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# CYCLICAL EXPERIENCE IN THE INTERWAR PERIOD: THE INVESTMENT BOOM OF THE 'TWENTIES

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This is a second progress report on a long range study of business cycles in the interwar period.<sup>1</sup> For the purposes of this paper, I have chosen to center attention on the investment boom of the '20's. It is on this portion of the broader study that most progress has been made. As a matter of fact, the longer range study has as its starting point the twofold assumption that the causes and nature of this prolonged boom are not fully understood and that a detailed historical study of the investment stimuli operating on the economy in these years may throw some needed new light on the cause of both the severity of the collapse after 1929 and the slowness of the recovery after 1932.

The main part of this paper is devoted to a fairly detailed study of the factors influencing the behavior of the main components of total investment during the '20's. To provide essential background for this analysis, I shall first deal briefly with two related topics: the significance of the distinction between major and minor cycles in interpreting the cyclical experience of the interwar period, and, secondly, the bearing of events during the short cycle of 1919-21 on the development of the major expansion after 1921. The latter discussion will, I hope, add to our understanding of the forces responsible for the turning point following the sharp deflation of 1920-21.

## 1 MAJOR AND MINOR CYCLES

Table 1 lists the National Bureau reference dates for the business cycles during the interwar period. Let us begin with the initial assumption that, to understand the cyclical forces operating upon the American economy in these years, we must group the five cycles listed in Table 1 on the basis of the frequently cited distinction between major and minor cycles. Thus

<sup>1</sup> The longer study was made possible by the generous assistance of The Rockefeller Foundation and the Bureau of Business and Economic Research of the University of California. For an earlier report on the project, which dealt primarily with certain methodological issues, see *Business Cycles in the Interwar Period: The 'Quantitative-Historical' Approach*, *American Economic Review, Papers and Proceedings*, May 1949, pp. 47-63.

I believe that one major cycle began in 1914 (initial trough) and ended in 1921. This swing contained as its concluding phase the short cycle of 1919-21. Then followed the major cycle of 1921-33, which culminated in the 1929 downturn and the ensuing great depression. I think of the 'New Deal' cycle of 1933-38 as representing an unusual sort of minor cycle superimposed on a major swing which was still in its underlying expansion phase when war in Europe and the defense program in this country initiated an entirely new set of major cycle influences.

Table 1

## CYCLICAL TURNING POINTS, UNITED STATES, 1919-1938

TROUGH	PEAK
April 1919	January 1920
July 1921	May 1923
July 1924	October 1926
November 1927	June 1929
March 1933	May 1937
June 1938	

Source: Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles* (NBER, 1946), p. 78, with later revisions by the National Bureau: from September to July 1921; from December to November 1927; and from May to June 1938.

Now I want to try to make clear what I mean by major and minor cycles and why I think the distinction between them is an analytical device essential for an understanding of what happened during the '20's and '30's.

The usual sort of cumulative process, during which elements of vulnerability and some self-reversing forces gradually accumulate, operates during both major and minor cycles. Major upswings are periods of rising or high level investment, including government spending, during which, even if cumulative downward spirals develop, long-term investment opportunities continue favorable and therefore the self-correcting forces inherent in recessions are sufficient to bring about a new recovery in fairly short order. In major downswings, on the other hand, long-term investment opportunities become seriously impaired (for a variety of reasons); and hence the self-correcting forces inherent in recessions are either insufficient to generate any new cumulative expansion at all (until long-term investment opportunities improve) or, if one is generated, the ensuing upswing is too weak to generate as high a level of investment and output as prevailed before the major downswing began.

It is a truism to say that business cycles exist because private enterprise economies expand and contract through a cumulative process that eventually breeds a movement in the opposite direction. In minor cycles the self-reversing cumulative process operates primarily through the short-period production planning of business men and the short-period purchasing plans of consumers, together with the monetary and financial apparatus

required to implement these plans. Major cycles result from the long-term investment planning of business men and consumers. The analysis of minor cycles would emphasize short-period changes in price-cost relations, 'horizontal maladjustments' capable of relatively quick correction, changes in inventory holdings, the behavior of the short-term credit market, and so on. The study of major cycles would center on 'underlying investment opportunities', on changes in the rate of growth of the economy, on waves of speculative promotion of capital projects, on the effect of monetary and financial developments on the opportunities for profitable investment in long-term projects, and so on.<sup>2</sup>

History tells us that these two sets of cyclical forces are not always combined in the same way. Sometimes the long-run investment expansion proceeds at a moderate pace; financial excesses do not develop; and further investment opportunities develop as fast as old ones are exploited. In this case, the minor cycles are what chiefly meet the eye. The major may be scarcely distinguishable from the underlying trend (say, of total output). In other cases the underlying investment boom may be so rapid that minor maladjustments do not have a chance to lead to widespread hesitation before the final collapse comes. In this case only the major cycle would stand out. Most often in the United States we find the two sorts of cycles operating together and both distinguishable. Where the major cycles have stood out clearly and can be readily dated, they seem to have included from two to four minor cycles. I find no evidence to support Professor Schumpeter's empirical generalization that the majors have always included exactly three minors (assuming that my majors and minors correspond approximately to his Juglars and Kitchins).<sup>3</sup>

<sup>2</sup> The distinction between major and minor cycles described here is very similar to, if not identical with, that outlined by Alvin Hansen in *Fiscal Policy and Business Cycles* (Norton, 1941), pp. 16-9. This does not mean, however, that I necessarily accept all of Professor Hansen's empirical generalizations regarding the behavior of major and minor cycles. While Schumpeter's scheme of Juglar and Kitchin cycles is also similar, there are in this case also important points of differences. See the next footnote.

Since this paper was written, Hansen has further elaborated his views on major and minor cycles in *Business Cycles and National Income* (Norton, 1951), Ch. 2.

<sup>3</sup> See his *Business Cycles* (McGraw-Hill, 1939), I, 173-4, and *The Analysis of Economic Change*, reprinted in American Economic Association, *Readings in Business Cycle Theory* (Blakiston, 1944), especially p. 15. See also Burns' and Mitchell's discussion of some of the statistical evidence bearing on Schumpeter's empirical generalization regarding the occurrence of Juglars and Kitchins (*op. cit.*, pp. 440-8). It should be remarked that, for Schumpeter, Juglars and Kitchins (and also Kondratieffs) result from the same cause — the way the economy reacts to innovations. The difference in duration is due to the fact "that some processes covered by our concept of innovation must take much longer time than others to have full effect." (The

It is worth noting that — at least in the United States since the Civil War — minor cycles seem usually to have occurred only during the upswings of major cycles.<sup>4</sup> Major contractions have ordinarily been so severe — the maladjustments so serious and so extensive — that the mere curtailment of production, the easing of credit, and the elimination of a few weak firms have not been sufficient to generate a cumulative expansion of even short duration. On the other hand, major expansions have not ordinarily been so strong and rapid as to preclude the appearance of minor maladjustments which have temporarily interrupted the expansionary phase.<sup>5</sup>

In our scheme monetary and financial factors are a part of both major and minor cyclical processes. Bank credit feeds both types of expansion. Security prices react to both sets of cyclical forces and may show quite marked swings over even minor cycles. In major expansions speculative promotions expand the demand for loanable funds beyond that called for by the underlying improvement in investment opportunities, and the developing optimism tends to relax the degree of capital rationing previously exercised by lenders and to bid up capital values, thus expanding investment still further. When the major decline finally comes, forces from the financial and monetary side may have as much to do with bringing on a protracted fall in long-term investment as the decline in 'real' investment opportunities.

Major cycles are particularly, but not exclusively, a product of technological change. The long-run effects of such change can be seen in the secular growth of productivity and of total output and in the expansion of new industries. But other secular forces, such as population growth and migration (working chiefly through the building industry), play an important role in generating major cycles. Even in the absence of technological

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Analysis of Economic Change, *op. cit.*, p. 12. See also *Business Cycles*, I, 166-7.)

My distinction between majors and minors rests in part on different sets of causes and permits disturbances other than innovations to affect both types of cycle, although, like many economists, I agree that innovations play an exceedingly important role, particularly in major cycles. It should also be noted that the three-cycle scheme is not essential to Schumpeter's theoretical model (he points this out emphatically), but it does play a highly important role in his empirical work.

I note that Professor Schumpeter, in his paper for this Conference, now believes that Kitchin cycles "may possibly be explained by some such schema as Metzler's inventory cycle".

<sup>4</sup> Cf. Hansen, *op. cit.*, p. 17. The cycle of 1894-97 (from trough to trough) is clearly an exception. I am not sure how the two short cycles during 1908-14 should be interpreted, since the major cycle does not stand out clearly at all in this period. On the basis of the picture portrayed by some output series, 1919-21 might be considered as coming after the peak of a major cycle.

<sup>5</sup> However, there was no interruption in the major expansion of 1879-82.

change and population growth, major cycles might be generated by fluctuations in replacement demand or by government intervention, but to say this is not to deny that in the past major cycles have been peculiarly the product of the way in which the economy, especially through its monetary and financial mechanism, has responded to the secular forces making for growth.

It is not surprising that our conceptual scheme does not permit us unequivocally to mark off all relevant time series into neat major cycle segments. The application of our model to past cycles involves using statistical and general historical material. Purely statistical criteria may give us a first, provisional, and incomplete grouping of cycles. Then detailed historical studies should help to uncover the causes of observed behavior, and thereby permit a more complete and refined grouping in accordance with the results of the causal analysis. For some periods, however, for example, 1897-1914 in the United States, the results of such analysis may not be very conclusive.

I would now like to introduce the concepts of incomplete and of overlapping major cycles, based on the nature of the investment stimuli operating in certain cycles. In the case of incomplete major cycles, the stimuli primarily responsible for a major upswing may come to be superseded by a new and stronger set of stimuli (before or after a superimposed minor recession). Eventually a major decline sets in. In this case, the statistical record shows a major swing which, at least conceptually, should be interpreted as one cycle following upon an incomplete portion of another. This is the way I prefer to interpret the period since 1933, with the introduction of a new set of expansionary forces coming in 1940 for the United States.<sup>6</sup> The concept of overlapping cycles differs only in degree. New investment opportunities may be building up during a major cycle which is dominated by earlier stimuli. The boom may breed excesses which generate a sharp depression while at the same time the new stimuli are accumulating strength and beginning to take hold. Hence the depression, though sharp, may be short. Conceptually, if not statistically, a new major cycle overlaps the old.

When we apply our two-cycle concept to the interwar period, we secure the results previously indicated. The boom of 1919-20 and the deflation of 1920-21 mark the end of a major cycle that began in 1914. The dominating major cycle stimuli at work between 1914 and 1919 were military expenditures. The inflation of 1919-20 represented primarily not new stimuli but the belated working of the cumulative process in response to

<sup>6</sup> I.e., one set of major cycle influences led to a slow and halting expansion from 1933 to about 1940 (with the minor recession of 1938 intervening), after which a new set of major cycle forces, geared to military expenditures, took hold.

the stimuli injected earlier by war expenditures, i.e., pent-up demand (foreign as well as domestic) for both investment and consumer goods. Since the increase in aggregate demand that began in the spring of 1919 came with resources already close to full utilization, a sharp price rise was inevitable; and the beginnings of this rise started the rapid upward shift in short-term expectations that helped to give this period its inflationary character.

During the boom new stimuli that were to support the economy during the 1920's were becoming important. But the inflation of aggregate demand in 1919-20, while due partly to these new stimuli, was, I think, chiefly due to the forces mentioned earlier. The new stimuli, however, increased in strength rapidly. While they were not strong enough to resist the deflationary forces unleashed by the violent reversal of short-term expectations that began early in 1920, they were strong enough to keep the downswing relatively short (for a major contraction) and to generate between 1921 and 1923 one of the most vigorous recoveries on record. Our concept of 'overlapping' major cycles helps to explain the brevity of the downswing and the vigor of the boom that followed.

From 1921 on, we clearly have a major cycle with a peak in 1929 and a trough in 1932 or 1933. One outstanding characteristic of this cycle, of course, is the unusual severity of the decline after 1929. But another important feature is the high and stable level of investment that prevailed for as long a period as seven years — from 1923 through 1929 — thereby creating a 'plateau effect' which shows in many series. As for the '30's, a detailed treatment of this period will have to wait for another time and place. I have already indicated that, as a working hypothesis, I view 1933-39 as the expansion phase of an incomplete major cycle. However sharp the recession of 1937-38 may have been, I find little to suggest that the character of long-run investment opportunities changed in any important way at that time. The decline in the federal government's cash deficit in 1937 comes the closest to meeting this description, but this change was certainly ephemeral. At least provisionally, I should characterize the cycle of 1933-38 as a peculiar sort of minor cycle, with a very elongated expansion phase, superimposed on a submerged major cycle which had not even by 1939 carried the economy up to reasonably full employment.

## 2 THE CYCLE OF 1919-1921

There seems to be little argument regarding the main causes of the boom of 1919-20 and of the 1920 turning point.<sup>7</sup> Most economists, I think,

<sup>7</sup> Among the more recent studies of the cycle of 1919-21, see Thomas Wilson, *Fluctuations in Income and Employment* (3rd ed., Pitman, 1948), Ch. XI; and S. H. Slichter, *The Period 1919-1936 in the United States: Its Significance for Business*

would agree that the following were the most important factors operating early in 1919 to generate a rapid and substantial rise in aggregate demand:

- 1) A heavy pent-up demand by business for capital goods and by consumers for housing, automobiles, other durables, and also nondurable goods.
- 2) The existence of a large volume of liquid assets and a high level of money income to make these pent-up demands effective.
- 3) The maintenance of an abnormally high level of foreign demand for American goods.
- 4) Continuation of government expenditures on a large scale. Federal expenditures and the net deficit in the fiscal year ending June 30, 1919 were nearly 50 per cent higher than in fiscal 1918.
- 5) Because of the Treasury's needs, the monetary authorities felt compelled to maintain an easy money policy during most of 1919. In the face of a demand for loanable funds that shifted rapidly upward, the supply remained highly elastic.

This list, with appropriate modification of the fourth point, sounds like a textbook explanation of the causes of the boom following World War II. The origins of both obviously lay in the monetary inflation of the war years and in the accumulation of pent-up desires to invest and consume resulting from wartime restrictions and the needs for reconstruction and relief. The 'underlying' situation was created by the war. Only a short period of hesitation, much more the product of uncertain short-term expectations than of a decline in government spending or any other deterioration in 'real' investment opportunities, separated the peak of the wartime cycle (August 1918 in the United States, according to the National Bureau) from the rise that began in the spring of 1919.<sup>8</sup> Further, once the expansion began in 1919, its general character came to be strongly colored by the behavior of short-term anticipations. These are some of the considerations that lead me to speak of 1919-20 as a minor boom superimposed on a major cycle which dated approximately from the outbreak of war in Europe.

There is no need to describe the boom in detail, since its general features are already well known. As to what finally brought the boom to an end, there seems to be a fairly general consensus that the following factors were

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Cycle Theory, *Review of Economic Statistics*, February 1937, pp. 6-9. Valuable background material is to be found in the monthly reports on business conditions by regions in the *Federal Reserve Bulletin* during 1919-21.

<sup>8</sup> Contemporary reports confirm Slichter's statement: "At the beginning of 1919, the dominant question in the business world seems to have been: 'What is going to happen to prices?' Many business men expected the drop in the war demand to cause prices to fall." *Op. cit.*, p. 6.

important, either in making the economy highly vulnerable to shock or in acting as a positive deflationary force:

- 1) A growing inelasticity of price expectations resulting from the rapidity and extent of the rise in prices
- 2) The size of business inventories and the extent to which they had been financed by short-term bank borrowing
- 3) Growing resistance by consumers to high prices
- 4) An early decline in construction clearly associated with high building costs and the unavailability of mortgage credit on reasonable terms
- 5) Rapidly rising costs and numerous production and transportation bottlenecks, which, whatever their effect on current profits in view of the rise in prices, increasingly led business men to be apprehensive regarding the profitability of future operations
- 6) A decrease in government spending after the middle of 1919, with the result that during 1920 government finance came to exercise a strong deflationary force on the economy
- 7) Tightening of credit by the Federal Reserve authorities, beginning toward the end of 1919
- 8) Beginning early in 1920, a tendency for exports to sag and growing pessimism regarding the ability of foreigners to continue buying at the rate then prevailing

This is a long list of possible causes, and the temptation is strong to single out one or two as *the* initiating forces that set the downward spiral in motion. Possibly, more detailed analysis than I have had time for would point clearly to the factors most culpable, but so far other writers have not been able to agree when they get to this point. My own view is that a number of the factors listed operated more or less simultaneously to bring about the collapse, and I doubt whether any one of them can be given priority over all the others.

For our present purposes there is little to be gained by a more detailed discussion of the causes of the 1920 downturn in business. Of greater relevance to our problem is a consideration of the course of the depression and the reasons for the early upturn, for it is impossible to evaluate the significance of the investment boom of the '20's without weighing carefully the factors that prevented a more protracted depression in 1920-21.

The contraction of 1920-21 was severe but also surprisingly short-lived. One of its most notable features was the collapse of the inflated price structure. The wholesale price index fell 45 per cent, and farm prices fell more than 50 per cent. But on the whole, as Tables 2 and 3 suggest, the price decline was fairly well balanced, and no serious distortions in the price structure developed to accentuate the decline.<sup>9</sup>

<sup>9</sup> Cf., Slichter, *op. cit.*, p. 8.

Table 2

## BEHAVIOR OF SELECTED SERIES DURING DOWNSWING OF 1920-1921 AND SUBSEQUENT RECOVERY

	AMPLITUDE <sup>a</sup>						
	OF TOTAL DECLINE %	VALUE OF SERIES ON SELECTED DATES					
		Jan. 1921	June 1921	Sept. 1921	June 1922	Dec. 1922	
Total ind. production, index	33	58	56	58	74	86	
Durable manufactures	55	64	48	50	87	98	
Nondurable manufactures	36	47	58	60	67	74	
Wholesale prices, index							
Farm	53	102	81	90	93	99	
Nonfarm	45	117	97	94	97	101	
Finished	41	119	101	98	98	100	
Raw materials	51	105	81	86	94	100	
Department store sales, index	17	100	92	87	92	100	
Deflated dept. store sales, index <sup>b</sup>	13	90	90	91	101	110	
Factory employment, index	31	81	82	82	90	99	
Factory payrolls, index	43	84	76	73	80	95	
Construction contracts, \$ mil. <sup>c</sup>	61	152	180	216	279	271	
New corporation issues, \$ mil. <sup>d</sup>	83	483	402	376	790	434	
Commercial paper rates, % <sup>e</sup>	49	7.9	6.8	6.0	4.4	4.9	
Corporation bond yields, % <sup>e</sup>	22	7.2	7.3	7.0	5.9	5.9	
Common stock prices, index <sup>e</sup>	32	60	56	56	72	75	
Weekly reporting member banks <sup>e</sup>							
'All other' loans	} <i>billions</i>	27	9.1	8.2	8.0	7.1	7.3
Investments		37	3.3	3.3	3.2	4.2	4.6
Net demand deposits		} <i>dollars</i>	14	10.8	10.2	10.0	11.1

All series seasonally adjusted when necessary. No description or source reference is given for a standard series which is generally familiar.

<sup>a</sup> Measured from peak to trough of series in question.

<sup>b</sup> Adjusted for trend and price changes. Normal: 100. Original source is the Federal Reserve Bank of New York.

<sup>c</sup> F. W. Dodge data, seasonally adjusted, from National Bureau of Economic Research. Figures are monthly averages for the *calendar quarters* in which the indicated months fall.

<sup>d</sup> From *Banking and Monetary Statistics*. Figures are totals for the *calendar quarters* in which indicated months fall.

<sup>e</sup> From *Banking and Monetary Statistics*. The bond yield series is Moody's for all corporate bonds. The stock price index is Standard and Poor's for all common stocks.

The decline in production was also very sharp. As we should expect, the reduction in output of durable goods was particularly marked (Table 3), but what is especially noteworthy is the extent of the decline in nondurables, especially of textiles, leather, and food products. The percentage drop in production of nondurables in 1920-21 was actually greater than in 1929-32, although the decline lasted less than a third as long. The sharpness of the decline in the output of nondurables stands out in contrast to the very mild contraction in retail sales and consumption. Dollar department store sales fell only 17 per cent, despite the decline in retail prices, and an index of deflated department store sales fell 13 per cent (Table 2).<sup>10</sup>

<sup>10</sup> The deflated series (Federal Reserve Bank of New York) has the weakness of being corrected for trend, in addition to the weaknesses inherent in any deflated index.

Table 3

## EXTENT OF DECLINE IN WHOLESALE PRICES AND PRODUCTION, SELECTED INDUSTRIAL GROUPS, 1920-21, 1929-33, AND 1937-38

	PERCENTAGE DECLINES					
	1920-1921 <sup>a</sup>		1929-1933		1937-1938	
	Total	Per month	Total	Per month	Total	Per month
<i>Wholesale Prices</i>						
All commodities	44.1	3.4	38.0	0.88	14.8	0.53
Farm	52.6	3.1	62.0	1.44	29.0	1.53
Nonfarm	44.8	2.4	32.3	0.75	11.1	0.48
Finished	41.4	2.1	31.3	0.73	11.2	0.49
Raw materials	51.1	4.6	51.2	1.22	26.2	0.87
<i>Industrial Production</i>						
Total	32.9	2.4	53.5	1.53	33.1	2.8
Durables	54.5	5.0	77.3	1.76	51.1	5.1
Nondurables	36.2	3.3	33.7	0.91	23.7	3.0
Textiles	53.5	4.1	48.0	1.33	48.0	6.9
Food products	25.9	2.9	27.9	0.80	8.4	1.7

Based on wholesale price indexes of Bureau of Labor Statistics and production indexes of Federal Reserve Board.

In all cases, declines are measured from peak to trough of series in question. The number of months used in computing the monthly rate of decline therefore varies from series to series.

<sup>a</sup> Some of the price series did not reach a trough until 1922.

Satisfactory monthly inventory figures are lacking except for department stores. These stocks, deflated for price changes, fell some 15 per cent in the short space of four months — from a peak in September 1920 to a low in January 1921. Significantly, they then rose by a third during the remainder of 1921, and at the end of the year they were considerably above the 1920 peak. This accumulation was certainly planned (despite a continued decline in wholesale prices of finished goods), since deflated sales also rose during these months. Apparently the ratio of stocks to sales reached in early 1921 was abnormally low, with the result that the maintenance of sales led early in 1921 to renewed buying by department stores and a sharp reversal of earlier attempts to liquidate inventories.<sup>11</sup> This, of course, is only one section of the retail field. But other evidence lends additional support to the conclusion that the reversal of price expectations in 1920 led to a curtailment in output of consumer goods (and of their processed raw materials) that was too sharp to continue in view of the maintenance of consumption. By early 1921 business men were beginning to reorder liberally, and production of consumer and nondurable goods started to increase.

<sup>11</sup> The ratio of the index of department store stocks to that of sales fell from a peak of 1.176 in April 1920 to a low of 0.935 in February 1921. Except in one month in 1922 and one month in 1926, the ratio was not again this low until 1928, by which time the marked downward trend in this series had made such a low figure 'normal'. Data are from National Bureau files.

The liquidation of 1920-21 was extensive and thorough. Looking at the character of the downswing and the promptness and vigor of the recovery, we can conclude that the liquidation was primarily of the sort that eliminated weak spots and tended in a short while to breed new confidence rather than the sort that fed on itself in a succession of deflationary spirals. We have spoken of the balanced decline in prices and reduction of excess inventories.<sup>12</sup> Costs fell with prices. There was a sharp reduction in wage rates and a marked increase in labor productivity.<sup>13</sup> The resulting decline in labor costs helped to protect profit margins and to restore confidence, especially in view of the maintenance of consumer demand. In the construction industry the decrease in costs evidently played an important role. While high building costs had tended to cause postponement of construction projects in 1919-20, the reduction in costs in 1920-21, given the continued and growing needs for nearly all types of building, led to an early recovery in construction.<sup>14</sup> Contracts awarded reached their low point in December 1920, and recovered rapidly thereafter. This was particularly true of residential construction which, by the end of 1921, was back to the peak rate of 1919-20.

On the monetary side, also, the liquidation in 1920-21 did more good than harm. It did not take long for the banks to put themselves in a liquid position,<sup>15</sup> and short-term interest rates began to fall from the later months of 1920 on. Bond yields reached a peak in December 1920. Short-term rates fell more rapidly than bond yields during 1921 (Table 2). New corporate issues in 1921 were only about a third less than in 1920, and this drop was in good part offset by the increase in state and municipal issues

<sup>12</sup> Actually, according to Kuznets, there was little if any net reduction in inventories for the economy as a whole in 1921, though his annual data may conceal a decline in the first half of the year. In a study of a sample of large manufacturing and trade corporations, C. H. Schmidt and R. A. Young found that the manufacturing companies reported a slight increase in inventories during 1921 when deflated for price changes, whereas the large trade companies reported a large decrease (Effect of War on Business Financing, National Bureau *Occasional Paper 10*, 1943, p. 37). Terborgh's figures also suggest that there was little if any decrease in the physical volume of manufacturing inventories between the end of 1920 and the end of 1921 (*Federal Reserve Bulletin*, July 1941, pp. 615-7). This is an area that needs further study, but we are handicapped by lack of monthly or quarterly data.

<sup>13</sup> The following figures are significant. An index of composite wages (Federal Reserve Bank of New York) fell from 103.4 in October 1920 to 87.0 by the end of 1921. In manufacturing, output per man-hour rose 13 per cent between 1920 and 1921 and unit labor cost fell 20 per cent. Labor cost declined further in 1922.

<sup>14</sup> All indexes of construction costs fell sharply between 1920 and 1921. Rents, however, rose. As we shall see later, one type of building that did not recover fully after 1921 was factory construction.

<sup>15</sup> Helped by a substantial inflow of gold.

(which were particularly heavy in the latter half of 1921). The decline in new corporate issues was nearly all in stocks. Corporate bond issues to raise new capital were nearly as large in 1921 as in 1920. Short-term borrowing from banks continued to decline through all of 1921, but in the second half of the year there was a partial offset through an increase in bank investments. Member banks were able to reduce their indebtedness at the Reserve banks rapidly from late 1920 on, but the Reserve banks waited until the following spring to begin reducing rediscount rates.

I think we can safely say that monetary influences were passively favorable in the 1921 upturn and that they became more actively so after the middle of the year, but it does not appear that we can attribute the beginnings of recovery to any specific activation of private spending from the monetary side.

On the fiscal side, the federal surplus in fiscal 1921 was somewhat larger than in fiscal 1920, and still larger in fiscal 1922. Privately held federal debt declined about 400 millions during fiscal 1921, but only a fourth of this came out of nonbank portfolios. During 1922 total federal debt privately held declined by 1.4 billion, and that held by nonbank investors about 2 billion.<sup>16</sup> It may be surmised that, largely after recovery had begun, private firms and individuals called extensively on their holdings of bonds to finance an increase in spending.<sup>17</sup> State and local governments played a more active stimulating role than the federal government during the calendar year 1921; for example, in increased expenditures for roads and local improvements.<sup>18</sup>

The foreign situation certainly was not responsible for recovery. The dollar value of exports in 1921 was not much more than half the level of 1920, and the physical volume was lower, also. According to Kuznets, net foreign investment in current prices fell a billion dollars in 1921 and nearly as much more in 1922. In constant prices foreign investment in 1921 was only slightly less than in 1920, but 1922 showed a large decline.

### 3 BEGINNINGS OF THE BOOM

Further analysis of the 1921 turning point requires that we look into the

<sup>16</sup> Board of Governors, Federal Reserve System: *Banking and Monetary Statistics* (1943), p. 512.

<sup>17</sup> Slichter argues (*op. cit.*, p. 8) that the maintenance of consumer demand in the face of declining incomes in 1920-21 was due in large part to the liquidation of individuals' bond holdings. Since we cannot break down private holdings of government debt, we cannot verify this suggestion, plausible as it seems. Nonbank holdings showed little decrease in the year ending June 1921, but it is possible that there was a shift in such holdings from lower income groups to wealthy individuals and insurance companies.

<sup>18</sup>Cf. Wilson, *op. cit.*, p. 107.

early stages of the major cycle that followed. The National Bureau dates the turn in July 1921 (Table 1). Industrial production reached its low, however, in April. Examination of the production indexes in Table 4 reveals that the industries that turned down first in 1920 were the earliest to turn up again.<sup>10</sup> The nondurables group led the durable goods index by 7 months. The indexes that turned up early in 1921 clearly fall into three groups: consumer goods lines based on staple raw materials in which commodity speculation and subsequent liquidation had been most marked (textiles, leather, food and tobacco products); automobiles and tires, for which a huge unsatisfied demand existed in 1921; and building materials. For each of these industrial groups, the underlying demand situation was highly favorable in 1920-21. The sharp drop in output had been associated with the reversal of price expectations and the consequent anxiety to get rid of inventories. Maintenance of demand meant that sufficient liquidation to improve expectations was achieved promptly, and as a result all these lines began to improve early in 1921. In all these cases except food and tobacco products, the increase in production during 1921 was striking (cf. Table 4).

Table 4

CHANGES IN GROUP INDEXES OF THE FEDERAL RESERVE INDEX OF INDUSTRIAL PRODUCTION BETWEEN SELECTED DATES, 1921-1922

INDUSTRIAL GROUP	TURNING POINT		AMOUNT OF CHANGE			VALUE AT	
	Date	Value	Turning Point to 12/21	12/21 to 6/22	6/22 to 12/22	12/22	1920 Peak
Total index	4/21	55	+6	+13	+12	86	82
Durable manufactures	7/21	45	+10	+32	+11	98	99
Iron and steel	7/21	31	+19	+46	+8	104	111
Automobiles	1/21	23	+11	+40	+23	97	76
Lumber	1/21	95	+48	+5	+8	156	162
Stone, clay, glass	2/21	42	+17	+17	+10	86	76
Nondurables	12/20	44	+17	+6	+7	74	69
Textiles	12/20	40	+37	0	+12	89	86
Leather	11/20	56	+36	-3	+15	104	104
Manufactured food	10/20	60	+7	+13	+2	82	81
Tobacco	12/20	61	+4	+15	0	80	91
Petroleum refining	7/21	32	+3	+6	+3	44	38
Tires and tubes	12/20	17	+48	+22	+12	99	n.a.
Minerals	9/21	62	+2	+29 <sup>a</sup>		93	88

Source: Board of Governors of the Federal Reserve System, *Federal Reserve Index of Industrial Production* (October 1943).

<sup>a</sup> These two periods have been combined to eliminate the effects of a coal strike on the group index in June 1922.

n.a.: not available.

<sup>10</sup> Leather production is an exception. Its peak did not come until May 1920, and it began to revive after November 1920.

Iron and steel and other producer durable goods turned up later, but here again the recovery from the low point was prompt. The most rapid expansion came in the first half of 1922. Even in the most durable lines there was no dragging out of the process of recovery. By the end of 1922 the total Federal Reserve index was above its 1920 peak. Of the products listed in Table 4, the following had by the end of 1922 exceeded their 1920 peak: automobiles, stone, clay and glass, textiles, food products, petroleum refining, and minerals. And the steel industry was approaching its 1920 peak, despite the decline in shipbuilding and the fact that steel production depended upon many lines besides the booming automobile and construction industries.

Let us now look at the more inclusive annual data in Table 5, which reproduces Kuznets' figures for gross national product during the '20's. Compare the figures for the peak years 1920 and 1923 (in 1929 prices). The following facts stand out:

- 1) Total GNP increased 11 billion or 16 per cent. Nearly 10 billion of this was in consumption, which increased more in percentage (as well as absolute) terms during these 3 years than did investment.
- 2) All forms of consumption increased substantially. The largest relative change, surprisingly, was in semidurables (no less than 51 per cent larger in 1923 than in 1920), followed by durables (35 per cent). Each of the four components of consumers' outlay made a substantial contribution (in absolute terms) to the total increase in output and employment.
- 3) The big expansion in capital formation was in construction, which more than offset the decline in inventory accumulation and net exports. The increase in construction was particularly great between 1921 and 1922. The flow of producer durables in 1923 was about 10 per cent greater than in 1920, the largest increase taking place in trucks and railway equipment; production of industrial machinery increased only slightly.<sup>20</sup>

The significant expansion in the flow of consumer goods seems to have been the result of at least three developments. Most important, in absolute terms, was apparently the backlog of pent-up demand for semidurables carried over from 1919-20. During the postwar boom, dollar outlay on semidurables was abnormally large, even in relation to total incomes, because of the extreme rise in the prices of these products. But in real terms, the flow of semidurables in 1920 seems to have represented an unprecedentedly small proportion of the total flow of consumer goods and services and of national income. The drastic decline in prices of textiles and related products led to a tremendous increase in the flow of such goods from 1920 to 1923 without, however, increasing the percentage of con-

<sup>20</sup> W. H. Shaw, *Value of Commodity Output since 1869* (NBER, 1947), pp. 76-7.

Table 5

## GROSS NATIONAL PRODUCT AND ITS CHIEF COMPONENTS, IN 1929 PRICES, 1919-1929 (billions of 1929 dollars)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Flow of consumer goods	50.2	52.2	53.8	56.5	61.9	66.0	64.9	70.0	71.7	73.2	76.4
Perishable	19.9	21.0	21.8	22.6	23.5	25.3	25.1	26.3	26.8	26.7	28.0
Semidurable	7.5	6.5	7.8	8.9	9.8	9.0	9.9	10.0	11.2	11.2	11.8
Durable	5.0	4.9	4.0	5.1	6.6	6.9	7.8	8.6	8.2	8.4	8.8
Services	17.8	19.8	20.1	20.0	22.0	24.8	22.0	25.1	25.5	26.9	27.8
Gross capital formation	16.3	15.6	10.4	12.4	16.9	14.2	18.0	18.6	17.8	17.4	20.7
Producer durables	5.4	5.3	3.6	4.2	5.8	5.4	6.0	6.5	6.1	6.5	7.5
Construction	5.9	4.7	5.6	7.4	8.1	9.1	10.2	10.7	10.8	10.6	10.3
Change in inventories	2.8	4.2	0	0.3	2.8	-0.9	1.6	1.2	0.4	-0.4	2.4
Foreign investment	2.1	1.4	1.3	0.5	0.2	0.6	0.3	0.1	0.5	0.7	0.4
Total GNP	66.4	67.8	64.2	68.9	78.8	80.3	82.9	88.5	89.5	90.6	97.1

Source: Simon Kuznets, *National Product since 1869* (NBER, 1946), pp. 35, 36, 41, 46, 50, 52.

sumers' dollar outlay taking this form.<sup>21</sup> It is probable that the release of this pent-up demand induced considerable dishoarding both during 1921 and the ensuing expansion. The expansion in semidurables accounted for about a third of the total increase in the flow of consumer goods and for about 30 per cent of the rise in total GNP between 1920 and 1923 (Table 5).

The second factor expanding consumption was, of course, the automobile, both directly and indirectly through its stimulation of demand for other products and services. The third factor was the marked upward secular trend in the flow of services.<sup>22</sup>

Analysis of the data on construction reveals how important residential building was to the recovery after 1921. Total new construction rose 3.4 billions (in 1929 prices) between 1920 and 1923. Of this, 2.4 billion was accounted for by residential building alone. The other large increases were in public utility and (local) government construction. Industrial and commercial building showed little net increase.<sup>23</sup>

At this point, we must separate factory from other types of business construction. Economists sometimes need to be reminded that plant expenditures in manufacturing are only a minor part of total construction. Manufacturing plant construction alone fell nearly two-thirds between 1920 and 1921, and in 1923 was still some 45 per cent under the 1920 figure. The level of plant construction achieved in 1920 was never matched during the boom of the '20's, not even in 1929.<sup>24</sup> Hence the favorable showing that nonpublic utility business construction made in 1923 must have origi-

<sup>21</sup> The following figures are of interest:

	SEMIDURABLES AS A PERCENTAGE OF NET NATIONAL PRODUCT				
	<i>Current prices</i>	<i>1929 prices</i>		<i>Current prices</i>	<i>1929 prices</i>
1899-08	14.3	14.7	1921	16.0	13.9
1909-18	14.3	14.5	1922	16.1	14.7
1919	15.7	12.9	1923	15.5	13.9
1920	15.8	10.9			

Source: Kuznets, *National Product since 1869*, pp. 27, 55-6, 93, and 119.

<sup>22</sup> After 1920 the decline in the prices of perishables without a corresponding increase in quantities purchased seems to have permitted a substantial shift in expenditures to services. The flow of services in current prices was a much larger percentage of income payments (excluding entrepreneurial savings) in 1923 than in 1919-20. This contrast is even more marked than in the case of consumer durables.

<sup>23</sup> All data are from Kuznets' *National Product since 1869*, p. 41. He does not show industrial building separately, but his figures for private nonresidential construction other than public utility are as follows for 1920-23 (billions of 1929 dollars): 1.6, 1.6, 1.7, 1.7.

<sup>24</sup> Based on estimates (in constant prices) by Lowell J. Chawner, in *Survey of Current Business*, March 1941, p. 11.

nated outside manufacturing. The decline in factory building seems to have been largely offset by a rise in commercial and private institutional building.

The extremely high level of plant construction in 1920, and also during 1918-19, together with the substantially lower level of factory building during the early and middle '20's, suggests that neither the sharp recovery after 1921 nor the boom of the '20's as a whole owed much to investment opportunities in manufacturing plant. As a matter of fact, there may well have been too much long-term investment in this direction in 1920.

Equipment expenditures in manufacturing, which in the '20's averaged two to three times plant expenditures, tell a somewhat different story. In constant prices manufacturers' expenditures on equipment fell sharply in 1921 but recovered to within 85 per cent of their 1920 figure by 1923. They remained at roughly this level, which was still undoubtedly a high one by prewar standards, until a spurt in 1929 carried them above the 1920 peak.

#### 4 A LOOK BACK

Our findings thus far suggest the following provisional explanation of the 1921 upturn:

1) Pent-up consumer demand was not satisfied in 1919-20 and re-asserted itself in 1921, apparently with the help of liquid assets accumulated during the war. It was especially strong in the field of semidurables and automobiles.

2) Because consumer demand was maintained, the reversal of price expectations in 1920 very quickly carried the liquidation of inventories too far. It is even probable that in consumer goods lines inventories in 1920 were not far out of line with sales in 1921.

3) The most important factor by far operating on the investment side was the tremendous demand for housing. Government and public utility construction also played a role. Residential and government construction together entirely accounted for the fact that building in 1921 was greater than in 1920 (which of course contributed to the maintenance of consumer demand). Residential and public utility building account for the rise in construction between 1922 and 1923.

4) While we have characterized 1919-21 as a minor cycle, the extremely high level of investment in manufacturing in 1920, the collapse of such investment in 1921, and its slow recovery thereafter are the sort of behavior we expect of a major cycle. However, minor cycle influences centering around price expectations and inventory accumulation were much more important than expenditures on manufacturing plant and equipment in affecting developments in 1919-21.

5) On the whole, the concept of overlapping major cycles fits the cyclical behavior of 1919-23 fairly well. The decline in federal spending and foreign investment and the collapse of private speculation brought one major cycle to an end. But already in 1920 powerful expansionary forces were at work that did not reach their full strength until some of the most important distortions created by the boom were eliminated. These forces operated in 1921 to expand both consumption and investment. The pent-up demand for consumer semidurables and automobiles, the need for housing, public utility, and local government construction, an accumulation of miscellaneous investment opportunities (especially trucks and railway equipment), and the underlying expansion in the service industries were apparently the most important factors. All these except the pent-up demand for semidurables gave rise to what we have called long-term investment opportunities. They seem to have been the most important forces that 'caught hold' once short-term expectations improved in 1921 and thus initiated not merely a minor cycle but the major expansion of 1921-29.

#### 5 CHANGES IN THE COMPOSITION OF OUTPUT AND EMPLOYMENT

As a part of the search for the causes of the boom and its collapse, it is necessary to examine in some detail how the main components of output and investment behaved during the '20's. Kuznets estimates that gross national product in 1929 prices increased about 33 billion, or more than 50 per cent, in the 8 years 1921-29 (Table 5). Close to 15 billion, or almost 45 per cent of this expansion, occurred between 1921 and 1923. The middle '20's were marked by a steady increase in output — with only minor and short-lived interruptions in 1924 and 1927 — but the rate of expansion was less than during 1921-23 or 1928-29.

If we compare the peak years 1920 and 1929, we find that a little more than four-fifths of the increase in GNP occurred in the flow of consumer goods. Between 1923 and 1928 capital formation remained nearly constant, while consumers' outlay rose over 11 billion or about 18 per cent. In 1929, however, capital formation showed a much larger percentage increase than consumption — and even a slightly larger absolute increase. The decline in the rate of increase in consumption during the three-year intervals between the four peaks that marked the 1920-29 period is especially to be noted (Table 6). The rapidity of the expansion in consumption compared with that in capital formation, stands out particularly for 1920-26.

The largest absolute contribution to the expansion in consumption between 1920 and 1929 was in services. While the increase in output of consumer durables, dominated by the rapid growth of the automobile industry, was greater in percentage terms, it was smaller in absolute

Table 6

CHANGES IN THE FLOW OF CONSUMER GOODS AND IN GROSS CAPITAL FORMATION BETWEEN SUCCESSIVE CYCLICAL PEAKS, 1920-1929 (absolute figures in billions of 1929 dollars)

	FLOW OF CONSUMER GOODS Increase			GROSS CAPITAL FORMATION Increase		
	Amount	Absolute	%	Amount	Absolute	%
1920	52.2			15.6		
		9.7	18.6		1.3	8.3
1923	61.9			16.9		
		8.1	13.1		1.7	10.1
1926	70.0			18.6		
		6.4	9.1		2.1	11.3
1929	76.4			20.7		

Source: Simon Kuznets, *National Product since 1869*, p. 52.

amount. Semidurables, which increased 50 per cent in the three years following 1920, expanded only an additional 20 per cent between 1923 and 1929.

Let us now look at the components of capital formation in Table 5. In every year but one between 1921 and 1929, construction made up half or more of total capital formation, although for the '20's as a whole it did not represent as large a fraction of total investment as before World War I.<sup>25</sup> The expansion in construction virtually ceased after 1926, and there was a net decline from 1927 on. Producer durables reached a temporary peak in 1926 which was matched in 1928 and exceeded in the sharp spurt in 1929. Thus, in both construction and producer durables, we find some evidence of a tendency toward a leveling off or decline by 1926 or 1927, which was interrupted for the latter by the spurt of 1928-29. The spurt in total capital formation in 1929 was accounted for entirely by two components — chiefly inventory accumulation and, to a less but still important degree, by the largest increase in the flow of producer durables since 1923.

Terborgh's estimates of total expenditures on new durable goods (Table 7) show a similar picture. There was little net increase in the total between 1926 and 1929; the spurt in 1928-29 did little more than offset the decline in 1927. The only important increase in the components between 1926 and 1928 was in public construction. During these two years, particularly between 1927 and 1928, there was a significant decrease in consumers' expenditures on plant, i.e., residential construction, followed by a further large decrease in 1929. Between 1926 and 1928 business investment did not quite hold its own, while the expansion in public construction nearly offset the decline in residential building. By 1929 residential building was exerting an extremely strong deflationary force on the economy, which

<sup>25</sup> Cf. Kuznets, *National Product since 1869*, p. 115.

Table 7

## ESTIMATED EXPENDITURES FOR NEW DURABLE GOODS, SELECTED YEARS, 1923-1929 (billions of dollars)

	TOTAL PLANT & EQUIPMENT	PRODUCER		CONSUMER <sup>a</sup>		PUBLIC <sup>b</sup>
		Plant	Equipment	Plant	Equipment	
1923	21.6	3.3	4.6	4.8	7.3	1.6
1926	25.3	4.2	4.9	5.5	8.5	2.1
1927	24.6	4.1	4.6	5.4	8.1	2.4
1928	24.9	4.1	4.7	5.0	8.6	2.5
1929	25.5	4.6	5.6	3.8	9.2	2.4

Source: George Terborgh, *Estimated Expenditures for New Durable Goods, 1919-1938, Federal Reserve Bulletin*, September 1939, p. 731.

<sup>a</sup> 'Plant' here refers primarily to houses, although buildings for nonprofit institutions are also included. 'Equipment' refers to all consumer durables.

<sup>b</sup> Public construction only.

was temporarily offset by a spurt in business investment — especially in equipment but to a less extent also in plant.

If we go behind total business investment (Table 8), we see that the tendency for capital formation to level off between 1926 and 1928 was general. All the groups listed participated in the spurt in 1929, the largest increase occurring in mining and manufacturing (both plant and equipment). Between 1920 and 1926 the expansion in business investment had been more marked in public utility and commercial and miscellaneous expenditures than in manufacturing and mining investment. During 1923-26 investment expanded chiefly because of an increase in plant expenditures (particularly commercial and miscellaneous), whereas between 1926 and 1929 equipment expenditures were chiefly responsible for the increase in business investment. Of the nonagricultural fields listed in Table 8, only the public utilities showed a larger increase in plant expenditures in 1926-29 than in 1923-26.

I should like now to consider some of the changes in industrial structure during the '20's. Let us look at Table 9, which shows the changes between short cycle peaks in 'income originating' and in employment for each major industrial division.<sup>26</sup> Between 1920 and 1929 net income rose 11.5 billion and employment, excluding the self-employed, 4.3 million. Manufacturing did not account for any of the expansion in either income or employment, despite a 50 per cent increase in manufacturing output. For the period as a whole the major increases in income were in finance (3.5), service (4.4), transportation and public utilities (1.1), government (1.9),

<sup>26</sup> In interpreting the income data we must remember to allow for price changes. Prices in 1923 were substantially below those in 1920. There was a further downward drift in wholesale prices between 1923 and 1929 of about 5 per cent. Retail prices did not change much between 1923 and 1929.

Table 8

EXPENDITURES FOR NEW PLANT AND EQUIPMENT, BY INDUSTRIAL GROUPS, SELECTED YEARS, 1920-1938  
(billions of dollars)

	RAILROADS		PUBLIC UTILITIES		MINING & MANUFACTURING		AGRICULTURE		COMMERCIAL & MISCELLANEOUS	
	Plant	Equipment	Plant	Equipment	Plant	Equipment	Plant	Equipment	Plant	Equipment
1920	0.24	0.39	0.58	0.41	1.75	1.79	0.51	0.87	0.66	1.14
1923	0.36	0.72	0.80	0.68	1.05	1.63	0.34	0.41	0.74	1.19
1926	0.49	0.39	0.88	0.73	1.32	1.85	0.32	0.53	1.18	1.45
1928	0.44	0.24	0.90	0.72	1.23	1.83	0.36	0.54	1.18	1.42
1929	0.50	0.34	1.05	0.84	1.44	2.16	0.38	0.61	1.19	1.65
1933	0.09	0.02	0.15	0.23	0.37	0.62	0.10	0.13	0.16	0.50
1936	0.14	0.17	0.31	0.45	0.73	1.68	0.19	0.54	0.29	1.30
1937	0.19	0.34	0.43	0.58	1.05	2.07	0.22	0.70	0.40	1.59
1938	0.12	0.12	0.38	0.55	0.82	1.24	0.18	0.58	0.37	1.12

Source: pp. 732, 733 of source for Table 7.

and miscellaneous (1.1). The expansion of incomes in finance and service is particularly striking.

Turning to employment, we find that the greatest contributors to the expansion over the 9 year period were the service industries and trade. These two groups alone accounted for about 2.7 million of the total increase in employment, 4.3 million. Construction, finance, and miscellaneous added another 1.7 million.

If we go on to look at the last column of Table 9, we see that the major areas of lost employment opportunities between 1929 and 1937 were construction, transportation and public utilities, and trade. These three fields accounted for more than the total decline in employment, whereas two of them, construction and trade, were important contributors to the expansion in employment in the '20's. The service industries made a more favorable showing during the '30's in terms of both incomes generated and employment than did the economy as a whole. To a less extent, so did manufacturing, at least in terms of employment.

Table 9

CHANGES IN INCOME ORIGINATING AND EMPLOYMENT BETWEEN  
CYCLICAL PEAKS, BY INDUSTRIAL GROUPS, 1920-1937

	INCOME ORIGINATING (billions of dollars)				EMPLOYMENT (millions of persons)			
	1920- 1923	1923- 1926	1926- 1929	1929- 1937	1920- 1923	1923- 1926	1926- 1929	1929- 1937
Manufacturing	-3.0	+1.3	+1.7	-3.9	-0.3	-0.1	+0.5	0.0
Mining	-0.3	+0.1	-0.4	-0.4	-0.1	0.0	-0.1	-0.1
Construction	+0.7	+0.9	-0.2	-2.3	+0.4	+0.3	-0.1	-0.8
Transportation & public utilities	-0.4	+0.8	+0.6	-2.4	-0.2	0.0	-0.1	-0.9
Trade	-1.3	+1.4	-0.1	-2.4	+0.1	+0.4	+0.5	-0.6
Finance	+1.4	+1.0	+1.1	-4.3	0.0	+0.2	+0.3	-0.2
Service	+1.4	+1.9	+1.1	-2.2	+0.6	+0.6	+0.6	+0.2
Government	0.0	+1.1	+0.8	+1.9	-0.1	+0.2	+0.2	+0.6
Miscellaneous	+0.4	+0.5	+0.2	-0.3	+0.2	+0.2	+0.2	+0.1
Agriculture	-2.3	+0.8	+0.2	-1.4	-0.2	+0.1	-0.1	-0.3
Total <sup>a</sup>	-3.5	+9.9	+5.0	-17.7	+0.5	+1.8	+1.9	-1.8

Source: Simon Kuznets, *National Income and Its Composition, 1919-1938* (NBER, 1941), Table 43, p. 310; Table 51, p. 314.

<sup>a</sup> Because of rounding, totals may not equal sum of figures shown.

If we divide the '20's, we find that between 1920 and 1923, during which prices showed a net decline, only construction, finance, and service (and the miscellaneous group) were able to generate a larger income; the number of employees in finance, however, did not increase. During 1923-26, when prices were fairly stable, every group without exception contributed to the expansion in national income. The largest increases in employment were in service, trade, and construction. Expansion in income

and employment occurred more widely and evenly through the economy during 1923-26 than at the beginning or end of the 1920's.

During 1926-29 the absolute rate of increase in income slackened but the rate of increase in employment rose slightly. Manufacturing played a much more important role in expanding incomes and employment in this period than in the preceding two. The slackening of the rate of expansion in incomes was most marked in the case of construction, trade, services, and the extractive industries (mining and agriculture).<sup>27</sup> Whatever the situation in trade, the spurt in manufacturing and the slackening tendencies during 1926-29 in the other industries are important facts to remember in investigating the causes of the downswing after 1929.

Let us now extend our time horizon backward and compare the '20's with the years before 1919. What industries and what types of expenditure contributed most to the increase in output and employment in the '20's compared with the prewar period? What role did changing rates of growth play in stimulating investment in the '20's and depressing it in the '30's? Was the rate of expansion after 1919 so much greater than in earlier years as to suggest the rapid development of maladjustments and in some sense 'overproduction'? These and other questions having to do with secular influences suggest themselves for examination. Only a few observations can be made here.

The industrial composition of the working force changed significantly between 1900 and 1930. The relative decline in the importance of agriculture is well known. Manufacturing increased in importance to 1920, especially between 1910 and 1920, but its share of the labor force declined during 1920-30 and showed little change between 1930 and 1940. The big increases after 1920 were in the noncommodity producing industries. The rise in the relative importance of these areas — especially trade, finance, and services — was much greater between 1920 and 1930 than in either of the two earlier decades. Trade, services, construction, and finance, particularly the first two, contributed much more to the expansion of employment during the '20's than in either of the first two decades of the century; and much more also than they did in the '30's (Table 10). The abrupt halt in the expansion of manufacturing employment during the single decade 1920-30 is striking. So, too, is the marked decline in the labor-absorbing power of transportation and public utilities after 1920 and especially after 1930.

<sup>27</sup> The small decline in income generated by trade between 1926 and 1929 should probably be discounted. Kuznets' figure for 'adjusted' income generated in trade in 1926 is abnormally large, much larger than for any other year in the '20's, because of an unusually large estimate for 'adjusted' business saving in that year, the reasons for which I have not had time to explore.

Table 10

## NONAGRICULTURAL WORKING FORCE, TOTAL AND SELECTED INDUSTRIES, INCREASE PER DECADE, 1900-1940 (millions of workers)

	1900-10	1910-20	1920-30	1930-40 <sup>a</sup>
Total nonagricultural	7.2	5.0	7.9	5.9
Selected Industries				
Manufacturing	1.9	2.7	0.1	1.2
Construction	0.6	-0.1	0.9	0.5
Transportation & public utilities	1.0	1.0	0.6	-0.7
Trade	0.9	0.7	2.0	1.0
Finance	0.2	0.3	0.6	0.1
Services	1.3	0.1	2.3	1.3

Source: Daniel Carson, *Changes in the Industrial Composition of Manpower since the Civil War, Studies in Income and Wealth, Volume Eleven* (NBER, 1949), p. 47. Data include not only self-employed but also unemployed workers usually in the labor market.

<sup>a</sup> Based on age group 14 years and older, in contrast to 10 years and older for earlier decades.

Kuznets' data permit us to compare the components of GNP for the decades before and after World War I.<sup>28</sup> Comparing the decade averages for 1904-13 and 1919-28, we find that total GNP in constant prices rose 56 per cent. The annual rate of increase is not as great as in the several decades preceding the war. The flow of consumer goods increased by a larger percentage, 58.6, than did capital formation, 46.8. The growth of the latter noticeably slackened after 1913, even if we leave out the years from 1929 on. As we have already seen, the '20's were a period of stable, high level investment rather than one in which investment continued to expand rapidly.

If we subdivide the components further, we find the expected contrasts between the decades 1904-13 and 1919-28. The great increases in consumption, relatively, were in services and durables. The expansion in services contributed much more to the absolute increase in consumption than did consumer durables or any other group. The rise in capital formation was held down by the relatively small increase in construction, 21 per cent, compared with the 74 per cent growth in producer durables. Even though the level of construction reached new heights in the 1920's, building made up a smaller percentage of total capital formation than in any prewar decade. And here we come to an important point, the full implications of which need more study. Apparently construction activity has shown some secular retardation since the turn of the century if not before; it has not been rising as rapidly as total GNP. To the extent that continued expansion of output and high level employment depend on maintaining gross capital formation as a fairly constant percentage of total

<sup>28</sup> See *National Product since 1869, Part II.*

output, other forms of investment, public as well as private, must increase correspondingly more rapidly. In the absence of government intervention, the job must be done primarily by the expansion of producer durables and, to a minor extent, by foreign investment.

Here we get into a range of issues that have generated much heat under the heading 'secular stagnation', and I am not yet prepared to join the argument on either side. At this point, I wish to confine myself to observed tendencies. The growth of construction does seem to have retarded during the three decades before 1929. And construction both before 1914 and during the '20's was the larger part of total capital formation. We shall have more to say later about the role of building activity in the '20's and '30's.

This quick glance at selected secular tendencies needs to be carried much further, and we are attempting to analyze the problem more intensively and extensively in the long range study.<sup>29</sup> Here we shall merely point out a few of the more important conclusions suggested by the data already presented.

- 1) The decline in the absolute rate of increase in consumption may have exerted a downward pressure on investment in the late '20's. Also, the rapid expansion in the early and middle years of the boom was much greater than that which could be explained by the rise of investment acting through a constant multiplier.
- 2) The sharp expansion of new products and services in the '20's was undoubtedly a powerful stimulus to investment, as well as to the expansion of consumption, a stimulus that began to weaken as these new areas began to approach 'maturity'. This stimulus operated primarily on nonmanufacturing types of investment.
- 3) The forces tending to maintain investment and to expand consumption changed significantly as the boom wore on. Hence it is important to study the main components of output and investment for significant subperiods during the '20's. The changing role played by various of these components in supporting the boom has been indicated in the preceding discussion.
- 4) On the basis of the material presented here, the areas that seem to call for further study are construction, trade, the service industries, finance, and public utilities. To these, of course, must be added the automobile.<sup>30</sup>

<sup>29</sup> Particularly by studying the detailed data in the valuable studies of manufacturing output, total commodity flow, and GNP by Fabricant, Shaw, and Kuznets, as well as the material in other National Bureau studies of secular changes in output and productivity.

<sup>30</sup> Professor Schumpeter states: "The electrical, chemical, and automobile industries, which (sic) together with their subsidiaries and all that directly and indirectly hinges upon them . . . account for 90 per cent of the postwar changes in the industrial

It is clear that building played a key role in creating and supporting the boom.<sup>31</sup> As a matter of fact, one of the most puzzling aspects of the cyclical behavior of this period is why and how the final spurt of 1928-29 occurred in the face of the deflationary forces that were beginning to operate on the most important component of total investment. A related question is: what caused the final spurt in manufacturing activity and in the demand for producer durables?

#### 6 NONMONETARY STIMULI TO INVESTMENT

What can we say now regarding the underlying nonmonetary factors responsible for the high level of investment in the '20's. Do these factors throw any light on the reasons for the collapse of investment in the '30's? Some of the more important possibilities will be explored here.<sup>32</sup>

##### *Pent-up demand from World War I*

This factor may help to explain the rapidity of the rise from 1921 to 1923. Its influence on the demand for semidurables has already been mentioned. The war probably also deferred some of the rising demand for automobiles and helps to explain the high level of automobile output in the '20's. It obviously created a pent-up demand for housing, and helped to raise railway expenditures on plant and equipment in the first half of the decade. It seems probable also that more public utility investment was concentrated in the '20's than would have been the case without the war. The figures on investment in mining and manufacturing suggest that pent-up demand in this area may have been largely satisfied during 1919-20, although the war undoubtedly inspired a host of technological changes that affected investment and productivity during the '20's. In general, except in the case of housing, railways, and consumer semidurables, pent-up demand from the war operated chiefly through the delay in the economy's reaction to prewar innovations and its concentration in the '20's.

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organism and for most of the increase in real income." (*Business Cycles*, II, 753-4.) This is a loose statement and obviously not subject to verification. Even granted the importance of electric power and the automobile (I think Professor Schumpeter exaggerates the importance of the chemical industry in the 1920's), the other industries mentioned in the text must not be neglected. As already indicated, they played a major role in supporting investment and expanding total income. And we do not yet know to what extent expansion in these other industries was a result merely of the innovations Professor Schumpeter emphasizes.

<sup>31</sup> Professor Schumpeter tends to minimize the role of building activity, especially residential construction, both in creating the boom and in bringing on the great depression (*ibid.*, pp. 743-9).

<sup>32</sup> For other studies of investment stimuli in the '20's, see Schumpeter, *Business Cycles*, II, Ch. 14, and Wilson, *op. cit.*, Part II.

*Influence of the automobile*

A full evaluation of the role of the automobile obviously cannot be attempted here, but some comments are in order. The rise in output of cars, trucks, and accessories accounted for roughly a third of the total increase in the flow of finished commodities between 1909-13 and 1923-29.<sup>33</sup> Comparing the flow of finished commodities from the automobile industry with the total flow of all finished commodities, both in producers' 1913 prices, for selected years between 1909 and 1929, we find that by 1920, the output of the motor industry had already expanded some 2 bil-

	1909	1920	1923	1926	1929
		(billions of 1913 dollars)			
Automobiles, trucks & accessories	0.13	2.26	4.25	5.15	5.20
Total flow of finished commodities	12.27	18.00	22.48	25.94	28.41

lion, in 1913 prices, since 1909.<sup>34</sup> It expanded by virtually as much again in the next three years, during which it accounted for nearly 45 per cent of the increase in the flow of finished commodities. The expansion in the flow of cars, trucks, and accessories to domestic users retarded rapidly thereafter. Thus, the sharp stimulating effect from the rapid expansion in domestic purchases of motor vehicles was felt chiefly before 1923, and was virtually over by 1926.<sup>35</sup>

It is difficult to say precisely what effect this tapering off had on investment in the automobile industry. According to one estimate, total capital invested in automobile manufacturing proper reached a peak in 1926;<sup>36</sup> Chawner's estimates show the peak in current plant and equipment expenditures for the automobile and automobile equipment industry as not coming until 1929.<sup>37</sup> However, at no time during the '20's did the indus-

<sup>33</sup> Total commodity flow, in 1913 prices, rose \$11.7 billion, and of this increase cars, trucks, and accessories accounted for more than 4 billion (cf. W. H. Shaw, *Value of Commodity Output since 1869*, pp. 74-7).

<sup>34</sup> *Ibid.* I have added Shaw's columns labeled (consumers') motor vehicles, motor vehicle accessories, and business vehicles, motor. His estimates refer to the flow of finished goods destined for domestic use and thus exclude exports. There is a break in his series in 1919, but it is serious only in the case of motor vehicle accessories.

<sup>35</sup> This was true of passenger cars, which make up much the larger part of the totals shown in the text. The flow of business motor vehicles, however, expanded sharply between 1926 and 1929; cf. Table 12 below.

<sup>36</sup> Automobile Manufacturers Association, *Automobile Facts and Figures, 1936*, p. 15. Excludes parts, accessory, body, and tire manufacturers. See also Spurgeon Bell, *Productivity, Wages, and National Income* (Brookings Institution, 1940), p. 288.

<sup>37</sup> These two sets of estimates are not necessarily contradictory. Current plant and equipment expenditures in the late '20's may have not exceeded total write-offs through depreciation and obsolescence and through the departure of some weak firms from the industry.

try's expenditures on plant and equipment amount to as much as 10 per cent of total capital expenditures in manufacturing.<sup>38</sup> And the latter are by no means the major part of total capital formation.

It is impossible to estimate with any precision the investment in other industries that is directly traceable to the expansion of automobile production. While some stimulus continued until 1929, it seems likely that the automobile's chief impact on manufacturing investment was felt before 1926. During the early and middle '20's the stimulus to investment in other manufacturing industries was undoubtedly substantial.

Between 1923 and 1929 the growing *use* of automobiles and trucks had a more important impact on total investment and employment than did the expansion in motor vehicle output. Motor vehicle registrations in 1929 were about 75 per cent greater than in 1923 and nearly three times the number in 1920. While an increasing percentage of the total output came to be for replacement, vehicles on the road increased all through the '20's. And the use made of each vehicle increased also. The result was a rate of induced investment in the rest of the economy much greater, in absolute terms, than that which occurred in the automobile industry and in the other branches of manufacturing feeding that industry. For example, large scale investment was necessary for roads and bridges, oil wells, pipe lines, garages and service stations, and tire and automobile supply stores, as well as for oil refining and tire manufacture. In addition, the automobile accelerated the trends toward urbanization and 'suburbanization,' stimulating thereby residential and commercial building. Road building alone averaged more than a billion dollars a year between 1923 and 1929.

It is clear that the automobile market was becoming saturated by 1928-29, given existing prices and incomes and the size and age distribution of the vehicles in use.<sup>39</sup> Production of cars and trucks attained a peak in 1929 which was not to be reached again in the interwar period. The period of rapid expansion in production was over, and with it a stimulus of some importance to investment was partly lost. Perhaps more important, the absolute rate of expansion in the use of automobiles had begun to decline before 1929 and could have been expected to decline further even if incomes had not declined as drastically as they did in the '30's. By 1929 the car, the bus, and the truck had done the major part of their work in changing the face of the economy. Here is the sort of situation in which the principle of acceleration has validity — not in any precise way in the short run but in a rough way over periods of a decade or more. The expand-

<sup>38</sup> See estimates by Lowell J. Chawner, *Survey of Current Business*, March 1941, p. 10, and May 1942, p. 15.

<sup>39</sup> It would take us too far afield to present here all the evidence tending to confirm this conclusion.

ing output and use of motor vehicles not only permanently enlarged aggregate demand but also induced directly and indirectly a spurt in investment to serve the new demands that had been created. So much seems reasonably clear. More detailed study may permit us to arrive at some very rough estimates of the investment in the '20's induced by the automobile, and to secure some rough notions of the loss of investment opportunities after 1929 which resulted once the major adjustments to this innovation had taken place.<sup>40</sup>

*Electric power and other public utilities*

Next to the influence of the automobile, the growing use of electric power is generally assumed to have been the most important technological force stimulating investment in the '20's. Here again we have a prewar innovation the chief impact of which was felt after the war. The generating capacity of the electric power industry rose 11.7 million kw. between 1902 and 1920 and nearly 20 million kw. during 1920-30. Only 7 million kw. were added between 1930 and 1939.<sup>41</sup>

In 1920 total plant and equipment expenditures of all public utilities except railroads were slightly under a billion dollars (Table 11). By 1924

Table 11.

EXPENDITURES FOR PLANT AND EQUIPMENT, PUBLIC UTILITIES,  
SELECTED YEARS, 1920-1938 (millions of dollars)

	Railroads	Electric Power	Telephones	Transit	Other Utilities	Total Utilities excl. Railroads
1920	630	437	203	162	181	983
1923	1,077	723	318	180	245	1,466
1924	901	827	385	133	355	1,700
1925	728	766	385	123	300	1,574
1926	883	704	404	116	380	1,604
1927	751	722	397	130	427	1,676
1928	673	679	457	135	348	1,619
1929	840	774	615	135	369	1,893
1930	865	835	612	124	298	1,869
1933	101	113	171	46	57	387
1936	306	251	261	109	135	756
1937	525	400	348	101	162	1,011
1938	238	422	318	83	102	925

Source: p. 732 of source for Table 7.

<sup>40</sup> An important point here is the extent to which replacement demand eventually took the place of the net new investment originally induced, directly or indirectly, by the automobile. As Frisch properly emphasized in his debate with Clark regarding the acceleration principle, replacement can become important in supporting the level of gross investment after the decline in the rate of growth of an industry brings about a decline in net investment.

<sup>41</sup> J. M. Gould, *Output and Productivity in the Electric and Gas Utilities, 1899-1942* (NBER, 1946), p. 65.

they had risen to \$1.7 billion and remained not far from this figure through 1930. The expansion in electric power alone was from \$437 million in 1920 to \$827 million in 1924, with a level slightly lower than this for the rest of the '20's. The fraction of total gross capital formation going into electric power increased substantially between 1920 and 1925-29; so did the share going into all public utilities exclusive of railroads. Of the other public utilities the one showing the largest absolute increase in investment was the telephone industry.

Here was a substantial stimulus to investment, but it is important to keep it in perspective. Total public utility investment between 1923 and 1929, excluding the railroads, averaged only 40 per cent of residential construction. And the electric power industry alone accounted for less than half of total public utility investment. Of course, there was the stimulus provided to investment in producer and consumer electrical equipment, about which we shall have more to say later.

The electric power industry contributed nothing to the further expansion of total investment between 1924 and 1928. Between 1928 and 1930 there was a spurt in plant and equipment expenditures by both the electric power and telephone industries, but the peak in electric power investment in 1930 was only approximately equal to the earlier peak in 1924. Only telephone investment, among all the utilities, showed a steady tendency toward expansion throughout the '20's.

In seeking to explain the failure of electric power investment to expand further after 1924, we must distinguish between construction of generating capacity and the building of transmission and distribution systems. Investment in generating and transmission facilities reached a peak during 1924-26; expenditures on distribution facilities reached their peak in 1930, though the rate of expansion noticeably slackened after 1927.<sup>42</sup> The ratio of output to generating capacity reached a peak in 1923, fell sharply until 1925, then rose slowly to a second peak in 1929 slightly below that for 1923.<sup>43</sup> These facts do not suggest much overbuilding of capacity in the late '20's. They may suggest also that the long-run working of the acceleration principle was exerting a downward pressure on investment in generating capacity long before the boom ended, and that only the need

<sup>42</sup> It is worth noting that plant expenditures in the industry reached their peak in 1924, whereas the peak in equipment expenditures came in 1930. Plant expenditures were substantially in excess of those for equipment in the early '20's, but after 1929 equipment expenditures regularly exceeded those for plant. This behavior probably resulted chiefly from changing investment requirements as the industry grew (e.g., increasing need for distribution facilities compared with generating capacity) and the more rapid development of replacement requirements (because of both obsolescence and physical depreciation) for equipment than for plant.

<sup>43</sup> Cf. Gould, *op. cit.*, p. 65.

to expand facilities to distribute power from existing capacity kept investment from declining earlier than it did.

It is doubtful that the holding company boom led to much over-investment in generating capacity in the late '20's. If we look ahead, we find that by 1936 the ratio of output to capacity was considerably higher than it had ever been in the '20's, and it rose further thereafter.<sup>44</sup> Between 1930 and 1935, of course, the ratio was abnormally low because of the reduced demand for power.<sup>45</sup>

Although electric power investment averaged about 4 per cent of gross capital formation during 1925-29, it fluctuated between 2 and 3 per cent during 1934-39 (with the exception of 1938). By 1937 demand was pressing on capacity, and the *Electrical World* was talking of a power shortage. Yet it was in generating and transmission facilities that investment in these years was most deficient compared with the late '20's.<sup>46</sup> Expenditures on local distribution facilities made a much better showing.

It seems safe to conclude that the long-run version of the acceleration principle was beginning to operate to reduce electric power investment before 1929. The holding company and stock market boom intervened to support investment, creating thereby perhaps some but certainly not serious excess capacity. The depression stopped the rise in demand for power and reduced the need for investment to negligible proportions. The optimism that inspired building ahead of demand disappeared in 1930 and never reappeared. After the expansion in demand began again, and particularly from 1936 on, the low level of investment can be explained in part by the fact that, given existing facilities and the current rate of expansion in demand, less investment was required than in the '20's.<sup>47</sup> Undoubtedly, however, other forces were also at work, of which the most important seems to have been the impact on long-run expectations of the industry's protracted battle with the federal government. But this part of the story must be saved for later.<sup>48</sup>

<sup>44</sup> Increased diversification of the demand for power in the '30's probably helped to improve the load factor, but certainly does not explain all of the increase in the ratio of output to capacity.

<sup>45</sup> Total output of electric power declined from 1929 to 1932. The 1929 figure was exceeded in 1935.

<sup>46</sup> Cf. *Electrical World*, January 14, 1939, p. 101.

<sup>47</sup> Not only was the absolute rate of expansion less after 1929, but it is probable that in the earlier period a given increase in output required a larger capital investment than after a national, integrated power system had been built. Also, after 1929, greater diversification of demand improved the load factor, thus permitting a large ratio of output to capacity.

<sup>48</sup> These comments raise some interesting questions regarding the possible relations between investment and the growth of output in a rapidly growing industry. Should

Of the public utilities other than electric power, only the telephone industry and, to a less extent, the miscellaneous category, chiefly gas and pipe lines, showed a persistent tendency toward expanding investment after 1923 or 1924 (Table 11). The effect of the war and postwar backlog in stimulating railroad investment in 1923-24 stands out clearly. Despite their being a sick industry, the railroads generated more gross investment between 1923 and 1930 than did electric power.

Let us now look at the situation after 1929. The largest percentage decline in 1933 was in railroad investment, but the decline in electric power and other utilities is also striking. By 1936-37 the best recoveries, compared with 1926-29, had been made in transit and telephones. Railroads had made a somewhat better recovery than electric power. Electric power, telephones, and other utilities together, all rapidly growing in the '20's, generated in 1936-37 an investment nearly 800 million less than in 1926-29, and, if the railroads are included, the deficiency in investment is more than 1.1 billion, or nearly half the total decline in business expenditures on plant and equipment recorded by Terborgh for this period.<sup>49</sup> Here we have a wide and important area in which the propensity to invest was much less in 1936-37 than in the middle and late '20's. While more work needs to be done in isolating the forces responsible for this deterioration in investment opportunities, the following factors were clearly at work. Slackening in rates of growth were important in electric power, other utilities, and telephones. Government regulation and the threat of government ownership played some role in electric power. Special forces operated to hold down replacement investment in the railroad industry. And financial disorganization in the early '30's generally weakened the willingness of managements to borrow and of investors to lend.

The total stimulus provided by the expanding use of electric power obviously went much beyond the electric power industry itself. So far as effects on investment are concerned, we must take into account — in addition to plant and equipment expenditures by the power industry — investment by industry and trade in electrical equipment, further investment in machinery, conveyors, etc., resulting from improved methods made possible by the use of electric power, and expenditures by consumers on elec-

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we expect the ratio of required new investment to increments of output to change in any systematic way as an industry grows — leaving aside the effect of continuing technological change? Also, might the willingness of business men to anticipate changes in demand be in part a function of the past rate of growth? And how rapidly and to what extent will replacement expenditures take the place of net investment as the rate of growth slackens?

<sup>49</sup> Construction costs were little, if any, lower in 1936-37 than in 1926-29. Prices of metal and metal products were 5 to 10 per cent less.

tric appliances, although they are not usually included in investment.<sup>50</sup>

Shaw's figures for the total flow of producer durables and for its three largest components are shown in Table 12, for the five peak years in the interwar period. First of all, note that the increase in the flow of electrical equipment between 1920 and 1929 was greater than the total flow in 1920. Unlike the situation in automobiles, expansion was more marked between 1923 and 1929 than between 1920 and 1923. Electrical equipment was an important and slightly rising fraction of total producer durables during the '20's, but even in 1929 it was much smaller in amount than the other two groups in Table 12 — industrial machinery and motor vehicles destined for business use. Of the spurt in total producer durables between 1926 and 1929, about 900 million, nearly half was contributed by motor vehicles alone.<sup>51</sup>

Table 12

FLOW OF PRODUCER DURABLE GOODS, 1920-1937 (millions of 1913 dollars)

	Electrical Equipment	Industrial Machinery	Business Motor Vehicles	Total Producer Durables <sup>a</sup>
1920	283	745	474	2916
1923	330	789	799	3170
1926	434	826	808	3374
1929	575	1010	1243	4294
1937	428	910	1500	4494

Source: Shaw, *op. cit.*, pp. 76-7.

<sup>a</sup> Total of all producer durables, not merely of the selected groups shown in the other columns.

The figures for electrical equipment in Table 12 include both too much and too little. They include equipment bought by the electric power industry, which we have already taken into account. And they exclude electrical equipment incorporated as parts of finished machinery and equipment, as well as nonelectrical equipment devised to go with electric motors. Undoubtedly a substantial portion of the total expenditures in the category labeled industrial machinery stemmed directly or indirectly from the technological advances made possible by the use of electric power in industrial operations. This indirect effect also stimulated expenditures on office and store equipment and other producer durables.

<sup>50</sup> Conversion to electricity also stimulated a considerable amount of building repair and modernization, which would be in addition to the types of expenditure listed in the text. These repair and modernization expenditures were at their maximum during the '20's. The number of new residential users reached a peak in 1924 and decreased steadily thereafter (*Electrical World*, January 7, 1928, p. 65).

<sup>51</sup> It is worth noting also that the 1937 showing made by business motor vehicles and to a less extent by industrial machinery was better, compared with 1929, than was that made by electrical equipment.

On the basis of the evidence thus far assembled, we cannot make even a rough estimate of electric power's total contribution to business investment in the '20's. Subject to future correction, however, one might venture these tentative conclusions regarding the impact of electric power on investment outside the electric power industry during the interwar period. Here again the principle of acceleration operated to raise the level of investment in the '20's and lower it during the '30's. The maximum effect of introducing electric power into industry was felt during the '20's.<sup>52</sup> Secondly, as a force creating technological change and therefore raising the demand for new investment, electric power reinforced the stimulus created by the automobile industry. The latter created a demand for machinery capable of large scale production of interchangeable parts, stimulated the development of elaborate conveyor systems and of automatic control devices, and so on — for all of which electric power was a prerequisite. Thirdly, the stimulus electric power gave technological change continued into the '30's, although probably at a slackened pace. This continuing stimulus to investment, however, was not reinforced by the need to install electric power *de novo* in industry to the same extent as had been the case in the '20's.

The flow of consumers' electric appliances, including radios, increased from 100 million dollars in 1920 to 543 million in 1929 (in current producers' prices), at which time it was about half the flow of producers' electrical equipment. The spectacular rise, of course, was in radios, which accounted for about two-thirds of all consumers' electrical equipment in 1929. Because of the rapid rise of the radio industry, consumers' electrical equipment accounted for about four-fifths of the rise in the flow of consumer durables exclusive of automobiles and accessories between 1923 and 1929.<sup>53</sup>

While the radio industry was badly overbuilt in 1929, and although the acceleration principle reinforced the effect of the decline in incomes in bringing about a sharp drop in expenditures on radios, other forms of consumers' electric appliances recorded a more rapid absolute rate of growth in the '30's than in the '20's. Shaw's estimates indicate that by 1935 the flow of household electric appliances, excluding radios, was greater than in 1929, and by 1937 it was nearly twice as great.<sup>54</sup> Unlike the

<sup>52</sup> For example, horsepower installed in electric motors in manufacturing increased 18.2 million during 1919-29; 11.5 in 1929-39. Gould's measure of electrification in manufacturing rose from 55.0 per cent in 1919 to 82.3 per cent in 1929, and to 89.8 per cent in 1939 (*op. cit.*, p. 47). Contrast the picture drawn by Schumpeter, *op. cit.*, II, 771.

<sup>53</sup> On all this, see Shaw, *op. cit.*, p. 68.

<sup>54</sup> These comparisons are in current prices. If rough allowance is made for the sub-

situation in electric power production, producers' electrical equipment, and radios, electric household appliances provided a larger autonomous stimulus to total spending after 1933 than during the '20's.

#### *Other industries*

Obviously, other new industries and products helped to maintain investment and expand total output during the '20's — various chemical products, particularly rayon, oil and rubber products other than gasoline and tires, natural gas, production and distribution of motion pictures, and so on. Most of these represented prewar innovations which added more to output in the '20's than before the war. We cannot stop to assess the contribution of each of these industries to the level of investment during the '20's. None of them compares in importance with the segments of the economy we have marked off for separate treatment.

#### *Changes in productivity*

The effect of this influence on investment in the '20's is a subject for a volume in itself. We can do no more here than raise a few questions and try to provide partial answers.

First, in what ways were the pace and character of technological change different in the '20's than before World War I, and how does the answer to this question bear upon what happened after 1929? For manufacturing it is clear that output per man-hour did increase relatively more during 1919-29 than during either of the two preceding decades. This is apparently true of most manufacturing industries taken individually and thus cannot be explained merely by the increased output of products requiring less labor.<sup>55</sup>

Much of the increase in productivity during the '20's should, in an important sense, be credited to the preceding decade. There was a sharp increase in productivity in manufacturing between 1908 and 1916, but between 1917 and 1919 productivity fell rapidly.<sup>56</sup> In 1919 output per man-hour was probably no greater than in 1914, though the latter year showed a 15 per cent gain over 1909.<sup>57</sup> At the same time the war undoubtedly generated a considerable volume of technological improvements which manufacturers were anxious to take advantage of in producing for

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stantial decline in the prices of most electric appliances between 1929 and 1937, it is probable that the flow of electrical equipment, other than radios, to consumers in 1937 was double or more than in 1929. For data on unit sales of selected appliances, see TNEC, Monograph 1, *Price Behavior and Business Policy* (1940), p. 112.

<sup>55</sup> On all this, see Solomon Fabricant, *Employment in Manufacturing, 1899-1939* (NBER, 1942).

<sup>56</sup> Cf. *ibid.*, pp. 11, 331.

<sup>57</sup> BLS, *Handbook of Labor Statistics*, 1947 ed., p. 155.

peacetime markets. Finally, the sharp increase in labor costs during the war must have created a strong impetus to the introduction of labor saving devices, particularly since prices failed to rise as much as unit labor costs during 1914-19 but fell more than labor costs in 1921.<sup>58</sup>

The result of these developments was a great increase in labor productivity during the '20's, the most rapid increase coming during the first part of the decade.<sup>59</sup> The following figures compare man-hour output in manufacturing for the peak years of the interwar period.<sup>60</sup>

	OUTPUT PER MAN-HOUR				
	1920	1923	1926	1929	1937
Index	48.0	59.5	69.5	78.1	90.0
% change		24.0	16.8	12.4	15.2

Thus the tendency toward labor saving tended to slacken rather than accelerate as the boom continued.<sup>61</sup> If we take the '20's as a whole, it appears that most of the difference between the rate of increase in productivity during 1919-29 and that during, say, 1899-1914, can be explained by (a) accumulation of 'know how' during the war years, (b) the unfavorable relation of prices to labor costs during 1919-21, (c) the direct and indirect effects of the expanding use of electric power, and (d) the example of the automobile industry in stimulating the introduction and improvement of assembly line techniques in other branches of manufacturing. These factors created an unusually sharp rise in productivity during 1919-23, and their influence continued to be felt, though to a less marked extent, during the rest of the '20's.

How did the technological changes implied by these increases in man-hour productivity affect the level of investment during the '20's and after 1929? The following considerations seem relevant. In so far as improved productivity results from the use of labor-saving equipment, investment in the latter should precede the increase in man-hour output. May we not

<sup>58</sup> Cf. *ibid.*, pp. 126, 155. Reference is to wholesale prices of manufactured goods.

<sup>59</sup> This was true not only of manufacturing but also of mining. The railroads made their greatest gain in productivity in 1923-26 rather than in the three years preceding or following. (Note that railroad expenditures on plant and equipment were unusually low in 1919-20 and reached their peak for the interwar period in 1923-24.) A comparison of real national income and total employment also indicates that productivity increased much more rapidly during 1920-22 than after (National Resources Committee, *Technological Trends and National Policy*, 1937, Ch. 5).

<sup>60</sup> *Handbook of Labor Statistics*, 1947 ed., p. 155. The results shown here are in general confirmed by Fabricant's data, although his figures yield a somewhat slower decline in the rate of increase in productivity between successive cyclical peaks; see *Employment in Manufacturing*, pp. 19, 331.

<sup>61</sup> There was a final spurt in man-hour productivity in manufacturing during 1927-29, which, however, was considerably less than the increase during 1920-22.

conclude, therefore, that opportunities for improving productivity were more important in stimulating investment in the early than in the late '20's; i.e., before or while productivity was increasing most rapidly?<sup>62</sup> In this connection, is it merely a coincidence that total plant and equipment expenditures in manufacturing, corrected for price changes, reached a peak in 1920 that was not exceeded even in 1929? Equipment expenditures alone, which would react to technological change more directly than outlay on plant, exceeded the 1920 peak only in 1929 and then by only a small amount.<sup>63</sup>

If we leave aside the investment induced by the automobile industry and by the substitution of electric for other forms of power, I do not think that technological change can be considered a major cause of the investment boom of the '20's. Shaw's category of industrial machinery and equipment, which excludes electrical equipment and business motor vehicles, represented only about one-fourth of his total flow of producer durables during the '20's, and, according to Kuznets, producer durables accounted for roughly only about a third of total capital formation during this decade. (We exclude electrical equipment and business motor vehicles because we have already allowed for the effect of these items on total investment.) If we add all Shaw's components that were most likely to have responded to technological change, we get only about 40 per cent of the total flow of producer durables in 1929.<sup>64</sup> And, of course, a substantial part of total expenditures on these categories was either in response to expansion in the output of consumer goods or for replacement due to physical depreciation.

<sup>62</sup> Of course, there is no fixed relation between a given increase in productivity and the investment needed to bring it about. The investment required to raise an over-all index of man-hour output one per cent depends upon the industry in which the change occurs and the precise nature of the innovation, which may be more or less 'capital-using'. Thus it is entirely conceivable that the development of labor saving devices stimulated more investment after 1923 than before. However, I do not think this is probable.

<sup>63</sup> Chawner's data, in constant prices, *Survey of Current Business*, March 1941, p. 11. Terborgh's estimates of equipment expenditures in manufacturing and mining in current prices are slightly higher for 1926 and 1928 and considerably higher for 1929 than his estimate for 1920. Most of this discrepancy may be explained by his inclusion of mining, which includes crude oil and natural gas production, industries that expanded rapidly during the '20's.

<sup>64</sup> I have added together industrial machinery and equipment, farm equipment, office and store machinery and equipment (but excluding furniture and fixtures), and miscellaneous subsidiary durable equipment. I have excluded electrical equipment, tractors, and business motor vehicles (for the reason given in the text) and also office and store furniture and fixtures, locomotives and railroad cars, ships and boats, carpenters' and mechanics' tools, and his residual group. See *Value of Commodity Output since 1869*, pp. 76-7.

Did a slower rate of technological change hold back investment after 1933? We know that producer durables made a better recovery than construction, but accumulated replacement needs may be chiefly responsible for this relatively good performance. Of the various categories into which Shaw divides the flow of producer durables, the following showed a larger domestic use in 1937 than in 1929: tractors, farm equipment, ships, and business motor vehicles. The flow of industrial machinery was about 90 per cent of that in 1929. Technological change in agriculture was an important stimulus to investment in the '30's; replacement, the widening use of a new product, and continued technological change account for the heavy flow of business motor vehicles in 1937. All in all, I do not think that the retardation of technological change — apart from the maturing of the motor and electric power industries — was an important factor in holding down investment in 1937. Our analysis of the data on construction in a later section does much to reinforce this conclusion. The important deficiencies in investment in the middle and late '30's were in construction, and it is clear that a slower rate of increase in productivity had little to do with what occurred in this field.

This discussion of productivity raises questions regarding the behavior of prices, costs, and profits during the '20's that our long-term project will have to investigate in detail. Although unit labor costs fell more rapidly than the prices of manufactured goods after 1923, particularly between 1923 and 1926,<sup>65</sup> profit rates on both sales and investment remained surprisingly stable except for the final spurt in 1929.<sup>66</sup> This is for manufacturing as a whole. Of course, the story differed for different groups within manufacturing, and there are other industries to consider also. To prevent this paper from becoming completely unmanageable, I shall not pursue this problem further here, except for one general comment. The profits data I have examined do not lend much confirmation to the assumption sometimes made that the investment boom occurred because improvements in productivity inflated profits. Not only do profit rates seem to have been fairly stable but, as we pointed out earlier, improvements in productivity in manufacturing — leaving aside the effects of the automobile and

<sup>65</sup> In terms of annual averages, unit labor costs in manufacturing fell 17 per cent between 1923 and 1929; wholesale prices of manufactured goods about 4 per cent. The behavior of raw material prices did little to offset the resulting favorable effect on profits (*Handbook of Labor Statistics*, 1947 ed.).

<sup>66</sup> Cf. R. C. Epstein, *Industrial Profits in the United States* (NBER, 1934); F. C. Mills, *Economic Tendencies in the United States* (NBER, 1932), pp. 398-9, 486; W. L. Crum, *Corporate Earning Power* (Stanford University Press, 1929), pp. 330-8; S. H. Nerlove, *A Decade of Corporate Incomes* (University of Chicago Press, 1932), p. 42; Spurgeon Bell, *op. cit.*, p. 269.

electric power — are not sufficient to explain the most important changes in the level and composition of total investment which occurred in the '20's and '30's.

### *Construction*

This is a convenient heading under which to discuss some of the most important factors operating upon the level of investment in the '20's. In particular, I want to pay some attention to the behavior of residential and commercial building.

Referring back to Table 5, we see that in every year from 1921 through 1929 total construction was a much larger fraction of gross capital formation than was the flow of producer durable goods.<sup>67</sup> Between 1919 and 1927 total construction in constant prices increased more than 80 per cent, or five billion dollars. So far as absolute magnitudes are concerned, this rise completely dwarfed the expansion in producer durables.

This enormous increase occurred before 1927; from then on construction declined.<sup>68</sup> Thus, the final spurt in economic activity during 1928-29, vigorous enough to expand total capital formation by \$3 billion and to induce the largest single year's increase in gross national product since 1923, was in the face of deflationary pressures operating on the largest single component of total investment. This raises two important questions. Why did construction begin to decline before the end of the boom? What was the nature of the inflationary stimuli that were strong enough to offset the decline in construction during 1927-29? The second question will be considered briefly below.

Table 13 classifies the Department of Commerce data for new construction activity during selected years of the interwar period. Note first the importance of residential construction, which made up 40 per cent of the total in 1925-26, about a third in 1928-29, but only a quarter in 1936-37. Table 13 also points up the relatively minor role played by industrial, chiefly factory, building during the '20's, and the relative importance of public utility, government, and 'other', chiefly commercial, construction.

Let us now examine the behavior of the various components of construction during significant subperiods. More than 80 per cent of the increase between 1920 and 1923 was accounted for by residential build-

<sup>67</sup> Yet even during these years construction did not constitute nearly as large a fraction of total investment as it did before 1914. It was more than twice the flow of producer durables in every decade between 1869 and 1913. During the '20's it ranged between 1.4 and 1.8 times the latter. Cf. Kuznets, *National Product since 1869*.

<sup>68</sup> In earlier building cycles, also, the peak in building usually preceded a major downswing in business; cf., Clarence D. Long, *Building Cycles and the Theory of Investment* (Princeton University Press, 1940), pp. 150-3.

Table 13

## NEW CONSTRUCTION ACTIVITY, 1919-1939 (billions of dollars)

	TOTAL	RESIDENTIAL (nonfarm)	PRIVATE NONRESIDENTIAL			GOVERNMENT	
			Indus- trial	Farm	Public Utility		Other <sup>a</sup>
1920	6.1	1.5	1.1	0.4	0.8	1.0	1.3
1921	5.5	1.7	0.6	0.2	0.6	1.0	1.6
1923	8.6	3.6	0.5	0.3	1.2	1.3	1.6
1924	9.6	4.2	0.5	0.3	1.4	1.4	1.9
1925	10.6	4.5	0.5	0.3	1.3	1.9	2.1
1926	11.2	4.5	0.7	0.3	1.4	2.2	2.1
1927	11.1	4.2	0.7	0.3	1.5	2.1	2.4
1928	10.8	3.9	0.8	0.3	1.4	2.0	2.5
1929	9.9	2.8	0.9	0.3	1.6	1.9	2.4
1933	2.2	0.3	0.2	0.1	0.3	0.2	1.2
1936	4.7	1.1	0.3	0.2	0.5	0.4	2.2
1937	5.3	1.4	0.5	0.2	0.6	0.6	2.0
1938	5.0	1.5	0.2	0.2	0.5	0.5	2.1
1939	6.1	2.1	0.3	0.2	0.5	0.5	2.4

Source: *Survey of Current Business*, July 1947, p. 23.

<sup>a</sup> Includes warehouses, offices, stores, restaurants, and garages, and religious, educational, hotel, recreational, hospital, and institutional building.

ing.<sup>69</sup> The rise in residential construction was larger than the total rise in gross capital formation,<sup>70</sup> and was 5 times as great, in absolute magnitude, as the increase in any of the other types of construction shown in Table 13.

During 1923-26 residential building continued to expand but at a much slower rate. During this middle third of the decade, the expansion of nonresidential construction was more important, absolutely, than that in residential building. Note particularly the sharp expansion of commercial construction. It was during this period also that government construction increased most rapidly.

The decline in total construction in the final three years of the '20's was substantial and was more than accounted for by the severe drop in residential building. Commercial building also began to decline. We shall not attempt to discuss the role that monetary and financial, as opposed to 'real', factors played in the decline of these types of investment. The data point strongly to the conclusion that nonmonetary causes were the most important. Whatever the explanation, here we have the beginning of strong deflationary pressures, which the economy was able to offset during the final spurt of 1928-29 but which came fully into their own after the down-swing began.

<sup>69</sup> Kuznets' estimates in constant prices suggest that residential building accounted for about 70 per cent of the total rise in construction during these years (*National Product since 1869*, p. 41).

<sup>70</sup> In 1929 prices residential construction increased \$2.4 billion (*ibid.*, p. 41); gross capital formation, \$1.3 billion (Table 5).

Now look at the '30's. Three types of construction — residential, public utility, and commercial — were primarily responsible for the poor performance of the building industry in 1937. If we compare 1926-29 with 1936-39, so that no single year influences the results unduly, we get the accompanying annual averages, in billions of dollars. The largest absolute

	Residential	Industrial	Public Utility	Commercial and Institutional	Government
1926-29	3.9	0.8	1.5	2.1	2.4
1936-39	1.5	0.3	0.5	0.5	2.2

decline was in residential construction, the largest relative decline in commercial and institutional building. If we add public utilities, we find that the three types of construction together (in 1929 prices) averaged during 1936-39 about 4.3 billion less than in 1926-29, or more than 85 per cent of the total deficiency in gross capital formation, which (also in 1929 prices) averaged during 1936-39 about 4.9 billion per year less than in 1926-29.<sup>71</sup> This is a striking fact that I think has not been sufficiently emphasized.

Turning to some of the factors determining the behavior of residential and commercial building, it seems fairly clear that the housing boom of the '20's resulted in a serious degree of 'overcapacity', which began to affect new residential construction from 1926 on. During 1900-18, the supply of dwelling units kept in fairly close step with the increase in the number of families. Some overbuilding during 1908-12, at the peak of the prewar building cycle, was absorbed during the half-dozen years following. The housing shortage associated with World War I developed chiefly during 1919-22, when the number of urban families increased sharply while the volume of new housing rose much more slowly.<sup>72</sup> This discrepancy between demand and supply can be followed also in vacancies and rents.<sup>73</sup>

The rate of expansion in the number of urban families was at its peak during 1920-23, and remained high by prewar standards for several years more. On top of the increase in total population and the movement to the cities, the tendency toward 'suburbanization' (fed by the automobile) cre-

<sup>71</sup> Computed from *National Product since 1869*. Kuznets gives separate estimates for residential and public utility construction but lumps industrial and commercial construction together. In current prices, commercial (and institutional) construction was about 70 per cent of total industrial and commercial building in 1926-29 and 60 per cent in 1936-39. I applied these percentages to Kuznets' estimates for 'other private', nonresidential construction in constant prices to get estimates for commercial and institutional building in 1929 prices.

<sup>72</sup> Cf. Chawner, *Residential Housing*, National Resources Committee, Housing Monograph 1 (1939), p. 15.

<sup>73</sup> *Ibid.*, pp. 6, 11.

ated an additional demand for housing. To these factors must be added the gains in real income since 1914 and wartime accumulated savings. These were the sources of an abnormally high demand for new housing which should have made the volume of new construction in the '20's significantly higher than in the prewar decade. Actually, residential construction reached such high levels that an oversupply of dwelling units developed two or three years before the final downturn in business. My own view is that this overbuilding was serious and contributed significantly to the severity of the depression and the slowness of the subsequent recovery. Here, as in so many other places in this paper, documentation must be limited to bare essentials.

1) During 1917-23, if we may take this as a generous estimate of the period of housing shortage,<sup>74</sup> the increase in nonfarm families exceeded that in dwelling units by roughly 800,000. During the next six years, 1924-29, the increase in dwelling units exceeded that in the number of families by roughly 1.5 million.<sup>75</sup>

2) The absolute rate of increase in the number of nonfarm families began to decline after 1923. The rate in the middle '30's was about the same as in 1927-29, or in the neighborhood of 20 per cent less than during the early '20's.<sup>76</sup>

3) Between 1924 and 1929, while incomes were still rising, rents fell about 15 per cent, more than they declined during 1929-31 (the first half of the downswing).<sup>77</sup>

4) The level of residential building in the '20's, especially during 1923-28, was inflated to an abnormal degree by the extreme boom in apartment house construction, which averaged about a billion dollars a year during 1926-28, when it accounted for nearly 30 per cent of total residential construction.<sup>78</sup> The causes of this boom were partly financial, partly the accelerated urbanization in the early '20's. As these stimuli did not exist in the '30's, apartment house building during 1936-38 was less than 25 per

<sup>74</sup> In each of these years, the number of nonfarm families increased more than dwelling units. This was also true to a smaller degree in 1914 and 1916, but I doubt that even by 1917 the overbuilding during 1908-12 had been fully absorbed. The ratio of nonfarm families to dwelling units in 1917 was no higher than in 1911 and lower than at any time during 1900-10. See *ibid.*, pp. 15-6.

<sup>75</sup> Cf. *ibid.*, p. 16.

<sup>76</sup> *Ibid.*, pp. 2, 16, and charts on pp. 5 and 15.

<sup>77</sup> NICB index, *ibid.*, p. 6.

<sup>78</sup> The curve of apartment house construction took the form roughly of a plateau extending from mid-1925 to mid-1928, then began to decline relatively more rapidly than construction of one-family dwellings; between 1928 and 1929 its decline was quite severe. Only the continued boom in New York City prevented the decline from being greater than it was.

cent of the 1926-28 level.<sup>79</sup> Single family dwellings made a somewhat better showing in the '30's. Apartment houses are a type of construction which was particularly susceptible to the speculative optimism of the '20's and particularly vulnerable to both the financial disorganization of 1931-33 and the depressed state of long-term confidence by both builders and potential lenders during the remainder of the '30's.

5) Overbuilding is further evidenced by the magnitude of the decline in residential building between 1926 and 1929 (more than a billion dollars in both current and 1929 prices), and by the rapid rise in foreclosures during these years.<sup>80</sup>

Thus the highly important contribution of residential construction to total investment was maintained during the middle '20's only at the cost of overbuilding, while from about 1926 on the slackening pace of population growth and urbanization foretold a lower rate of building even if there were no excess supply of dwelling units for the economy to absorb.<sup>81</sup> A conjunction of developments enabled the economy to generate during 1927-29 sufficient investment in other directions to offset this deflationary influence. But once these other stimuli lost their strength, the full effect of the reduced investment opportunities in residential building were felt. And the decline was cumulative as falling incomes, both directly and through the effect on the increase in the number of families, reduced the demand for new housing still further.

So far I have emphasized 'real' as opposed to monetary or financial influences. There is no question that an ample supply of bank credit, relaxed credit standards by lenders, and generally unwise lending policies by both individuals and financial institutions added to the boom of the '20's.<sup>82</sup> The aftermath of these lending practices disorganized the mortgage market in the early '30's and thus tended both to exaggerate the decline in building during 1929-33 and to impair confidence after a stable mortgage market was again re-established. Even without the financial disorganization, residential building in the middle and late '30's would have been substantially less than in the middle '20's; but, as a result of

<sup>79</sup> Cf. BLS, *Bulletin 713*, pp. 14, 18, 19.

<sup>80</sup> Cf. D. C. Horton, *Long-Term Debts in the United States*, Bureau of Foreign and Domestic Commerce, Domestic Commerce Series No. 96 (1937), pp. 146-7.

<sup>81</sup> The evidence seems conclusive that building costs played no role in bringing on the early downturn in residential building. While wage rates in the building trades rose between 1923 and 1929, prices of building materials declined; and most indexes suggest that building costs were either constant or slightly falling after 1923. I think it is clear also that rising or high interest rates had little influence in causing residential building to decline in the late '20's.

<sup>82</sup> Cf. Schumpeter, *Business Cycles*, II, 746-8; also Norman J. Silberling, *The Dynamics of Business* (McGraw-Hill, 1943), Ch. 9.

such disorganization, it was even less than it would otherwise have been.

The role of commercial and institutional construction in influencing the course of investment in the '20's and '30's has received surprisingly little attention. Such building accounted for nearly 20 per cent of total new construction during 1926-29 and for only about 10 per cent in 1936-39; it more than doubled between 1920 and 1926 and accounted for about 30 per cent of the total increase in new construction between 1923 and 1926 (Table 13). We commented in an earlier section on the great expansion in the trade, service, and finance industries in the '20's. The rising volume of commercial construction after World War I resulted in large part from this expansion. Like other types of building it was carried too far. The depressed level of commercial building in the '30's can be attributed primarily to three causes: the slackened rate of expansion in the industries mentioned, the degree of overbuilding that had to be absorbed, and the financial and psychological aftermath of the speculative excesses and unsound lending practices in this field during the middle and late '20's.<sup>83</sup>

#### 7 MONETARY, FINANCIAL, AND INTERNATIONAL FACTORS

In a paper already too long, this is as far as we can carry our analysis of the underlying nonmonetary stimuli that helped to generate the prolonged investment boom of the '20's. In concentrating upon nonmonetary factors we do not mean to minimize the role monetary and financial influences played both in supporting the boom and in aggravating the collapse that followed. All that we have tried to do here is to break down total investment into reasonably homogeneous components, then relate their behavior to the more important nonmonetary stimuli operating on investment in the '20's.

In the longer study more detailed attention will be paid to the monetary and financial sphere. It is my present view that monetary and financial developments were important, but played a secondary rather than a primary role in creating the boom of the '20's. Obviously, interest rates and attitudes toward liquidity were favorable to a high level of investment, granted the underlying profit opportunities, and part of the large volume of investment during the '20's was financed by credit expansion. But I think the chief reasons for this expansion — the active, initiating forces — lay in the developments already discussed, which made the marginal effi-

<sup>83</sup> For recent data on commercial construction in the interwar period, see Bureau of Foreign and Domestic Commerce, *Construction and Construction Materials*, June and July 1949. The exaggerated character of the boom in office buildings, warehouses, and lofts is clearly brought out; so also is the close relation between construction of stores, restaurants, and garages, on the one hand, and residential building on the other.

ciency of capital high, and in the wave of speculative optimism, which pushed it still higher.

Interest rates do not seem to have been important either in initiating or terminating the boom. Attitudes toward liquidity seem to have affected the extent and direction of capital rationing more than the level of interest rates. It may be conjectured — and without further evidence it is only a conjecture — that the inflated money supply created by World War I and the new elasticity created by the Federal Reserve System led to relaxed credit standards on the part of both bank and nonbank lenders. The supply of loanable funds was thus highly elastic as the demand shifted upward in the early '20's. These developments within the monetary sphere tended to accelerate the exploitation of real investment opportunities and undoubtedly encouraged speculation in securities and real estate. Thus, to some extent, monetary factors, operating on expectations, tended to lift the marginal efficiency of capital higher than was justified by underlying investment opportunities. This seems to be a typical development in the expansion phase of major cycles, but it was apparently carried further than usual in the '20's.

On the whole, it was probably the nature rather than the amount of lending that chiefly led to later trouble. Unwise lending on the basis of relaxed credit standards encouraged speculation and unsound promotions and weakened the ability of the banking system to withstand the strains that were to come after 1929. Conditions on the supply side of the money market did not create the boom, but they did help to make a boom of that magnitude possible; and they certainly helped to sow the whirlwind that was reaped after 1929.

Similar comments can be made about the security speculation and related financial developments of the period (holding companies, investment trusts, mergers, etc. as well as the stock market boom and the inflated level of security issues). Inflated capital values and speculative promotions were manifestations of the interaction of unusually favorable real investment opportunities and of an elastic money supply operating to relax credit standards. The result was to accentuate the boom and to help turn a major depression into a complete catastrophe. Perhaps the simplest generalization we can make about these monetary and financial developments is that they exaggerated the 1921-33 cycle, but did not cause it.

The reader may be struck by our failure to pay any attention to international factors. Actually, foreign investment was not an important part of total capital formation after 1921, ranging from \$0.2 to \$0.7 billion in 1929 prices during 1922-29. It is true that exports played an important role in some industries and that the state of international economic relations became increasingly unhealthy as the '20's progressed. However, I

find little evidence that international factors played an important role in creating the domestic investment boom, and I do not think that weaknesses in the international situation, important as they undoubtedly were, brought the American boom to an end.<sup>84</sup> It is possible, indeed probable, that a world-wide decline of some sort would have been called for by 1929 or 1930 merely as a result of the weak position of many world primary markets and the dangerous balance-of-payments position of many countries, and, of course, serious difficulties in the rest of the world would eventually have affected the United States. But, as things actually turned out, I must conclude that the immediate causes of the downturn in the United States lay in domestic developments. To me it seems equally clear that domestic factors were chiefly responsible for the unsatisfactory character of the recovery after 1933. However, there is no doubt that international developments did play a crucial role in determining the extent and severity of the depression once the downswing had begun. Further discussion of the role that international factors played in the American depression must be postponed.

#### 8 THE END OF THE BOOM

The recession of 1927 was extremely mild. The Federal Reserve index of industrial production declined only six points between its 1926 peak and its low at the end of 1927, at which time the index still equaled its 1923 peak. According to Table 5, gross national product in 1929 prices was slightly higher in 1927 than in 1926. On a quarterly basis and in current prices it declined about 5 per cent between the fourth quarter of 1926 and the fourth quarter of 1927.<sup>85</sup> Yet, though there was little decline from which to recover, and though long-run deflationary forces were already beginning to operate, particularly in residential construction, a sharp and speculative boom was superimposed on the underlying expansion which had begun in 1921.

Detailed analysis of this final spurt must be postponed. While its general features are well known,<sup>86</sup> several puzzling features about this episode in cycle history call for further study. What we need to know can be summarized in three questions: What caused it? What brought it to an end? And what effect did developments during 1928-29 have on what happened after 1929?

The preceding sections have already brought out certain features of the

<sup>84</sup>Cf. Wilson, *op. cit.*, pp. 143-4, 159-60.

<sup>85</sup> Harold Barger, *Outlay and Income in the United States, 1921-38* (NBER, 1942), p. 115. These estimates are seasonally adjusted.

<sup>86</sup> See, for example, Wilson, *op. cit.*, Ch. 16; Slichter, *The Period 1919-1936 in the United States, op. cit.*, pp. 12-3; Schumpeter, *Business Cycles*, II, 790-4 and Ch. 14.

1928-29 upswing which I think are important with respect to all three questions. Note the sharp rise in inventory accumulation in 1929, the marked increase in the flow of producer durables, and the accelerated expansion in manufacturing output and investment. Meanwhile, the expansion in consumers' outlay tended to flatten out. Between 1928 and 1929 the absolute increase in capital formation was actually as large as that in consumption (see Table 5).

It seems fairly clear that in 1928-29 a tendency for the marginal efficiency of capital to shift downward, because of a decline in long-run investment opportunities, was more than offset by an upward shift geared to rising short-term expectations. The increased importance of short-term expectations can be seen in the sudden rise in inventory accumulation; it shows up also in the expansion of producer durables. In 1929, for the first time since 1923, the sum of producer durables and inventory accumulation was nearly as great as total construction. And a larger fraction of construction in 1929 was probably stimulated by speculative optimism and inflated capital values than was true earlier in the decade.

Two highly important results ensued. Investment became increasingly vulnerable to shocks, from whatever source. And once investment began to decline because of unfavorable surprises, there was no longer the same backlog of investment opportunities to put a relatively high floor under the total volume of investment. This was the most important difference between the situation in 1929 and that in 1923.

The other main point to note about the 1928-29 expansion is the stock market boom and the monetary and financial developments that went with it. The definitive study of the effects of the boom and collapse in stock prices on the general business situation still remains to be written. Pending more study, it seems reasonable to say at least this much. The accelerated rise in stock prices led to a good deal of investment which the underlying situation did not justify and thus helped to create a condition of partial over-investment, in relation to consumer demand, in some lines. The inflated level of capital values weakened the banking system and left the whole financial apparatus of the economy in a position likely to become untenable if a major decline in security prices were to occur. Finally, the crash, when it did come, gave a severe jolt to business expectations.

Nonetheless, I do not think that the stock market boom and collapse were, in any significant sense, the cause of the great depression. As is now generally recognized, the turning point in business came before the crash. More important, our analysis of the factors influencing investment in the '20's suggests that a depression of some severity would probably have occurred even without the collapse of the stock market and independently, also, of the international breakdown that came after 1929. Security specu-

lation in all its ramifications affected the course of the ensuing depression chiefly in two ways: having helped to induce too much investment in particular lines during the boom, it made the subsequent decline more severe than it otherwise would have been; secondly, it helped bring about the financial breakdown of 1931-33 and the resulting collapse of long-term expectations. The impairment of expectations beyond that called for by the state of underlying investment opportunities continued after 1933.

## 9 SOME TENTATIVE CONCLUSIONS

The word 'tentative' appears in the title of this concluding section for obvious reasons. The preceding sections represent a preliminary report on a project still far from complete. We have looked in detail only at the '20's, and even here we have dealt only with some of the more important non-monetary stimuli affecting the level of investment and output. We have had nothing to say about agriculture, world primary markets, or international capital movements, nor have we dealt adequately with monetary developments. We still have to study in detail the 1927-29 expansion and the 1929 turning point. And there is the whole period of the '30's to be dealt with — the downswing, the lower turning point in 1932-33, the long and painful recovery thereafter, and the turning points in 1937-38. All this is necessary not merely to explain the '30's but also to complete our understanding of the boom of the '20's and the 1929 turning point.<sup>87</sup>

With this warning in mind, let us see what sort of picture, incomplete as it may be, emerges from the detailed findings of the preceding sections. To me, the salient feature is the magnitude and extent of the structural changes imposed on the American economy in the short span of a decade: the great expansion of the service, trade, and finance industries, the ramifying effects of the automobile, the electrification of industry and (to a less extent) of the home, and the great housing boom.<sup>88</sup>

These developments were interrelated and reacted one upon another. They greatly expanded consumption and thus helped to maintain the propensity to consume despite the rise in real income per capita. They created employment opportunities to absorb the increments of the labor force that were no longer going into manufacturing. Most important, they created a set of semi-autonomous stimuli to investment that for nearly a decade

<sup>87</sup> It should be clear, therefore, that I share Professor Neisser's opinion that I have not 'proved' my conclusions.

<sup>88</sup> For Schumpeter the '20's belong to the Kondratieff of the automobile, electric power, and chemicals. So far as the magnitude of its impact on output and investment is concerned, the chemical industry does not seem to me to belong in the same class with the other two.

were largely immune to reversals in short-term business expectations and to minor maladjustments.

Put differently, the investment boom of the '20's resulted from a concentrated flowering of investment opportunities, created by the rapid maturing of a series of new industries and new services. In this picture the demand for housing was partly an independent and reinforcing influence, partly the indirect result of changes occurring elsewhere.

At this stage in our analysis, the substantial, though not complete, exhaustion of these particular investment opportunities ranks as the most important of the causes bringing on the decline after 1929, though it alone is not sufficient to explain fully either the precise character of the 1929 turning point or the full severity of the great depression. The 'gestation period' for the new industries of the '20's was short compared with that of the railroads or steel in an earlier period. By 1929 automobiles, electric power, roadbuilding, the new service industries, and so on were at or near maturity;<sup>89</sup> they no longer needed, for replacement or for further growth, the same volume of investment as formerly.<sup>90</sup>

The rapidity with which these industries matured was attributable only in part to their size and technological characteristics. Involved also were the expanding size and resources of the economy as a whole. The larger the economy, and the higher the level of real income and savings going with full employment, the more easily can the demands of a rapidly growing industry be met. There is less likelihood that the expansion of an important new industry will be interrupted by capital shortage and miscellaneous bottlenecks.<sup>91</sup>

<sup>89</sup> This does not mean that further expansion was not possible. It does mean that future expansion would depend primarily on the rate of increase of total output and on new technological change.

<sup>90</sup> This statement needs qualification since it is at least possible for replacement to generate as high a level of gross investment after an industry matures as occurred when the industry was expanding rapidly. Whether this will happen depends on the original rate of expansion, the durability of the capital stock involved, and the rate of obsolescence created by further technological change. Even if replacement *eventually* fills the gap created by the decline in net investment as an industry ceases to expand rapidly, there may be a considerable period before replacement reaches this level. The more rapid the original expansion (the higher the rate of net investment per period), the more durable the capital equipment, and the slower the rate of obsolescence after the industry matures, the less likely is replacement demand to provide a prompt and sufficient offset to the decline in net investment.

<sup>91</sup> The investment required in a new industry is not always and necessarily proportional to the level of total output in the economy. A given fixed equipment may be necessary to produce anything at all. The railroad plant required to meet the transportation needs of a population of 120 million would not be double that required for a population of 60 million, given the same land area and geographical distribution of

While I would like to investigate this point further, it is my impression that the exhaustion of investment opportunities resulted more from the 'growing up' of new industries than from the creation of excess capacity. Both factors were certainly involved. It is clear, for example, that by the end of the '20's there was excess capacity (partial over-investment) in automobiles, housing, and commercial building, and it is likely that the boom in producer durables in 1928-29 generated some excess capacity in a number of manufacturing industries. But probably more important was the fact that, even without excess capacity, it was no longer necessary or profitable, in industries that had been growing rapidly, to expand at the former rate. This is the sense in which it is accurate to say that the acceleration principle played an important role in bringing the investment boom of the '20's to an end.

It is difficult to say to what extent the housing boom should be considered an independent influence in the '20's. In part it arose out of the changes created by the automobile. This was true also of commercial building. In part the housing boom was due to the war, which tended to push forward into the '20's a good deal of private investment that otherwise would have occurred earlier. And, as we have seen, the magnitude of the building boom was exaggerated — and excess capacity created — by speculative optimism.

Investment in the '20's was no more than enough to support a full employment level of income at the peaks of the short cycles. Even this much would not have been achieved in 1929 without an inventory boom and without expenditures on producer durables, exclusive of construction, that were probably excessive. Further, the level of consumption in the late '20's rested on a volume of expenditures for consumer durables that could not be maintained indefinitely, and it was further stimulated by the rapid growth in services. The tendency for the absolute rate of expansion in consumers' outlay to flatten out in the late '20's is probably significant.

Against this setting, the secular behavior of construction, and particularly residential building, takes on added importance. Despite the magnitude of the building boom, construction was a much smaller percentage of gross national product and of capital formation in the '20's than before World War I. While future building booms could be expected after 1929, the expected growth of population suggested that the trends discernible in the '20's would continue: that the economy would have to rely more heavily on investment in producer durables — and on industrial and commercial construction inspired by new industries — than it had in the past.

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the population in the two cases. But the savings available for investment would grow in proportion, or more than in proportion, to the increase in population and income.

And, even in the '20's, public investment was a not inconsiderable fraction of total investment.

These generalizations, of course, lend some support to the 'secular stagnation' thesis, but it is not unqualified support. Emphasis on the exhaustion of the particular investment opportunities that supported the boom of the '20's does not imply a forecast of what investment opportunities will be in the future. And recognition that construction had been gradually becoming a smaller fraction of total output does not imply that such a trend will continue indefinitely. Internal migration, technological change, or a decline, for whatever reason, in building costs relative to other prices may reverse this tendency.<sup>92</sup> Nor do we yet know what role replacement, spurred by the obsolescence created by technological change, may play in supporting investment in the future. It is worth noting, incidentally, that the larger the role of producer durables, relative to construction, the more rapidly will replacement demand rise to take the place of the net investment resulting from expansion — both because of the shorter life of machinery and equipment and because obsolescence affects the latter more than it does buildings.

Our study of components may throw some new — or at least clearer — light on why total investment behaved as it did in the '20's and '30's. In particular, it should cast some doubt on attempts to explain the behavior of investment by reference to relations among broad aggregates. Pent-up demand coming largely from consumers, for both new and old products, was chiefly responsible for the vigorous expansion of 1921-23. These pent-up demands affected chiefly semidurables, automobiles, and residential building. Between 1923 and 1926 the rate of expansion in investment declined considerably. Residential construction tended to support the level of employment but not to expand it much further. The same was true of investment in railroads and public utilities. Commercial and public construction became more important as factors making for further expansion and so also did manufacturing investment. After 1926 residential and some other types of construction began to decline; the rate of expansion in the automobile industry had begun to decline earlier; there was a marked shift generally from construction to producer durables; and manufacturing became the dominant factor making for further expansion.

This record bears little relation to the sort of theoretical discussion, found all too often in business cycle literature, that deals with 'investment' as if it were a homogeneous aggregate reacting in simple and clearly defined ways to a few other variables. Too much of the relevant literature makes

<sup>92</sup> It is worth noting, however, that even during the building boom of 1947-48 total new construction represented less than 40 per cent of gross private domestic investment compared with about 50 per cent in 1929 (Department of Commerce data).

the further implicit assumption that most investment takes place in manufacturing, and that the factors affecting total investment are those which business men in manufacturing industries are likely to have in mind.

One of the most important, and most frequently misused, analytical tools in business cycle analysis is the principle of acceleration. Most often it is used to relate investment to short-period changes in total output or consumption. This is precisely the way in which the acceleration principle should not be used. But if we relate investment in particular industries to fairly long-period changes in output in those industries, the acceleration principle becomes an important tool of empirical research. In this sense it helps to explain both the high level of investment before 1929 and its low level after 1933. This becomes clear if we look at the major components of investment one at a time.

In view of the major shifts among the components of gross capital formation during the interwar period, I do not think we can attach much significance to supposed equilibrium conditions stated in terms of the relation between total output and total investment. Domar, Harrod, and others have discussed the question: given the marginal propensity to consume and the (technologically determined) ratio of increments of capacity to increments of total output, what rate of expansion in total output is necessary to maintain full employment?<sup>93</sup> The question has little meaning until we specify the kinds of output and the weights to be attached to each kind, then examine the technological conditions in the industries affected. A given increase in total output may require a large net investment if it takes the form of housing or public utility services; it may require much less new investment if it takes the form of other goods and services requiring less capital equipment. And the amount of investment required by an increment of output will also depend on the newness of the industries involved and the extent to which the expansion of these industries requires additional expansion in other lines. A given increase in automobile or electric power output in the late '20's required less new investment in the economy as a whole than the same increase would have required a decade earlier.

The factors we have chosen to emphasize in this paper are not sufficient fully to explain either the 1929 turning point or the severity of the decline that followed. I think that the considerations we have discussed were sufficient to bring about a fairly severe depression in the '30's. It is clear, however, that additional factors were at work to bring about as complete a collapse as actually occurred. These additional forces making for a sec-

<sup>93</sup> Cf. e.g., Harrod, *Economic Journal*, March 1939, pp. 14-33, and *Towards a Dynamic Economics* (Macmillan, 1948), pp. 77 ff.; also Domar's articles in the *American Economic Review*, March 1947, pp. 34-55, and December 1948, pp. 777-94.

ondary deflation of unusual severity were chiefly of two sorts: those associated with the financial excesses of the '20's and the inherent vulnerability of the American banking system to extreme deflation; and the underlying disequilibrium in the balance-of-payments position of so many countries at the end of the 20's. I have already indicated my view that neither set of influences brought about the 1929 turning point in the United States, but both clearly played an important role after the downswing had begun to gather momentum. At this point I can only express the opinion — which may be refuted or confirmed as our project unfolds — that at least the second set of influences was not a critical factor in the relatively poor performance of the American economy after 1933.

## COMMENT

HANS NEISSER, *New School for Social Research*

In discussing Professor Gordon's paper I find myself in a strange position. On the one hand I agree with him about the usefulness of detailed historical studies of the kind he presented and I admire the careful way in which he has collected and organized the material. Moreover, not only did I learn much in studying his paper but I am inclined to accept his main conclusions about the American business cycle of the '20's, especially the causes of the collapse of 1929.

On the other hand, I do not think he has always proved his conclusions. Facts, especially statistical facts, do not by themselves prove a relationship between cause and effect. I feel Professor Gordon could make his presentation more convincing if he stated clearly the theoretical pattern in the framework of which the facts would prove something, and if he would make more explicit use of econometrics plus analysis of the Mitchell-Burns type. In his Christmas paper,\* Professor Gordon stated: "The historical approach does not require the precise measurement of functional relations or the preliminary setting up of complete theoretical models." Literally taken, this is certainly correct, but the true relation of the historical method to other methods is rather concealed by the use of the words *precise* in connection with econometrics and *preliminary* and *complete* in connection with theory. I shall say a few words concerning *completeness of theory* at the end of my comments. As to *precise* I am willing to admit that the historical method may be satisfied with only approximate measurements

\* See p. 163, note 1, above.

of functional relations, but I miss their explicit use in Professor Gordon's paper, as I miss an explicit statement of the theoretical framework. It seems to me almost axiomatic that historical explanations cannot be given except by stating at the same time theoretical laws. For the historical statement that the event B materializes because the event A in an environment X preceded B is identical with stating: whenever A happens, in the environment X, B will follow, and this is *theory*. But again from this axiomatic statement concerning historical explanation and theory it does not follow that we must or can have a complete theoretical model before we ever make use of experience, or that the historical experience of a certain period could not possibly modify our theoretical approach. I am not a great friend of abstract methodological discussions and shall not try to describe in detail how theory arises as a tentative formulation from historical experience, and how it in turn makes this experience intelligible and in a certain sense even reshapes it. I limit myself to interpreting Professor Gordon's findings in the light of his own statements, trusting that what I said before about the relation between the various methods will become clearer by such a concrete interpretation.

Professor Gordon discusses primarily what he calls the major cycle of 1921-33 or rather its upswing phase from '21 to '29 and I shall limit my discussion to this period. He also devotes some space to the minor cycle after 1919, which preceded the major cycle of the '20's, and to the minor cycles within the major cycle from 1921 to 1933. As he states himself, there is very little dispute about the causes of the economic fluctuations from 1919 to 1921, and the so-called recessions of 1924 and of 1927, which marked the end of a minor cycle, were so unimportant that some economists may disregard them entirely.

According to Professor Gordon the study of major cycles centers on underlying investment opportunities. He mentions other factors, but some of them are part and parcel of the investment process, and in any case, most of his paper is devoted to an analysis of investment. He summarizes the result of the investigation in the following way: "Our analysis of the factors influencing investment in the '20's suggests that a depression of some severity would probably have occurred even without the collapse of the stock market." and "Perhaps the simplest generalization we can make about these monetary and financial developments is that they exaggerated the 1921-33 cycle but they did not cause it." How do we know that underlying investment opportunities change? This point is particularly important for the explanation of the great depression. Professor Gordon states "and once investment began to decline because of unfavorable surprises, there was no longer the same backlog of investment opportunities to put a relatively high floor under the total volume of investment." Hence, it is not

alone the stock exchange crash of '29 that discouraged investors and caused the decline in actual investment from 1930 on, but there was a decline in investment opportunities that would have brought about a substantial depression even if there had been no stock exchange crash.

I shall take up this question at its proper place and first proceed with my interpretation. Closer inspection shows that Professor Gordon's historical method makes use of a very specific theoretical framework, which represents a very wholesome combination of the ideas of Keynes and Schumpeter. There is a gap in the simplified Keynesian system: income equals consumption (as function of income and, possibly, other variables) plus investment: this gap was filled by Professor Gordon from Schumpeter's investment theory, the bunching of innovations. To put investment as prime mover in the center of the analysis, to state even hypothetically that continued expansion of output depends on maintaining gross capital formation as a fairly constant percentage of total output, one has to assume that in principle a consumption function exists in the sense that consumption is virtually independent of the current rate of investment, in other words, that consumption does not fall when investment increases and vice versa. Professor Gordon, as Keynes himself did, may have come to believe from common experience in the existence of a consumption function. But many of his specific statements are warranted only if he has at least a general idea about the particular form of this consumption function, which can be obtained only by econometric methods, e.g., the statements in which he refers to *pent-up* demand, *specific activation* of private spending, and the outlay on some durables *being abnormally* large.

It scarcely needs explanation that for business cycle purposes the simplified Keynesian system cannot suffice. It only defines a state of short-run equilibrium, but what Professor Gordon wanted to know is why one state of short-run equilibrium was transformed into another, e.g., a state of high utilization during the boom into a state of low utilization. In other words, the behavior of investment itself had to be explained.

Considering Professor Gordon's solution of the puzzle of 1929 does him an injustice, because he himself admits that his analysis of the final spurt in 1929 is insufficiently detailed. "Several puzzling features," he says, "about this episode in cycle history call for further study." However, the outline of his explanation is clear; and his detailed discussion of the features of investment in 1921-28 is relevant for cycle analysis only if we include at least the collapse of 1929.

The puzzle of 1929 becomes manifest if we inspect his basic Tables 5 and 7. The statistics in Table 5 are in constant prices, while those in Table 7 are in current prices. Table 5 shows clearly that in contrast to 1920 and 1921 gross capital formation in 1929 *exceeded* the level of the preceding

year. This is true even if we eliminate the change in inventory; and as Table 7 in conjunction with Table 13 shows, the increase of investment in total plant and equipment in 1929 over 1928 in current prices was almost large enough to offset the decline in new construction activity from 1928 to 1929. Since the last month of 1929, after the stock exchange crash, must have influenced all investment series unfavorably, we might conclude that the investment had been maintained well before the stock exchange crash. Further light may be thrown on this question by the analysis of monthly or quarterly data, but at the moment I have to deal only with the material Professor Gordon presents. Furthermore, the flow of consumers goods continued to increase in 1929; all the figures I have seen indicate that consumption credit continued to increase and, by the end of 1929, considerably exceeded the level of 1928; profits were higher and unemployment was lower in 1929 than in 1928. How then can it be proved that a substantial downturn would have occurred even without a stock exchange crash? There is a reservation in Professor Gordon's paper not quite consistent with his previous definite assertions concerning the major cycle of the '20's: "The factors we have chosen to emphasize in this paper are not sufficient fully to explain either the 1929 turning point or the severity of the decline that followed," but, he adds, "I think that the considerations we have discussed were sufficient to bring about a fairly severe depression in the '30's"; and the other factors he would like to study more in detail refer to the unusual severity of the depression from 1930 on, especially to the so-called secondary deflation, rather than to the turning point itself.

In Professor Gordon's explanation for the end of the prosperity phase of the major cycle in the '20's, the two basic ideas appear combined in the sense that neither by itself would be a satisfactory explanation. First, although consumption did increase, "the decline in the rate of increase in consumption is especially to be noted." Secondly, the new industries reached a stage of maturity, which is only another way of saying that investment opportunities were exhausted.

Let us look briefly at these two components of the explanation. First, as to the rate of change in spending. My quotation from Professor Gordon referred to consecutive changes in the rate of spending during the whole upswing of the major cycle; the increase in the rate of spending was less from '26 to '29 than from '23 to '26, and the increase from '23 to '26 less than from '20 to '23. However, such a general downward trend would be of no explanatory value because prosperity reigned until the middle of 1929. More important is his statement that the rate of increase in spending was particularly low in 1929, amounting to only 50 per cent of the increase in gross national product. Even this figure is not much below the cyclical marginal propensity to consume, according to Modigliani's estimate. More important is the question whether from this fact, taken by itself, any con-

clusions can be drawn. The change in the rate of spending from 1924 to 1925 was much worse; at this time consumption declined absolutely, yet no collapse ensued.

I stress this point not only because it shows the undisputed necessity of bringing in the other features of the development to which Professor Gordon has given ample attention but also to justify my position concerning the indispensability of econometric or semi-econometric methods. We cannot find out what caused a certain event in a given year by comparing the magnitude of a determining factor in this year with its magnitude in the preceding year, or by enumerating a great number of such changes, for the same constellation of changes may have occurred in another year without producing the same effect. I am sure Professor Gordon would agree. But I wonder whether he has fully realized that econometrics has methods specially designed to overcome this difficulty and to answer the question: was a change in a certain factor, other things being equal, nearly always associated with the event we want to explain? A simplified approach to this problem lies in some National Bureau methods, e.g., in the counting of the number of cases in which the change was associated with the event and those in which it was not.

As pointed out above, Professor Gordon is quite far from explaining the downturn in 1929 only on the basis of changes in the rate of spending. Though he does not say so explicitly, I feel the cornerstone of his explanation is the combination of this fact with the other fact of the maturity of the new industries. In 1929, and conceivably already in 1928, the American economy had reached a stage in which the secular increase of consumption could be satisfied by the existing capacity as built up in the preceding years. Some of the new industries already showed excess capacity, in the sense that their capacity was not fully used even before the middle of 1929. The bulk of the other industries needed very little additional investment, if any, to satisfy the secular increase in consumption.

This is the crucial point and, like his predecessors, Professor Gordon had difficulties in establishing it beyond doubt. He chose two approaches. The first, to which much space is devoted, is via industries. One can show the existence of an excess capacity for residential building from investment series, from occupancy statistics, and the history of rents. The econometrician might have tried to estimate from these data a consumption function for dwelling space; Professor Schumpeter would probably separate more distinctly the induced investment in construction from the investment due to innovation.<sup>1</sup> But I admit that the facts adduced suffice to prove the point

<sup>1</sup> Professor Gordon might, from this angle, elaborate on what he calls the long-run acceleration principle in contrast to the traditional short-run acceleration principle, where investment is supposed to react to any current change in consumption or in demand for consumables.

in question, because the high income level until 1929 excludes the possibility that the unfavorable development in construction was caused by a declining income and generally unfavorable expectations. The material for the automobile and electrical industries is not equally ample. But even if we concede Professor Gordon the fact of maturity for these industries, we cannot be fully satisfied with his approach, because the approach can convince us only if it is fairly complete; that is, if we have established the fact of maturity by examining carefully at least the *bulk* of all industries. This is the more necessary because Table 5 tells us that the investment in producer durables increased in 1929 by a larger amount than in any year since 1923.

The second approach to establish all around maturity is via inventories. Again the sharp increase of inventories in 1929 is not by itself convincing, since the increase in 1923 was even larger, and yet not followed by any serious recession. However, one could argue that in 1929, in contrast to 1923, the absolute level of inventories became excessive. The cumulated inventory changes over the whole cycle amount to an increase of 7.4 billion dollars, in constant prices, while the output of commodities increased 24 billion dollars. This is close to Abramovitz' average ratio of 34 per cent, while for 1920-23, the ratio is only 18 per cent. In the two expansion phases, 1919-20 and 1927-29, the change in manufactured inventories represented a much larger proportion of the change in gross national product than in the corresponding expansion phases, 1921-23 and 1924-26. The first two phases ended in a grave crisis which represented the end of a major cycle; the two others ended in extremely mild recessions.

Unless this inventory approach is considered as convincing, I cannot admit that the fact of maturity is fully established for 1929. But let us for the moment assume it were established and draw the conclusions from the combination of a declining rate of increase in spending and emerging excess capacity, especially also in consumer goods industries. There results for 1929 a picture of underconsumption — of underconsumption, however, of a specific short-run character, which only rarely has been analyzed in the literature. The downturn did not originate in changes in current investment; even disregarding inventory increases, investment was maintained in 1929 before the collapse; likewise the marginal propensity to consume remained largely the same. But spending did not increase as fast as capacity in consumption goods industries. Full utilization of this capacity implied a level of production higher than the sales volume at tolerable prices, because the average propensity to consume was declining. The efforts to maintain a high level of production all around thus caused an increase of inventories, which eventually forced down the production level. Investment became discouraged in all industries, though not until

the last months of 1929. The downturn of the business cycle was aggravated, but not caused, by the stock exchange crash.

I must apologize for this theoretical diversion. My main aim was to show how indispensable for Professor Gordon's procedure have been both a theoretical framework and traditional statistics, in National Bureau form or in the form of an approximate "measurement of functional relations". I think Professor Gordon was made to shy away from such measurements by what I consider a misinterpretation of econometrics. He seems to identify econometrics with dynamic model building. But econometrics is older than model building. It started when Henry Ludwell Moore tried to measure demand and supply elasticities; and though our Chicago friends may frown on attempts to measure individual structural relations between endogenous variables separately from a complete model, I have not yet given up the hope that a compromise may be found between their logical rigor and the practical necessities of econometrics. In any case, as we have seen, Professor Gordon's historical method cannot do without approximately measured functional relationships; no doubt we should always use whatever is available.

What then is the difference between the historical method in explaining past business cycles and the explanation furnished by dynamic models? I share Professor Gordon's skepticism about the adequacy of the models, although for different reasons. I am not so greatly worried about the possibility of more than one model fitting a given set of data and explaining the course of events in a given period. The differences between the explanations by various historians are legion, though they do not seem to bother Professor Gordon. Even in natural science, a similar phenomenon has not been infrequent. Two or more theories explaining the same set of observations have existed side by side. Here and there we may hope to develop criteria that in the course of further investigation allow us to decide in favor of one or another model. Moreover, I was surprised, delightfully surprised indeed, to hear that we already have the choice between various empirically tested and valid models. I had not been aware that we have a single model that covers the whole interwar period and does not break down in the great depression. The reason for the difficulties in developing empirically and theoretically valid models seems to lie less in the so-called qualitative factors that influence social life than in the great number of determinants that easily may exceed the number of observations; in Professor Schumpeter's terminology we deal with an open system. The econometrician's way out of this impasse has usually been to reduce the number of independent variables to a practicable minimum and to assume that all other determining factors can be relegated to the realm of a surrounding stable economic structure, which would not change during the period of

observation. I am afraid this will not always suffice, for the simple reason that the econometrician's services are primarily requested when the structure breaks.

For these reasons I think that the historical method is indispensable for understanding past business cycles. The theoretical models with which the historical method works, the econometric relations it uses, are incomplete. It has to insert unexplained facts, e.g., Schumpeter's innovations, into the theoretical framework, but it should recognize that it can do so only if the role of these facts is established by the framework itself. In economic forecasting we frequently act in a similar way. Since we do not as yet have a reliable investment function, we insert into a theoretical framework data about the investment plans of firms, as collected by statistical agencies. This certainly is a great step forward, but would be quite meaningless unless we had already established the framework. We may proceed similarly in our historical explanations of past business cycles. We cannot ask firms about their investment plans for a past period as easily as we can for the future, but we may be able to draw conclusions as to the plans and expectations of consumers and firms from what actually happened. Methodologically this is fraught with danger. The fact of lower investment in the '30's does not tell us that the marginal efficiency of investment would have been lower also in the absence of the stock exchange crash. But sometimes a combination of facts and relations allows us to draw such conclusions, as is illustrated by the conclusions Professor Gordon drew from the decline in construction activity (and other pertinent material) since 1927.

I think substantially this is the line Professor Gordon wants to follow. More clarity about the relation of the various methodical approaches and about their combination in the historical method would, I think, considerably strengthen the cogency of his argument.

ADOLPH LOWE, *New School for Social Research*

I should like to raise a question of substance concerning the explanation of the cyclical movement during the later twenties. As Professor Neisser has pointed out, the general hypothesis Professor Gordon formulated in his paper is a combination of the ideas of Keynes and Schumpeter. The Keynesian element refers to the behavior of aggregate consumption, which shows a falling rate of increase at least up to 1928. Though there can be no doubt about this behavior of consumption, I wonder whether we do not have to explain it in terms quite different from those associated with the Keynesian consumption function.

It is obvious that a slackening of aggregate consumption expenditure

can reflect two radically different forces: either an increase of saving out of a given aggregate income with constant income distribution, or a shift in the income distribution which increases the share of the saving strata at the expense of the consuming strata, above all of wage earners. The two phenomena can be contrasted as voluntary and forced underconsumption.

Now it seems to me that all available statistical evidence for the years 1926-28 speaks in favor of forced underconsumption. The share of wages and salaries in aggregate income declined, whereas the share of the upper 5 per cent of income receivers rose. In absolute terms, both payrolls and wage rates were constant during this period if not actually falling. The output of manufactured goods rose by 5 per cent whereas corresponding employment fell by 2 per cent. In other words, the income of the broad urban masses definitely lagged behind output.

We do not have far to seek for the reasons for this discrepancy. It reflects the short-term effects of technological displacement or, what in terms of wages and employment amounts to the same, the diminished capacity of manufacturing industries to absorb labor, a structural change that Professor Gordon has pointed out so clearly in his paper. It is true that both service industries and trade showed an increasing absorptive capacity, but apparently not strong enough to compensate fully for the technological change occurring in manufacture.

The picture seems to change in 1929. Not only the rate of increase in aggregate consumption but also the share of wages and salaries in aggregate income rose, as did aggregate payrolls. Still there was hardly any increase in wage rates, though employment rose by 5 per cent. The rate at which aggregate consumption increased remained far behind the rate of increase in investment. Apparently the pressure on the labor market, which characterized the preceding years, was not fully relieved and some sort of forced underconsumption seems to have persisted even through the prosperous half of 1929.

I submit these considerations as no more than a hypothesis. But it might be illuminating if Professor Gordon were to include in his further investigation a thorough analysis of the conditions in the labor market. He might come out with a consumption function quite different from that current in the Keynes School, namely one in which changes in the capacity to absorb labor far outweigh voluntary decisions on saving.

