *net change in foreign claims*, by the Department of Commerce series on net foreign investment. All of these extrapolations are adjusted to the level of Kuznets' estimates in the overlapping years 1936-1938. Finally, gross domestic capital formation plus net change in foreign claims yields *gross capital formation*, while the same series less construction and inventory investment yields *producer durables.*

This brief account is necessarily silent on many technical details, including interpolation formulas and specific source references. Persons desiring such information are referred to two mimeographed reports by Simon Kuznets, *Annual Estimates of National Product, 1869-1949*, NBER, 1951, and *Nine-Year Moving Averages of National Product and Components by Type of Use, 1873-1945*, NBER, 1951.

CHARTS 4, 5, 7, 8, 9, AND 10

For the family of series presented in these charts, the two fundamental sources are (1) the Department of Commerce estimates of new construction activity "Construction Volume and Costs, 1915-1951," statistical supplement to *Construction and Building Materials*, May 1952, and (2) the SEC–Department of Commerce estimates of business expenditures for new plant and equipment, 1939-1950 (see, e.g., *The Economic Report of the President*, January 1952, table B-19).

These materials are supplemented from three further sources, as follows: (3) Farm equipment investment is measured by estimates

of the Bureau of Agricultural Economics published in the *Farm Income Situation* (see, e.g., "Farm Capital Expenditures, Depreciation, and Net Investment, 1919-1950," table 14, in FIS-131, July-September 1951). (4) To carry business fixed capital expenditures back to 1919 and to achieve the breakdown of these between plant and equipment for 1919 to 1938, use is made of the Federal Reserve Board estimates (which, indeed, underlie the SEC-Commerce estimates before 1945). The relevant references here are to George Terborgh, "Estimated Expenditures for New Durable Goods, 1919-1938," *Federal Reserve Bulletin*, September 1939, pp. 731-736, and addenda to the same article, *Federal Reserve Bulletin*, February 1940, p. 116, and February 1941, p. 103; Frederick C. Dirks in the *Federal Reserve Bulletin*, April 1942, pp. 317-318; and D. P. Warner and A. R. Koch in the *Federal Reserve Bulletin*, September 1946, pp. 967-973. (5) Certain government estimates are reconstituted by reference to published series in the American Gas Association's *Gas Facts* and the American Transit Association's *Transit Fact Book*.

Public fixed capital expenditures consist of public nonresidential construction expenditures in (1). *Quasi-public* fixed capital expenditures comprise the following private construction expenditures in (1): religious, educational, social and recreational, hospital and institutional, miscellaneous nonresidential, and all other private. *Residential* fixed capital expenditures are the sum of public and private, farm and nonfarm residential construction in (1). *Farm business-plant* expenditures consist of farm service building construction in (1).

The classification of *nonfarm business* fixed capital expenditures is derived as follows:

a. "Manufacturing and mining" agrees with sources 2 and 4, except that estimates for 1935-1938 are unpublished revisions of the compiler.

b. "Railroads and local transit" consists of railroads (sources 2 and 4) and local transit (source 4 through 1938; *Transit Fact Book* thereafter).

c. "Heat, light, and power" through 1938 consists of electric utilities (source 4), gas utilities and pipelines (*Gas Facts*), and petroleum pipelines (source 1); thereafter it is identical with SEC-Commerce's "electric and gas utilities" (source 2).

d. "Commercial and miscellaneous" is the residual. Through 1938 it consists of the FRB's "commercial and miscellaneous" and "telephones" (source 4) plus Commerce's "private telegraph construc-

tion" (source 1); after 1938 it consists of SEC-Commerce's "commercial and miscellaneous" and "other transportation" (source 2) less local transit (as in item b, above).

The breakdown between plant and equipment after 1938 is accomplished by estimating plant expenditures and treating the difference between total fixed capital expenditures and plant expenditures as equipment investment. For manufacturing and mining, the estimate of plant expenditures is the sum of Commerce's private industrial construction and oil-and-gas-well drilling, raised to the level of the FRB's plant investment in 1939-1940 (see Dirks, *op.cit.*, pp. 317-318). For railroads and local transit, it is the total of Commerce's construction estimates for these two industries (source 1). And for the heat, light, and power industries, it is the sum of Commerce's construction statistics for the following utilities: manufactured and natural gas; petroleum pipelines; and electric light and power (except for 1939-1941, where Dirks' *relative* plant expenditures are applied to Warner and Koch's total—see source 4, above).

The least satisfactory of these series is the one on public investment because it fails to include public equipment expenditures. For the period 1939-1945 Warner and Koch (*op.cit.*, pp. 967-973) have attempted to meet this deficiency; and for subsequent years to 1950 we have made estimates of our own of public equipment investment, to be added to the series on public construction. Study of these alternative series, however, does not disclose any material differences in cyclical behavior; and because of the difficulty of combining estimates of different conceptual content, we prefer to use public construction as an index of total public investment throughout the period.

CHART 6

From Lowell J. Chawner, "Capital Expenditures in Selected Manufacturing Industries," in Dept. of Commerce, *Survey of Current Business*, December 1941 and May 1942.

CHART 11

See footnote 5 to text.

CHART 12

From Lowell J. Chawner, "Capital Expenditures for Manufacturing Plant and Equipment—1915 to 1940," in Dept. of Commerce, *Survey of Current Business*, March 1941.

CHART 13

From Dept. of Commerce, *Survey of Current Business*, National Income Number, July 1952.

COMMENT

BERT G. HICKMAN, National Bureau of Economic Research

An important lesson to be drawn from Millard Hastay's paper was not sufficiently emphasized, either in the paper or in the discussion. Only a small proportion of total investment could be easily regularized by the action of private firms.

For example, note the importance of residential construction. In 1926, near the top of a long cycle, fixed capital expenditures in residential construction were approximately $5.7 billion, or about one third of total fixed capital expenditures. In 1933, near the bottom of a long cycle, they stood at $500 million, or about one ninth of the total. This category not only bulks large in peak years, it also undergoes a tremendous decline in low years. Stabilization of investment in residential construction probably would require government action. Private firms might assist by reducing the cost structure in construction, but this would be hard to accomplish, and it is not clear that it would promote greater *stability* of expenditures over time, since costs would be reduced in both expansions and contractions. Furthermore, public and quasi-public investment together accounted for $2.9 billion in 1926 and $1.8 billion in 1933. This again is an area of public policy. Fixed capital expenditures in the public and residential sectors combined are approximately equal to the total expenditures made by business.

It is often argued that the best chances for private initiative in this matter lie with large firms which have a continuous existence and a range of choice in investment opportunities enabling them to select a time pattern of outlays over a long period. If this is a valid point, the opportunities for regularization of farm investment and perhaps of commercial and miscellaneous investment would be minor, since small firms are typical of these sectors. But in 1926, farm investment was $800 million and commercial investment $3 billion. The sum of the two is nearly one half of the business total. Small firms also account for an important part of total manufacturing and mining investment. Together these categories make up a substantial proportion of investment in business plant and equipment.