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STUDY PAPERS NOS. 14 AND 15

LIQUIDITY AND FINANCIAL INSTITUTIONS IN THE POSTWAR PERIOD

BY

JOHN G. GURLEY

PROFITS, PROFIT MARKUPS, AND PRODUCTIVITY

AN EXAMINATION OF CORPORATE BEHAVIOR SINCE 1947

BY

EDWIN KUH

MATERIALS PREPARED IN CONNECTION WITH THE

STUDY OF EMPLOYMENT, GROWTH, AND PRICE LEVELS

FOR CONSIDERATION BY THE

JOINT ECONOMIC COMMITTEE
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These are part of a series of papers being prepared for consideration by the Joint Economic Committee in connection with their "Study of Employment, Growth, and Price Levels." The committee and the committee staff neither approve nor disapprove of the findings of the individual authors.

LETTERS OF TRANSMITTAL

JANUARY 21, 1960.

To Members of the Joint Economic Committee:

Submitted herewith for the consideration of the members of the Joint Economic Committee and others are study papers 14 and 15, "Liquidity and Financial Institutions in the Postwar Economy," and "Profits, Profit Markups, and Productivity: An Examination of Corporate Behavior Since 1947."

These are among the number of subjects which the Joint Economic Committee requested individual scholars to examine and report on in connection with the committee's "Study of Employment, Growth, and Price Levels."

The findings are entirely those of the authors, and the committee and the committee staff indicate neither approval nor disapproval by this publication.

PAUL H. DOUGLAS,
Chairman, Joint Economic Committee.

JANUARY 8, 1960.

Hon. PAUL H. DOUGLAS,
Chairman, Joint Economic Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR DOUGLAS: Transmitted herewith are two of the series of papers prepared for the "Study of Employment, Growth, and Price Levels" by outside consultants and members of the staff. The authors of these papers are John G. Gurley, The Brookings Institution; and Edwin Kuh, Massachusetts Institute of Technology.

All papers are presented as prepared by the authors, for consideration by the committee and staff.

OTTO ECKSTEIN,
Technical Director,
Study of Employment, Growth, and Price Levels.

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LIQUIDITY AND FINANCIAL INSTITUTIONS IN THE POSTWAR ECONOMY

(BY JOHN G. GURLEY)

STUDY PAPER NO. 14

LIQUIDITY AND FINANCIAL INSTITUTIONS IN THE POSTWAR ECONOMY

(By John G. Gurley [1])

An important financial aspect of the early postwar years—perhaps the most important—was the excessive amount of money and close substitutes for it in the economy. These liquid assets had been built up to enormous proportions during World War II, and by 1946 they posed a serious problem for the monetary authorities. In one way or another, they threatened to spill over into markets for current output and to drive prices in these markets to substantially higher levels.

Consequently, the major task of the monetary authorities at the beginning of the period was somehow to reduce the volume of liquid assets without too much delay, or at least to prevent these assets from growing rapidly, from an already inflated base. In this task the monetary authorities did not succeed. Liquid assets were not reduced at the beginning of the postwar period; worse yet, they continued to expand rapidly throughout the period, despite restraint on monetary growth. This was mainly due to the growth of liquid claims on financial institutions that lay outside the direct control of the monetary authorities. The outcome was easy terms of lending during most of the period that allowed heavy spending on current output to culminate in price inflation.

This paper examines the consequences and causes, in that order, of postwar growth of money and its close substitutes. It first traces the growth of these assets during World War II and their continued expansion in the postwar period. It then shows how the postwar expansion of liquidity, from an already inflated base, held interest rates at abnormally low levels for at least a decade. The role of postwar liquidity in the determination of commodity prices and interest rates is next analyzed. The remainder of the paper examines the causes of the postwar growth of liquidity in the face of monetary restraint. These sections consider the growth of debt and equities, their composition, and the purchases of these securities by the monetary system and by other financial institutions. It was out of this process that an expanding volume of liquid assets was fashioned.

THE GROWTH OF LIQUID ASSETS, 1939–58

The term "liquid assets" is a shorthand expression for claims held by nonfinancial sectors of the economy that are considered by these sectors to be fixed in price and redeemable into money on demand.

[1] The interpretations and conclusions are those of the author and do not necessarily reflect the views of other members of the Brookings staff or of the administrative officers of the institution. I am grateful to Yvette E. Gurley, Bert G. Hickman, and E. S. Shaw for many excellent suggestions.

The money supply itself is the most liquid of these claims, but there are many other financial assets that serve as close substitutes for money for precautionary and diversification purposes, although these assets are not media of exchange. Close substitutes for money include time deposits in commercial banks, savings and loan shares, mutual savings deposits, shares and deposits in credit unions, deposits in the Postal Savings System, policy reserves in private life insurance companies, and U.S. Government savings bonds. There is, however, no hard and fast line between these financial assets and some others.[2]

There was a tremendous growth of liquid assets during World War II. As listed in table 1, they rose from $95 billion in 1939 to almost $260 billion in 1946. U.S. Government savings bonds easily had the highest rate of growth during this period, followed by the money supply (demand deposits adjusted and currency outside of banks), which tripled. There was roughly a doubling of time deposits, savings and loan shares, postal savings deposits, and credit union shares. Smaller percentage gains were recorded for policy reserves and mutual savings deposits.

The ratio of liquid assets to GNP (in current prices) fell from 106 percent in 1939 to 88 percent in 1942, and then rose very sharply to 123 percent in 1946. If the average of the 1939–41 liquidity ratios is taken as a norm, the economy had almost $50 billion of liquid assets in excess of its requirements in 1946, which represented around 25 percent of the level of GNP in that year.

From this very high level, liquid assets continued to grow during the postwar period, reaching $430 billion in 1958. However, their annual rate of growth was lower in the postwar than in the war period. This reduced rate of growth along with the rapid increase in GNP (in current prices) lowered the ratio of liquid assets to GNP from 123 percent in 1946 to 98 percent in 1958. The liquidity ratio fell during each year of the postwar period with the exception of the recession years of 1949, 1954, and 1958. In each of these years, liquid assets spurted ahead while GNP declined slightly.

[2] For example, Treasury bills are also close substitutes for money balances. It may also be questioned whether the public looks upon policy reserves in life insurance companies as close substitutes for money. The principal findings of this paper are not altered by these marginal changes.

TABLE 1.—*Liquid assets of nonfinancial sectors and GNP, 1939–59*

[Dollars in billions; percentages]

End of—	Total liquid assets	Money supply	Time deposits	Savings and loan shares	Mutual savings deposits	Credit union shares	Postal savings deposits	Policy reserves in life insurance companies	U.S. savings bonds	Total as percent of GNP	
										Unweighted	Weighted
1939	$95.4	$36.2	$15.3	$4.1	$10.5	$0.2	$1.3	$25.8	$2.0	105.7	72.2
1940	104.6	42.3	15.8	4.3	10.7	.2	1.3	27.2	2.8	104.0	73.1
1941	115.7	48.6	15.9	4.7	10.5	.3	1.4	28.9	5.4	92.0	65.3
1942	140.7	62.9	16.4	4.9	10.6	.3	1.4	30.8	13.4	88.4	64.0
1943	175.8	79.6	19.2	5.5	11.7	.3	1.8	33.0	24.7	91.3	66.3
1944	208.7	90.4	24.1	6.3	13.4	.4	2.3	35.6	36.2	98.7	70.8
1945	240.0	102.3	30.1	7.4	15.3	.4	2.9	38.7	42.9	112.4	80.1
1946	258.8	110.0	33.8	8.5	16.9	.4	3.3	41.7	44.2	122.8	87.5
1947	271.4	113.6	35.2	9.8	17.8	.5	3.4	44.9	46.2	115.8	82.2
1948	276.7	111.6	35.8	11.0	18.4	.6	3.3	48.2	47.8	106.7	74.9
1949	283.8	111.2	36.1	12.5	19.3	.7	3.2	51.5	49.3	110.0	76.5
1950	296.2	117.7	36.3	14.0	20.0	.8	2.9	54.9	49.6	104.1	72.7
1951	310.8	124.5	37.9	16.1	20.9	1.1	2.7	58.5	49.1	94.5	66.2
1952	327.2	129.0	40.7	19.2	22.6	1.4	2.5	62.6	49.2	94.3	65.7
1953	341.6	130.5	43.7	22.8	24.4	1.7	2.4	66.7	49.4	93.5	64.6
1954	359.9	134.4	46.8	27.3	26.4	2.0	2.1	70.9	50.0	99.1	68.1
1955	376.9	138.2	48.4	32.2	28.2	2.4	1.9	75.4	50.2	94.8	64.8
1956	391.7	139.7	50.6	37.1	30.0	2.9	1.6	79.7	50.1	93.4	63.4
1957	405.3	138.6	56.1	41.9	31.7	3.4	1.3	84.1	48.2	91.6	61.5
1958	430.5	144.2	63.2	47.9	34.0	3.8	1.1	88.6	47.7	97.5	65.1
1959 (June)	433.7	139.0	65.4	51.4	34.6	4.1	1.1	91.1	47.0	90.4	59.7

Sources: Various issues of Federal Reserve Bulletin, Life Insurance Fact Book, and flow-of-funds data.

The composition of liquid assets changed markedly from 1939 to 1958. Table 2 shows that total liquid assets increased by about the same absolute amount in each of the two long periods, 1939–46 and 1946–58. In the war period, the money supply was the leading liquid-asset component, comprising about 45 percent of the increase in all liquid assets. The growth of U.S. Government savings bonds was 26 percent of the total, and the growth of other liquid assets 29 percent. In the postwar period, the picture was vastly different. From 1946 to 1958, other liquid assets made up 78 percent of the increase in all liquid assets, while the money supply and savings bonds lagged behind at 20 percent and 2 percent, respectively. Thus, liquidity expansion during the postwar years was predominantly in the form of growth of nonmonetary liquid claims on financial institutions.

TABLE 2.—*Increase in components of liquid assets during 1939–46 and 1946–58*

[Dollars in billions; percentages]

	Increase during—		Increase in component as percent of total increase	
	1939–46	1946–58	1939–46	1946–58
Money supply	$73.8	$34.2	45.2	19.9
U.S. savings bonds	42.2	3.5	25.8	2.0
Other liquid assets	47.4	134.0	29.0	78.0
Total	163.4	171.7	100.0	100.0

Source: Computed from table 1.

LIQUID ASSETS AND INTEREST RATES, 1945–58

There was a close relationship between liquid assets and levels of interest rates during the postwar period. The first section below looks at the behavior of interest rates during these years; the second considers the theoretical basis for the relationship between liquidity and interest rates; and the third examines the actual relationship during the postwar period.

Postwar behavior of interest rates

The movement of both short-term and long-term interest rates was definitely upward during the postwar period. Table 3 shows the trend in three interest rate series—prime commercial paper (6–9 months), U.S. Government taxable bonds, and corporate (Aaa) bonds. The feature of the table is that long-term rates rose very slowly for almost a decade of this period, the annual rate of increase from 1946 to 1954 being only 1.5 percent, but very rapidly thereafter, at 7 percent per annum. Thus during 9 of the 13 years of the postwar period there was little upward pressure on these rates. The short-term rate, on the other hand, rose sharply from 1946 to 1949, and then displayed little overall change to 1954. During the third short business cycle (1955–58), however, this rate shot up along with the long-term rates.

Both of the long-term rates rose slowly on the average during recovery years (1947, 1950, and 1955). They recorded their largest gains during prosperity years (1948, 1951–53, and 1956–57), and fell during each of the recession years. The short-term rate behaved similarly within the short cycles, but with greater amplitude.

TABLE 3.—*Short-term and long-term interest rates, 1946–59*

	Corporate Aaa bonds	U.S. Government taxable bonds	Prime commercial paper (4–6 months)
1946	2.53	2.19	0.81
1947	2.61	2.25	1.03
1948	2.82	2.44	1.44
1949	2.66	2.31	1.49
1950	2.62	2.32	1.45
1951	2.86	2.57	2.16
1952	2.96	2.68	2.33
1953	3.20	2.94	2.52
1954	2.90	2.55	1.58
1955	3.06	2.84	2.18
1956	3.36	3.08	3.31
1957	3.89	3.47	3.81
1958	3.79	3.43	2.46
1959 (2d quarter)	4.35	4.06	3.60
Average annual change:			
1946–58	.11	.10	.14
1946–49	.04	.04	.23
1949–54	.05	.05	.02
1954–58	.22	.22	.22
Recovery	.07	.12	.26
Prosperity	.27	.24	.52
Recession	−.19	−.19	−.75

Source: Economic Report of the President, January 1959. Federal Reserve Bulletin, November 1959.

The demand for liquid assets and interest rates

The demand for money balances by nonfinancial sectors of the economy is affected by the supply of close substitutes for money—by the supply of nonmonetary liquid assets. Other things the same, an increase in the supply of nonmonetary liquid assets will reduce the demand for money. Consequently, given the supply of money, interest rates will decline. If the money supply is reduced to the same extent as the demand for money, there will be no change in interest rates.

When nonmonetary liquid assets are only imperfect substitutes for money, an increase in their supply requires a less than proportionate reduction in the money supply to maintain the same level of interest rates. This is because an increase in the supply of nonmonetary liquid assets, under these circumstances, reduces the demand for money less than proportionately. Consequently, if the money supply is reduced by the same amount as the demand for it, total liquid assets (money plus nonmonetary liquid assets) will rise at the constant level of interest rates. Thus, a given level of interest rates can be associated with differing amounts of total liquid assets, depending on the degrees of substitutability between nonmonetary liquid assets and money and on the composition of these assets. If nonmonetary liquid assets are imperfect substitutes for money, a given level of interest rates will be associated with a smaller total of liquid assets the more these assets are composed of money and the less they are composed of nonmonetary liquid assets.

If the degree of substitutability between each type of nonmonetary liquid asset and money were known, liquid assets could be weighted in such a way that the constancy of this weighted amount would imply constant rates of interest, other things the same. To illustrate, suppose that the demand for money is reduced by one half the increase in the supply of each type of nonmonetary liquid asset. Then, if nonmonetary liquid assets rose by $100 and the money supply (along with the demand for money) fell by $50, the market for money would would remain in equilibrium at the same rates of interest. Hence, if nonmonetary liquid assets were assigned one half the weight of money, the weighted total of liquid assets would remain the same at the given level of interest rates.

If, alternatively, the demand for money is reduced to the full extent of an increase in the supply of nonmonetary liquid assets (denoting perfect substitutability between these assets and money), equal weights would be assigned to both components in order to show the correct relationship between liquidity and interest rates. Finally, at the other extreme, if an increase in the supply of nonmonetary liquid assets does not affect the demand for money at all (denoting zero degree of substitutability between these assets and money), nonmonetary liquid assets would be ignored (i.e., weighted at zero) in establishing a relationship between liquidity and rates of interest. In this

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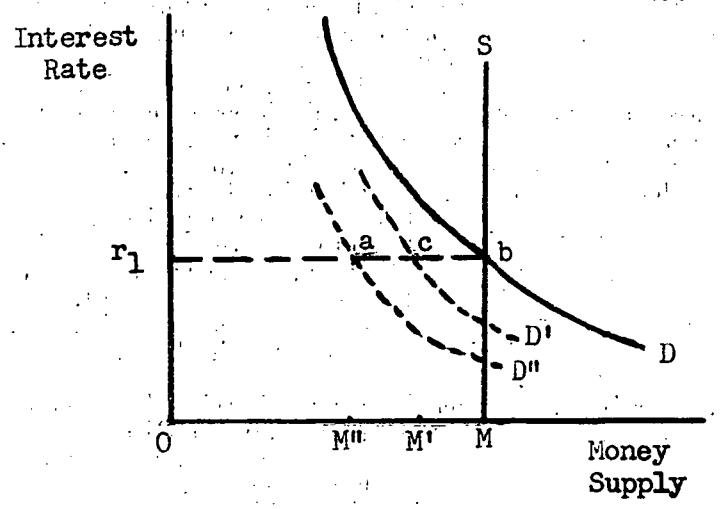
case, the money supply by itself would be a sufficient indicator of terms of lending.[3]

However, in the absence of direct information on the degrees of substitutability between each type of nonmonetary liquid asset and money, the best that one can do is to test various hypotheses about these degrees of substitutability with interest rate data. It is shown in the next section that the assumption that an increase in the supply of nonmonetary liquid assets reduces the demand for money by one-half provides a reasonable explanation of postwar interest rate behavior; at the same time this assumption is consistent with the theory that nonmonetary liquid assets have some affect on the demand for money.[4]

Postwar liquidity ratios and interest rates

The postwar behavior of interest rates is explained by movements in the ratio of liquid assets to GNP (in current prices), when it is assumed that nonmonetary liquid assets are less than perfect substitutes for money. Good results were obtained by assuming that

[3] These possibilities are summarized in the chart below, in which the money supply is measured on the horizontal axis and an average of interest rates on the vertical one. The market for money is in equilibrium at interest rate r_1, where the given stock of money OM is equal to the demand for money. Suppose that the supply of nonmonetary liquid assets increases by $M''M$, equal to ab. The interest rate will remain at r_1 if the money supply is reduced by the amount that the demand for money falls. Three possibilities with respect to the demand for money are shown. First, the demand for money may be unaffected by the increase in the supply of nonmonetary liquid assets. In this case, no reduction in the supply of money is



required to hold the interest rate at r_1, and nonmonetary liquid assets can be ignored in interest-rate analysis; that is, these assets can be assigned a weight of zero. Second, the demand for money may decline by cb, when the supply of nonmonetary liquid assets is increased by ab. If the supply of money is reduced by cb, the interest rate remains at r_1. But, at this interest rate, the unweighted amount of total liquid assets increases by ac. Hence, in order to show the same (weighted) amount of liquid assets at this interest rate, it is necessary to weight nonmonetary liquid assets by cb/ab of the weight assigned to money. Third, the demand for money may decline by ab, equal to the increase in the supply of nonmonetary liquid assets. In this case, r_1 will be maintained if the supply of money falls by ab. Thus, if equal weights are assigned to both components of liquid assets, total weighted liquid assets will remain the same at r_1.

[4] Other weights on nonmonetary liquid assets for the postwar period provide equally good explanations of interest rate behavior. Hence, the weight used in this paper is meant partly to be illustrative; it is not the "very best" weight out of an infinite number of possibilities.

It must be emphasized that the application of a weight on nonmonetary liquid assets is by no means an unusual procedure. When these assets are ignored in interest rate analysis, an implicit weight of zero is assigned to them. When, on the other hand, a few of these assets, such as time and mutual savings deposits, are included as part of the money supply, an implicit weight of unity is applied to these assets. In this case they are considered to be perfect substitutes for demand deposits and currency. Since I have considered the group of nonmonetary liquid assets to be imperfect substitutes for money, a weight between zero and unity must be assigned to the group.

an increase in the supply of nonmonetary liquid assets reduces the demand for money by one-half on the average. Accordingly, weighted liquidity-GNP ratios were constructed by giving the money supply a weight of unity and all other liquid assets a weight of one-half; these annual weighted ratios during 1939–58 are recorded in table 1.

The relationship between the weighted liquidity ratio and the corporate (Aaa) bond rate from 1945 to June 1959 is shown in chart 1. The observations trace out a smooth curve that rises from right to left very gently at first and then steeply. Thus it required a substantial reduction in the liquidity ratio, from 88 percent to 65 percent, during the first decade of the period, to achieve a modest rise in the corporate bond rate, from 2.5 percent to 3.1 percent. The continued liquidity declines, however, eventually pushed bond yields up sharply in 1956 and 1957, and the yields failed to decline very much in 1958 even in the face of a significant restoration of liquidity positions.[5]

Chart 2 shows the relationship over the same period between the weighted liquidity ratio and the prime commercial paper rate. The result is a steeply inclined curve that rises from right to left. The postwar decline in liquidity, therefore, had a stronger impact on short-term than on long-term rates.[6]

POSTWAR LIQUIDITY, INTEREST RATES, AND PRICES

Thus far we have looked at the market for money, or more generally at the market for liquid assets. This market, however, cannot be considered in isolation if one wishes to discuss the relationships among liquidity, interest rates, commodity prices, and real output. For this purpose, a general equilibrium model is required, and this is our first topic of discussion below. After that, postwar data will be examined in the light of the model. Finally, an explanation of interest rate and commodity price behavior during the postwar period will be offered.

A general equilibrium model

Assume that the economy is divided into three markets, for current output, liquid assets, and other (illiquid) financial assets. If equilibrium prevails on the first two markets, it also prevails on the third. The market for current output is in equilibrium when:

$$Y = E(Y, r, L^*/p), \tag{1}$$

where Y is real current output, r is the bond rate, L^* is weighted nominal liquid assets, and p is the commodity price level.

An increase in Y is assumed to increase the real demand for current output, but not in proportion to the increase in Y. That is, the marginal propensity to spend on current output is assumed to be less than one. An increase in r is assumed to reduce the real demand for current output, while an increase in real liquid assets (L^*/p) raises it.

[5] Essentially the same picture emerges when the weighted liquidity ratio is plotted against the Government bond rate, and when this ratio, exclusive of policy reserves in life insurance companies, or inclusive of Treasury bills, is plotted against either of the long-term rates.

[6] The relationship between the public's demand schedule for liquid assets, as shown in chart 1, and its demand schedule for money is discussed in the appendix.

CHART 1.—Relation between weighted liquidity ratios and corporate bond yield, 1945–59.

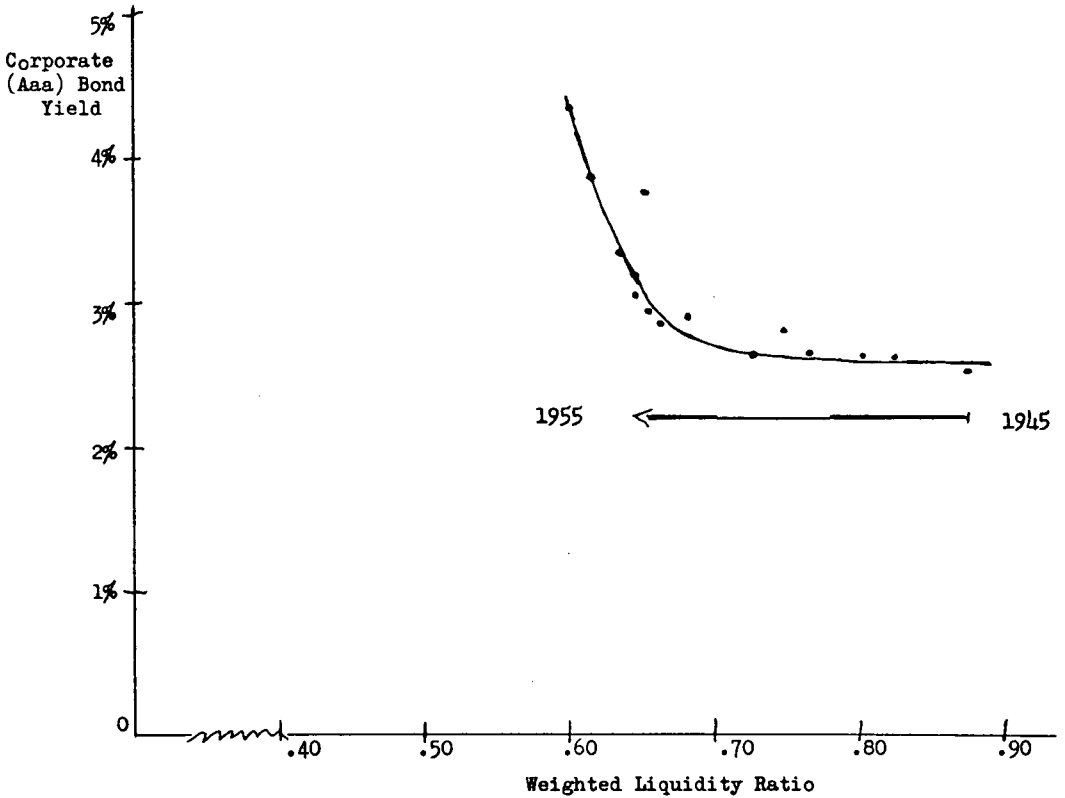
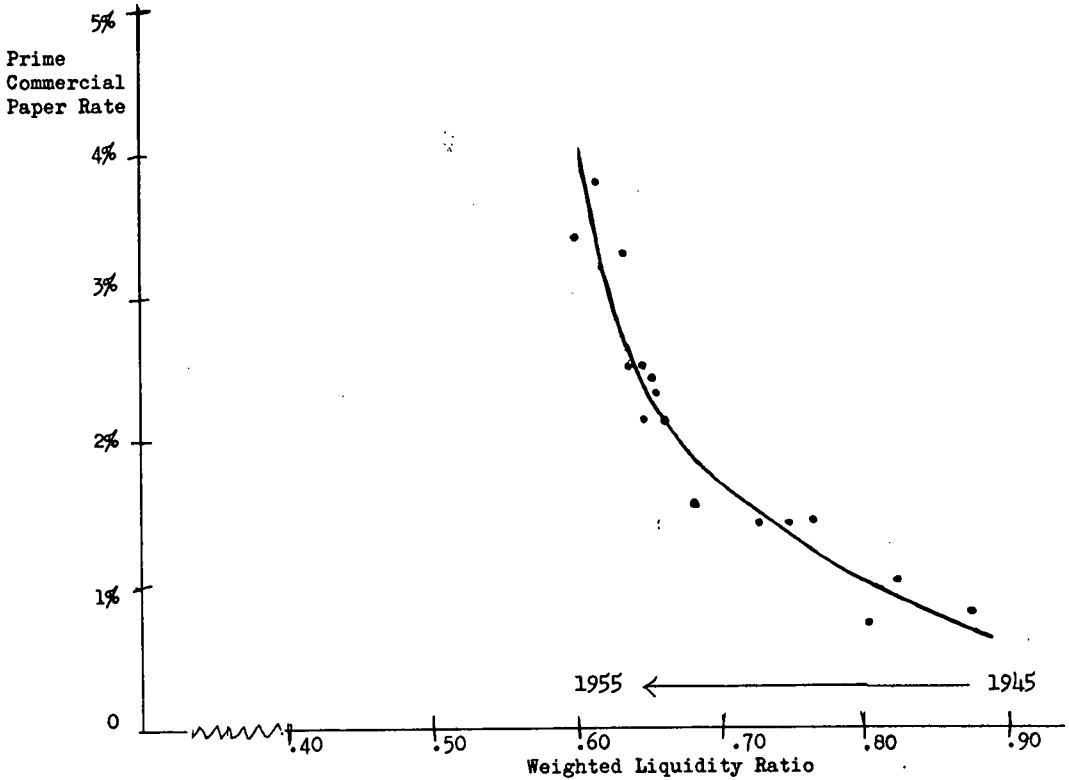


CHART 2.—Relation between weighted liquidity ratios and prime commercial paper rate, 1945–59.



The market for liquid assets is in equilibrium when:

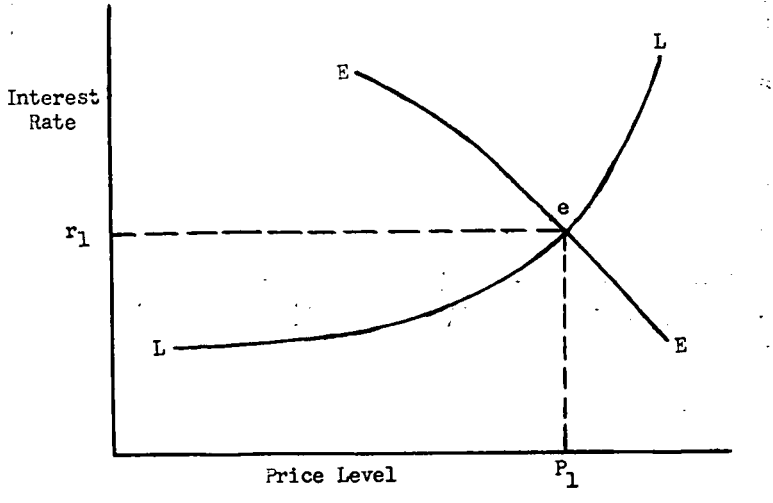
$$L^*/p = L(Y, r, L^*/p). \tag{2}$$

An increase in Y is assumed to raise the real demand for liquid assets, an increase in r to lower this real demand, and an increase in L^*/p to raise it. Real demand for liquid assets is assumed to rise less than proportionately to the rise in L^*/p.

It should be mentioned that the real demands for current output and liquid assets are affected by the public's total financial-asset portfolios, not just by its holdings of liquid assets. However, it is assumed here for simplification that total portfolios move hand in hand with the level of real income. Consequently, with respect to the market for liquid assets, an increase in the level of real income raises the real demand for liquid assets not only because more transactions and precautionary balances are needed but also because the accompanying growth of financial-asset portfolios requires additional liquid assets to maintain the same degree of portfolio diversification.

If both L^* and Y are assumed given, the system determines the rate of interest and the price level. This is shown in chart 3. The EE curve traces out alternative combinations of the price level and bond rate, given real output and the nominal amount of liquid assets, that maintain equilibrium in the market for current output. Thus, for equilibrium to prevail in this market, a reduction in the bond rate, which increases real demand for current output, must be accompanied by a rise in the price level, which reduces real demand for current output by decreasing the real value of a given nominal amount of liquid assets.

CHART 3.—Equilibrium in markets for current output and liquid assets.



The LL curve describes alternative combinations of the price level and bond rate, given real output and nominal liquid assets, that maintain equilibrium in the market for liquid assets. For equilibrium to be maintained in this market, a reduction in the bond rate, which increases the real demand for liquid assets, must be accompanied by a

fall in the price level, which raises the real supply of liquid assets by more than it increases the real demand for them.

In chart 3, equilibrum in both markets is established at point e, with a bond rate of r_1 and a price level of p_1, given real output and nominal liquid assets. An increase in real output shifts the EE curve downward, since it is assumed to increase the supply of current output by more than it increases the demand for output. A lower price level or a lower bond rate is then needed to achieve equilibrium in this market. At the same time, an increase in real output increases real demand for liquid assets and so creates excess demand in this market. Thus the LL curve shifts upward, denoting that a lower price level (which raises the real supply of liquid assets relative to the real demand for them) or a higher bond rate (which reduces the real demand for liquidity) is required to achieve equilibrium in this market. An increase in real output, therefore, by causing the EE curve to shift downward and the LL curve to shift upward, reduces the equilibrium price level and has ambiguous effects on the rate of interest.

On the other hand, an increase in nominal liquid assets works in the opposite direction. It raises the demand for current output and so shifts the EE curve upward. Simultaneously, it creates an excess supply of liquid assets and so shifts the LL curve downward. An increase in nominal liquid assets, therefore, tends to raise the price level; its effects on the rate of interest are ambiguous.

Alternative adjustment processes

At the beginning of the postwar period, at the price level then prevailing, liquid assets were excessive in relation to current output. Hence, there was strong upward pressure on commodity prices. At the same time, the large volume of liquid assets placed the economy "far out" on the almost horizontal portion of its demand schedule for liquidity (see chart 1). Long-term interest rates, therefore, were abnormally low, which further encouraged spending for current output. and these rates could not be raised significantly without sharp reductions in liquidity positions.

The status of the economy at the beginning of the postwar period is suggested by point a in chart 4. Here the market for liquid assets is in equilibrium at the wartime controlled price level p_0 and at the bond rate r_0. However, the bond rate and price level are both below the levels that would bring equilibrium to the market for current output. If real output and nominal liquid assets are given, equilibrium can be achieved in both markets, once price controls are removed, by a movement from a to e, where the price level is p_1 and the bond rate r_1. The attainment of general equilibrium by this path, however, requires substantial price inflation.[7]

What are the alternative paths to general equilibrium? Chart 5 illustrates three possibilities, in each of which the economy starts from the disequilibrium position a and seeks out a general equilibrium solution. Panel A illustrates the path taken by the economy after it is subjected to a monetary reform, which sweeps away much of the economy's excess liquid assets through conversion and blocking techniques. A monetary reform, by drastically reducing L^*, shifts the EE curve downward and the LL curve upward, so that the equilibrium price level is p_2, far below p_1.

[7] Chart 1 shows the relationship between L^*/pY and r. Chart 4 shows the relationship between p and r, when L^* and Y are given. Hence the shape of the demand schedule for liquidity in chart 1 governs the shape of the LL curve in chart 4.

CHART 4.—Position of the economy in early postwar period.

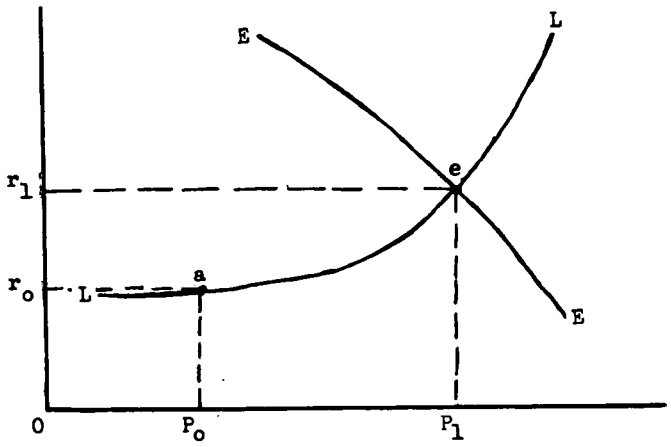
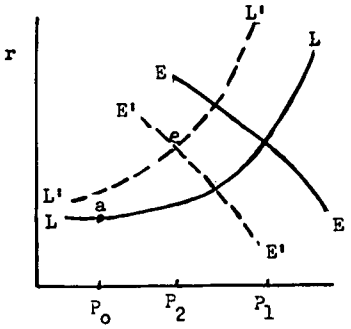
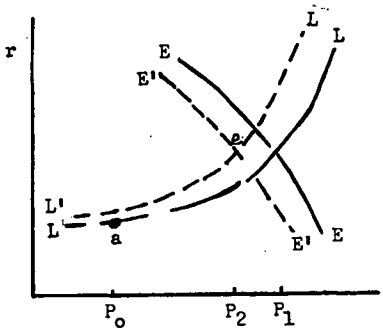


CHART 5.—Alternative paths of the economy to general equilibrium.

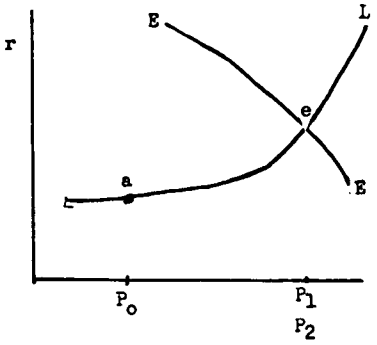
A. Monetary Reform



B. Constant nominal liquid assets: increase in real output



C. Increase in nominal liquid assets; increase in real output



Panel B shows the path toward equilibrium if nominal liquid assets are held constant during the longrun adjustment process while real output rises. The increase in real output shifts the *LL* curve upward and the *EE* curve downward, and moderates the extent of price inflation required to achieve general equilibrium.

If nominal liquid assets are permitted to grow along with real output, more or less in proportion, the path toward general equilibrium is assumed to be as illustrated in panel C. The increase in nominal liquidity tends to push both the *LL* and *EE* curves to the right, aggravating the extent of price inflation, while the increase in real output, as shown in panel B, tends to push both curves to the left. If nominal liquid assets and real output rise in about the same proportion, therefore, the two curves are assumed not to shift much on balance, so that the path to general equilibrium may be from *a* to *e* along the given *LL* curve, which generates a large amount of price inflation. The inflation is more severe the more that liquidity expansion outgains real output growth.

It is clear, then, that the task that faced the monetary authorities during the postwar years was to hold tight reins on the growth of liquidity—or better yet to reduce liquidity—while allowing growth in the supply of real output to moderate the price inflation required to achieve general equilibrium.

TABLE 4.—*Real output, liquidity, prices, and interest rates during postwar period*

	Real GNP (Y)	Nominal liquid assets (L^*)	GNP price deflator (p)	Corporate (Aaa) bond rate (r)	L^*/Y
				Percent	
1946	$282.5	$184.4	74.6	2.53	0.65
1947	282.3	192.5	83.0	2.61	.68
1948	293.1	194.2	88.5	2.82	.66
1949	292.7	197.5	88.2	2.66	.67
1950	318.1	207.0	89.5	2.62	.65
1951	341.8	217.7	96.2	2.86	.64
1952	353.5	228.1	98.1	2.96	.65
1953	369.0	236.1	99.0	3.20	.64
1954	363.1	247.2	100.0	2.90	.68
1955	392.7	257.6	101.2	3.06	.66
1956	400.9	265.7	104.6	3.36	.66
1957	408.3	272.0	108.4	3.89	.67
1958	399.0	287.4	110.7	3.79	.72

Sources: Economic Report of the President, January 1959; table 1 above; and Survey of Current Business, July 1959.

The postwar adjustment process

What was the actual path, over the long run, by which the economy sought to achieve equilibrium on markets for liquid assets and current output during the postwar period? The relevant postwar data for answering this question are recorded in table 4. It may be seen that the growth of nominal liquid assets and of real GNP during these years proceeded hand in hand, so that the ratio of the two (L^*/Y) fluctuated within narrow limits, as shown in the last column. This suggests that the longrun path taken by the economy in seeking equilibrium was similar to that of panel C in chart 5. That is to say, the growth of liquid assets and real output probably had little net effect on the position of the *LL* curve, so that the economy, starting from point *a*, worked its way during the postwar period toward successive

positions of general equilibrium by moving along the given *LL* curve to higher price levels and interest rates, as the *EE* curve shifted autonomously to the right.

Chart 6 shows the actual path taken by the economy, during 1946–58, in seeking successive positions of general equilibrium. This curve is similar to the *LL* curves drawn in previous charts. The path to general equilibrium, therefore, moved the economy at first to substantially higher price levels with little upward pressure on interest rates, and then to substantially higher interest rates with much less upward pressure on prices. Hence, during the first part of the postwar period, the equilibrating mechanism operated mainly through increases in the price level; in the later stages of the period, it operated mainly through increases in interest rates. This longrun adjustment process was inevitable, given the shape of the *LL* curve and its assumed relative stability throughout the period. The relative stability of the *LL* curve, in turn, was due to the roughly proportional expansions of nominal liquidity and real output.[8]

TABLE 5.—*Increase in prices and long-term interest rates during 1946–49, 1949–54, 1954–58*

[Percentages]

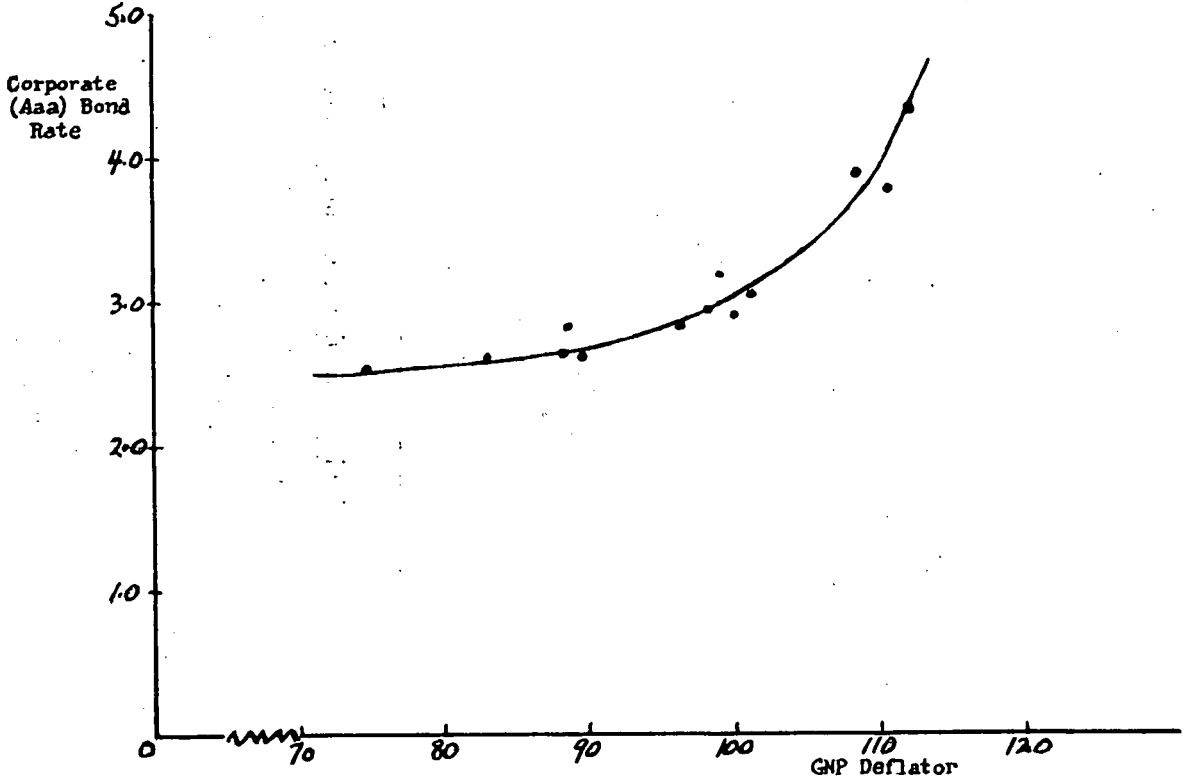
	Average annual percentage increase in:—			
	GNP price deflator	Consumer prices	Wholesale prices	Corporate (Aaa) bond yield
1946–49	6.1	7.4	8.7	0.5
1949–54	2.7	2.6	2.2	1.8
1954–58	2.7	1.9	2.0	7.7

Sources: Economic Report of the President, January 1959, and Survey of Current Business, July 1959.

The data in table 5 reflect the operation of the equilibrating mechanism through prices and long-term interest rates during three stages of the postwar period. In the initial stage of 1946–49, when the economy was moving along the almost horizontal portion of the *LL* curve, the equilibrating mechanism worked principally through the price level and hardly at all through long-term interest rates. During the second stage, as the economy began to "round the bend" of the *LL* curve, the equilibrating mechanism put more emphasis on movements in interest rates and less on those of prices. Finally, during the third stage, as the economy moved to steeper and steeper portions of the *LL* curve, the mechanism worked principally through interest rate flexibility rather than through price level movements.

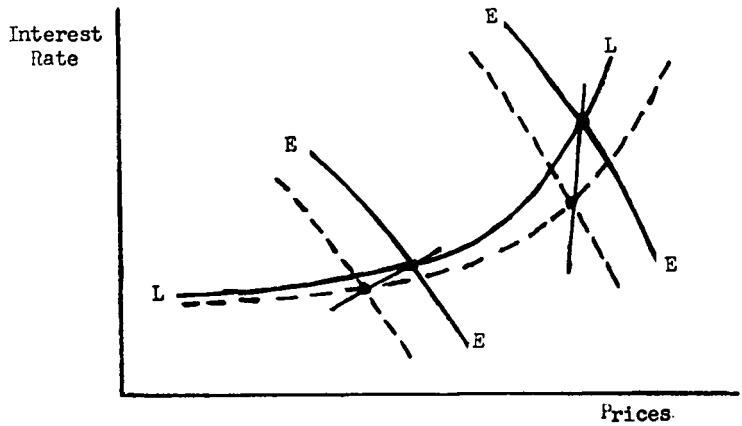
[8] There were also proportional increases in nominal liquidity and real output when the former is defined to include all U.S. Government securities held by nonfinancial sectors.

CHART 6.—Relation between prices and interest rates, 1946–58.



This long-run adjustment process was interrupted by three brief recessions, in 1949, 1953–54, and 1957–58. During each recession, there was an autonomous leftward shift of the *EE* curve.[9] At the same time, the decline in real output and the expansion in nominal liquid assets during the recessions caused the *LL* curve to shift downward. This is illustrated in chart 7. In the earlier stages of the long-run adjustment process (on the left-hand side of the chart), the recession is seen to reduce prices by more than interest rates, and the subsequent expansion to raise prices by more than interest rates. In the later stages of the adjustment process (on the right-hand side of the chart), the recession is seen to have much more impact on interest rates than on prices, and the same is true in the subsequent expansion. In fact, as the chart suggests, if liquidity growth during the recession is large enough, the equilibrating mechanism in the later stages might even raise prices slightly during downturns, which may explain interest rate and price movements in the recession of 1957–58, when the growth of nominal liquidity was enormous.

CHART 7.—Flexibility of prices and interest rates during postwar recessions.



Thus it was much easier in the earlier stages of the postwar period for commodity prices to fall in recessions and to rise in expansions than it was in the later stages. And it was more difficult in the earlier phases for long-term interest rates to fall in recessions and to rise in expansions than it was in the later ones. Prices became less flexible as the period progressed and interest rates became more flexible, in both the short and long run.

This analysis of price and interest rate movements within the short period can be made even more detailed. Within these short cycles, there was an upward shift in the *LL* curve in recovery years and a downward shift in the recession years, since nominal liquidity growth fell behind real output growth in the former years and spurted ahead in the latter. At the same time, the *EE* curve tended to shift autonomously to the right in recovery years and to the left in recession

[9] These shifts were autonomous with respect to the general equilibrium model used in this analysis. This model assumes full employment of labor services which is achieved by flexibility of interest rates and commodity prices when there are downward shifts in the *EE* curve. During the adjustment process, however, unemployment of labor services exists.

years. During the in-between, prosperity, years, the *LL* curve was relatively stable, as nominal liquidity and real output grew proportionately, while the *EE* curve tended to shift rightward.

Table 6 shows the probable effects of these movements on prices and long-term interest rates within the short business cycle during the earlier and later phases of the postwar period. The minus (−) sign denotes a downward movement in either prices or interest rates, the plus (+) sign an upward movement, and a particularly strong effect is shown by −− or ++. Thus, in the earlier phases of the postwar period, one would expect both prices and interest rates to rise somewhat in the recovery years, to continue to rise in the prosperity years, though with more upward pressure exerted on prices than on interest rates, and to fall somewhat in the recession years. On the other hand, in the later phases of the period, it would be expected that interest rates would rise sharply in the recovery year, while prices would remain fairly stable. The intense upward pressure on interest rates would continue into the prosperity years and prices would begin to move upward, too. In the recession years, interest rates would fall sharply, while prices would remain fairly stable or even rise. These expectations, in fact, correspond quite well to actual movements in prices and long-term interest rates from 1947 through 1958, either in terms of annual data (table 4) or monthly data at the cyclical turning points (which are not recorded here).[10] Postwar movements in long-term interest rates and commodity prices, therefore, can be explained by what is essentially a neoclassical framework.

TABLE 6.—*Probable movements of prices and interest rates within short cycles during earlier and later phases of postwar period*

	Earlier phases		Later phases	
	Prices	Interest rate	Prices	Interest rate
Recovery years:				
LL curve	−	+	−	++
EE curve	++	+	+	++
Net effect	+	+	0	++
Prosperity years:				
LL curve	0	0	0	0
EE curve	++	+	+	++
Net effect	++	+	+	++
Recession years:				
LL curve	+	−	++	−
EE curve	−−	−	−	−−
Net effect	−	−	+	−−

Summary

At the close of World War II, the economy had a vast amount of excess liquid assets. At the controlled price levels, excess liquidity was associated with abnormally low interest rates. Both the price and interest rate levels were below the levels necessary to achieve equilibrium in the market for current output.

General equilibrium could have been achieved and maintained with only moderate price inflation if nominal liquid assets had been reduced at the outset through a monetary reform. In lieu of this, price inflation would not have been severe if nominal liquidity had been held

[10] The explanation of short-run movements in interest rates and prices is improved a little by including all U.S. Government securities held by nonfinancial sectors in nominal liquid assets. With this inclusion, L^*/Y still shows much the same cyclical movements discussed above, but short-run movements in this ratio, which imply shifts in the *LL* curve, offer a somewhat better explanation of interest rate and price changes in a few years without worsening the explanation in other years.

fairly constant throughout the postwar period. In these cases, the equilibrating mechanism would have worked mainly through increases in interest rates rather than through increases in prices.

In the absence of an initial monetary reform, however, and in the absence of direct controls over the total supply of liquid assets, the monetary authorities were greatly handicapped in their efforts to halt the growth of liquidity and so the rise in commodity prices. Despite restraint on monetary growth, there was a large expansion of nonmonetary liquid assets during the postwar period, which mainly took the form of increases in liquid claims on financial institutions lying outside of the direct controls of the monetary authorities, and which reduced the economy's demand for money balances. This liquidity expansion, along with the growth of real output, forced the economy to seek general equilibrium by moving along the *LL* curve, at first to substantially higher price levels and only later to substantially higher interest rates.

Price flexibility was much more pronounced than interest rate flexibility within the earlier short business cycles, and much less pronounced within the later ones. This can be explained by the shapes of the *LL* and *EE* curves and leg shifts in these curves during contractions and expansions.

The remainder of this paper discusses the process by which nominal liquid assets were created during the postwar period, both in the short and long run. This process involved the growth of debts and equities of nonfinancial sectors, the raw material of liquid-asset creation, and the sale of these securities to financial institutions. This process will first be described in general terms; in subsequent sections, the manner in which it operated during the postwar period will be analyzed. This analysis will enable us to summarize the role of liquidity and financial institutions in the postwar economy.

THE MARKET FOR LOANABLE FUNDS AND THE CREATION OF LIQUID ASSETS

During any year, nonfinancial economic units sell new issues of debts and equities in the market for loanable funds. These securities are purchased by other nonfinancial economic units, by the monetary system, and by nonmonetary intermediaries. The following pages develop the broad outlines of this market.

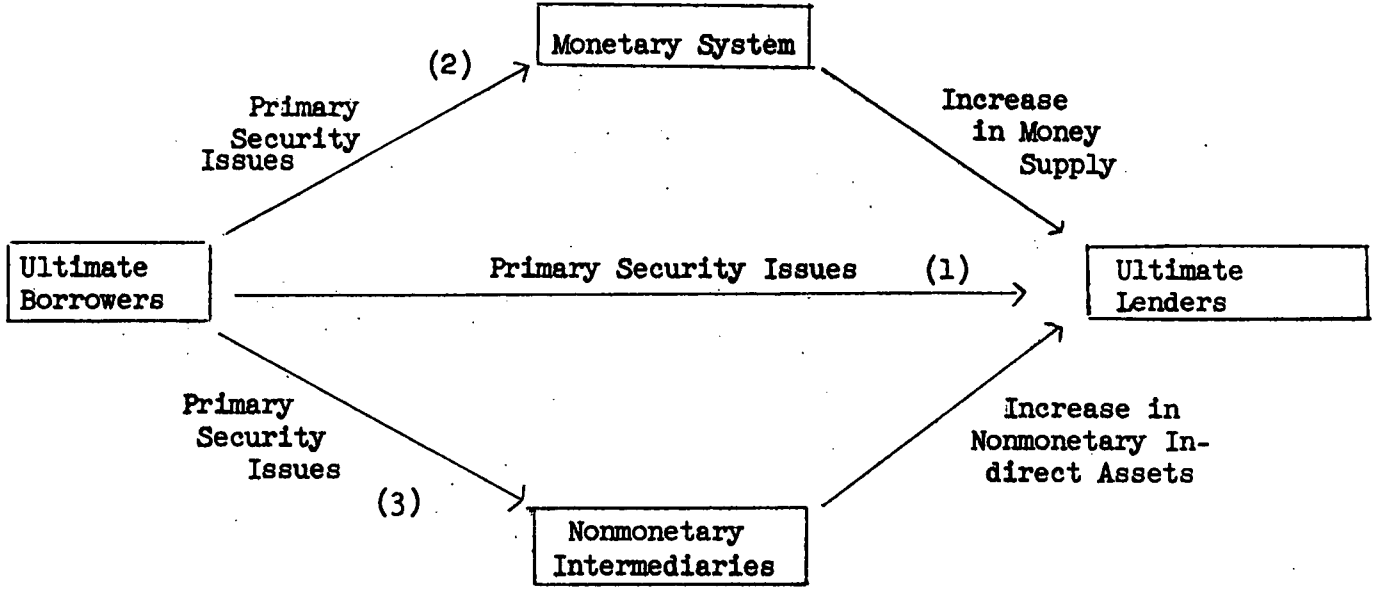
The demand for loanable funds

The net demand for loanable funds, during any year, is the planned net issues of primary securities by nonfinancial economic units—by consumers, business firms, and Government units. Primary securities are the obligations of these economic units, and they include Government securities, corporate bonds and stocks, mortgages, and a variety of short- and intermediate-term debt. The sellers of these new issues are ultimate borrowers.

Chart 8 illustrates that ultimate borrowers may sell primary securities through any of three channels: (1) Directly to ultimate lenders; (2) indirectly to them through the monetary system; or (3) indirectly to them through nonmonetary financial intermediaries.

(1) When primary securities are sold directly to ultimate lenders, the latter acquire these securities rather than claims on financial institutions. These financial transactions may conveniently be called direct finance.

CHART 8.—The market for loanable funds.



(2) When primary securities are sold to the monetary system, the ultimate lenders acquire money balances and time deposits instead of primary securities. This is called indirect finance through the monetary system. The monetary system comprises the monetary accounts of the U.S. Treasury, Federal Reserve banks, and commercial banks.

(3) When primary securities are sold to nonmonetary financial intermediaries, ultimate lenders acquire claims on these intermediaries —nonmonetary indirect assets—rather than primary securities. This is called indirect finance through nonmonetary intermediaries. These intermediaries include mutual savings banks, savings and loan associations, life insurance companies, credit unions, and similar institutions. Nonmonetary indirect assets are mutual savings deposits savings and loan shares, policy reserves, and so on. For some purposes the time deposit departments of commercial banks should be included in the group of nonmonetary intermediaries.

The supply of loanable funds

The net supply of loanable funds, during any year, is the demand for primary securities by ultimate lenders, the monetary system, and nonmonetary intermediaries.[11] When ultimate lenders supply loanable funds, they acquire primary securities. When the monetary system supplies loanable funds, it acquires primary securities and ultimate lenders accumulate money and time deposits. When nonmonetary intermediaries supply loanable funds, they acquire primary securities and ultimate lenders receive nonmonetary indirect assets. These relationships are shown in chart 8.

Market equilibrium

The market for loanable funds is in equilibrium when the demand for loanable funds is equal to the supply of loanable funds. It is in equilibrium, in other words, when issues of primary securities by ultimate borrowers are equal to the incremental demand for primary securities by ultimate lenders, the monetary system, and nonmonetary intermediaries.[12] When there is excess demand for loanable funds, interest rates on primary securities rise and other terms of lending tighten. When there is excess supply of loanable funds, interest rates on primary securities fall and other terms of lending are eased.

[11] This is what the orthodox definition amounts to. In that definition the supply of loanable funds is:

Planned saving by economic units
+
Increase in stock of money
−
Increase in economy's demand for money (hoarding)

Assuming that saving and investment are done by different groups and that savers do not repay debts, planned saving is equal to economic units' increase in demand for primary securities, money, and nonmonetary indirect assets. The increase in the economy's demand for money minus that of economic units is the increase in demand for money by nonmonetary intermediaries. With these definitions, the supply of loanable funds becomes:

Economic units' increase in demand for primary securities
+
Economic units' increase in demand for nonmonetary indirect assets
+
Increase in stock of money
−
Nonmonetary intermediaries' increase in demand for money

The second item above is equal to nonmonetary intermediaries' increase in demand for primary securities and money; the third item above is equal to the monetary system's increase in demand for primary securities, neglecting gold. This yields my definition.

[12] This assumes an initial state of equilibrium—that the stock of primary securities is initially equal to the demand for this stock.

Internal and external finance

Nonfinancial economic units finance their expenditures for current output either internally or externally. Expenditures are financed internally when they are financed out of current income or from existing holdings of financial or real assets. Expenditures are financed externally when economic units issue primary securities to obtain funds for spending. External finance may take the form of direct finance, when primary security issues are sold directly to other nonfinancial economic units, or of indirect finance, when primary issues are sold to financial intermediaries.

Creation of financial and liquid assets

All financial assets are created by someone. Primary securities are created by nonfinancial economic units when they sell new issues for money. (The money may then be used to purchase current output, primary securities, or other assets.) Indirect securities are created by financial intermediaries. Money, as one type of indirect security, is created by the monetary system when it purchases primary securities. Nonmonetary indirect securities are created by other financial intermediaries when they sell claims on themselves for money. (The money may then be used to purchase primary securities.)

Liquid assets, as previously noted, comprise those financial assets that nonfinancial economic units consider to be fixed in price and redeemable into money on demand. The money supply itself has the highest degree of liquidity. Some nonmonetary indirect assets, such as time deposits, savings and loan shares, mutual savings deposits, and credit union shares, also qualify as liquid assets. Finally, a small portion of primary securities is highly liquid, the most notable example being savings bonds of the U.S. Government. Thus liquid assets are created by the monetary system when it purchases primary securities and creates money and time deposits. They are also created by nonmonetary intermediaries when they purchase money and create liquid claims on themselves, and then "sell" money for primary securities. Economic units then end up with more liquid assets, comprising the same amount of money and additional liquid claims on nonmonetary intermediaries. Finally, liquid assets are created, in small part, by those nonfinancial economic units who issue highly liquid primary securities, such as savings bonds.

The scope of monetary controls

The monetary authorities have no direct controls over the amount of internal financing done by nonfinancial economic units. Moreover, they have only limited direct control over the amount of external financing done.

With respect to external financing, the monetary authorities ordinarily do not control directly the demand for loanable funds (issues of primary securities). Further, they have no direct control over the supply of loanable funds coming from ultimate lenders and from nonmonetary intermediaries (except that emanating from time deposit departments of commercial banks, when they are included in nonmonetary intermediaries). Instead, monetary controls usually impinge on only one portion of the total supply of loanable funds—that coming from the monetary system.

The monetary authorities seek to regulate the total supply of loanable funds in relation to the total demand for these funds. They try to restrict the supply of loanable funds in relation to the demand when they want credit tightness. They endeavor to increase the supply relative to the demand when they want credit ease. The purpose of credit tightness is to reduce spending for current output and to lower commodity prices. Credit ease is meant to increase spending for current output, which may raise commodity prices. Consequently, by controlling one portion of the total supply of loanable funds, without directly controlling the demand for these funds, and without directly controlling internal financing, the monetary authorities attempt to influence aggregate spending in the economy.

The efficacy of monetary controls in the postwar period

Monetary controls were not eminently successful during the postwar period in halting increases in commodity prices, despite the fact that the growth of the money supply was held in check. Many observers feel that the impact of monetary policy on prices and output has been weakened over the past few decades by fundamental changes in the economic environment, and that these changes account for the comparatively poor postwar record of the monetary authorities.

One of the fundamental changes, it is believed, has been the fast growth of nonmonetary financial intermediaries, which lie outside of the monetary authorities' direct control. These intermediaries, by purchasing large amounts of primary securities, have greatly increased the supply of loanable funds and have created a substantial volume of highly liquid assets.

One writer has pointed out the implication of this in the following way:

> Since the end of World War II the spectacular growth of the assets of financial institutions other than commercial banks reflects * * * the efficiency of financial markets in assembling "idle" funds and putting them to work in commerce and industry. This process not only can continue in the face of restrictions on the growth of commercial bank assets, but it is even likely for a time to be accelerated by a restrictive credit policy. A rise of interest rates increases the cost of holding demand deposits, on which commercial banks have been forbidden to pay interest since 1935. Hence, rising interest rates, especially if the movement is of considerable magnitude and duration, tend to stimulate both consumers and business firms to convert their cash balances into earning assets. This can often be done without any significant loss of liquidity. For example, when an individual draws on his checking account to buy a life insurance policy or to acquire savings and loan shares or to deposit funds in a mutual savings bank, he obtains against a financial institution a claim which can be readily converted into cash. The institution, in turn, having acquired ownership over a part of his demand deposit, now has additional money to lend to others who are likely to be active spenders. In these and other ways the loans of financial intermediaries can for a time grow quite rapidly even when the reserves of commercial banks are severely restricted by Federal Reserve actions.[13]

There is little doubt that ultimate borrowers obtained much of their postwar external financing through the sale of primary security issues to nonmonetary financial intermediaries, that the intermediaries obtained loanable funds by selling claims—often highly liquid ones—on themselves for money balances, and that such financing took place beyond the reach of the monetary authorities. This process of indirect finance not only increased the supply of loanable funds but at the same time it expanded the volume of liquid assets in the economy.

[13] Arthur F. Burns, "Prosperity Without Inflation," pp. 50-51.

As already pointed out, the increase in these nonmonetary liquid assets was largely responsible for holding long-term interest rates at relatively low levels, which in turn encouraged an excessive amount of spending for current output and culminated in price inflation.

The process by which liquid assets were created in the postwar period, therefore, can best be studied by examining the issues of primary securities in these years, the purchases of these securities by financial institutions, and the resulting expansion of liquid claims.

NET ISSUES OF PRIMARY SECURITIES, 1947–58

This section presents the annual amount of net issues of primary securities from 1947 through 1958. These annual net issues are then examined in relation to the level of gross national product. Finally, an explanation is given of the annual ratio of primary security issues to GNP.

Primary security issues and gross national product

Primary securities are all debt and equity obligations of nonfinancial economic units. These obligations include Federal Government securities, State and local government securities, corporate bonds and stocks, mortgages, consumer short- and intermediate-term debt, trade debt, and "other" bank loans.[14] Net issues of the components of primary securities are computed as changes in year end amounts outstanding, except for corporate bonds and stocks. In these cases, valuation is made at issue prices, the procedure being significant only for corporate stocks.

The annual net issues of primary securities from 1947 to 1958 are recorded in table 7, along with the average annual net issues during each of the three short business cycles (1947–49, 1950–54, and 1955–58) and during recovery years (1947, 1950, and 1955), prosperity years (1948, 1951, 1952, 1953, 1956, and 1957), and recession years (1949, 1954, and 1958).[15]

[14] "Other" bank loans excludes net purchases by commercial banks of mortgages and consumer debt, and includes policy loans of life insurance companies. Some minor debts of nonfinancial economic units are omitted from the total of primary securities. On the other hand, this total includes a small amount of primary securities (e.g., bonds and stocks) of financial institutions, principally stock issues of mutual funds.

[15] This analysis and subsequent ones are marred to some extent by the use of annual rather than monthly or quarterly data (seasonally adjusted). Nothing can be done about this, however, since the latter data are not available for most of the series during the full period.

TABLE 7.—*Net issues of primary securities and GNP, 1947–58*

[Dollars in billions; percentages]

	Net issues of primary securities (1)	GNP (in current prices) (2)	Net issues-GNP ratio (percentages) (3)
1947	$20.1	$234.3	8.6
1948	18.2	259.4	7.0
1949	18.8	258.1	7.3
1950	35.8	284.6	12.6
1951	31.8	329.0	9.7
1952	39.4	347.0	11.4
1953	32.4	365.4	8.9
1954	31.9	363.1	8.8
1955	52.9	397.5	13.3
1956	35.6	419.2	8.5
1957	34.8	442.5	7.9
1958	44.7	441.7	10.1
Annual average:			
1947–49	19.0	250.6	7.6
1950–54	34.3	337.8	10.2
1955–58	42.0	425.2	9.9
Recovery	36.3	305.5	11.9
Prosperity	32.0	360.4	8.9
Recession	31.8	354.3	9.0

Sources: See table 9 for sources of net issues of primary securities. GNP data are from Survey of Current Business, July 1959.

The data show an upward trend in annual net issues of primary securities during the postwar period, with a low of about $18 billion in 1948 and a high near $53 billion in 1955. The upward trend is also reflected in the average annual net issues during the three short business cycles. It is also clear that annual net issues tended to be relatively high in the recovery years and somewhat lower in the prosperity and recession years. However, in 2 of the 3 recession years, net issues rose from the previous year's level, and in the other they fell only very slightly.

Table 7 also records GNP (in current prices) and the ratio of net issues of primary securities to GNP. The issues-GNP ratio fluctuated between 7.0 percent and 13.3 percent during the period, the average for the period being 9.6 percent. The ratio was relatively low in the first short cycle and was around 10 percent in each of the other two. In each of the 3 recovery years, the ratio was at a maximum for its short cycle. In the prosperity years, it was substantially lower, but there was a tendency for it to rise in the recession years, the rise being particularly marked in 1958.

Basic determinants of the issues-GNP ratio

Why did economic units issue primary securities during most years of the postwar period that amounted to about 10 percent of the level of GNP? What factors account for the relatively heavy primary issues in recovery years, or the relatively light issues during the first short business cycle? This and the following section attempt to answer these and related questions.

Gross national expenditures and gross national income are distributed among millions of nonfinancial economic units each year—among millions of consumer and business units, thousands of State and local governments, and the Federal Government. Expenditures, however, are never distributed among these units in exactly the same way as income. Some economic units during a year have expenditures

in excess of income (deficits) and others have income in excess of expenditures (surpluses). From an ex post viewpoint, the sum of the deficits is always equal to the sum of the surpluses.

Deficit units can finance their excess expenditures by issuing primary securities or by drawing down previously accumulated financial (or real) assets. Surplus units can "invest" their excess incomes by acquiring financial (or existing real) assets or by repaying debts. Thus, ignoring existing real assets, deficits have their counterparts in net increases in debt and equity obligations, while surpluses are reflected in net acquisitions of financial assets. Aside from accounting discrepancies, net issues of primary securities by economic units are always equal to net acquisitions of financial assets by economic units.

Suppose that deficit units finance their excess expenditures entirely by issues of primary securities and that surplus units "invest" their excess incomes entirely in acquisitions of financial assets. Then, clearly, net issues of primary securities are equal to the sum of economic units' deficits (or surpluses). And these issues as a ratio of GNP are, of course, equal to the deficit-GNP ratio. In this simple case, the average propensity of deficit units to issue primary securities is unity—their issues equal their deficits—and the average propensity of surplus units to acquire financial assets is also unity—they acquire financial assets equal to their surpluses.

The financing of deficits and surpluses, however, may take other forms. Suppose that deficit units finance their excess expenditures partly by drawing down existing holdings of financial assets and partly by primary issues. Suppose, further, that surplus units use their excess incomes partly to repay outstanding debts and partly to build up financial assets. Then, for two reasons, net issues of primary securities are smaller than before: deficit units issue less securities, and surplus units retire some outstanding issues. The two average propensities are each less than unity. In this case, the issues-GNP ratio is less than the ratio of deficits to GNP.

It is possible for the relationship between the two ratios to be reversed. This is true if deficit units issue primary securities not only to cover their excess expenditures but also to build up their financial assets, and if surplus units acquire financial assets in excess of their surpluses by issuing primary securities. The two average propensities are now each greater than unity: deficit units issue primary securities in excess of their deficits, and surplus units acquire financial assets in excess of their surpluses. Hence net issues of primary securities exceed the sum of deficits in the economy; the issues-GNP ratio is greater than the deficit-GNP ratio.

The relationships among these basic determinants of the issues-GNP ratio can be shown in the following way:

$$\frac{\text{Net issues}}{\text{GNP}} = \frac{D}{\text{GNP}}(d+s-1).$$

Here D/GNP is the planned ratio of deficits to GNP, which is equal, in equilibrium, to the planned ratio of surpluses to GNP; d is the average propensity of deficit units to issue primary securities; and s is the average propensity of surplus units to accumulate financial assets.

The sum of d and s is likely to lie between 1 and 2, because deficits are financed principally by primary issues and surpluses are financed principally by accumulation of financial assets. This sum would be unity if half of deficits was financed by primary issues and half of surpluses went into acquisitions of financial assets. The sum would be 2 if all deficits were financed by primary issues and all surpluses took the form of financial-asset accumulation. Assuming that $(d+s)$ is greater than unity, it follows that the issues-GNP ratio rises as D/GNP rises—as deficits grow relative to the level of GNP. Alternatively, given D/GNP, the ratio of net issues to GNP rises as d and s rise—as deficits are increasingly financed by primary issues and surpluses go increasingly into financial assets.

What factors influence the level of D/GNP? This ratio depends essentially on the distribution of income among economic units relative to the distribution of spending among them. When these two distributions are exactly the same, each economic unit has a balanced budget on income and product account, so that D/GNP is zero. At the other extreme, when the two distributions are totally different, some economic units do all the spending and others receive all the income. Then the sum of deficits (or surpluses) is equal to the level of GNP, and D/GNP is unity.[16] In the normal cases, income and spending distributions differ from one another in some degree, so that D/GNP is positive but less than unity.

The income and spending distributions, it seems likely, will remain fairly stable so long as the growth rate of GNP itself is reasonably stable. Steady output growth can generally be expected to preclude large shifts in expenditures and incomes among economic units. Conversely, large changes in the growth rate of output, whether positive or negative, are likely to wrench apart the two distributions, opening up large budget imbalances among economic units. This is because such changes in the growth rate of output often imply sizable increases or decreases in expenditures of many economic units relative to their current income, which in turn lead to sizable changes in incomes of other economic units relative to their expenditures.

For example, a sharp increase in economic activity from the bottom of a recession might be accompanied by relatively large deficits in many business firms and consumer units, if the larger expenditures originated there, and by correspondingly large surpluses in (say) other consumer units and the Federal Government, reflecting a rapid rise in their incomes relative to expenditures. Or a large decline in private expenditures may lead to a relatively large deficit for the Federal Government, with correspondingly large surpluses in other areas of the economy. Budget imbalances may also grow rapidly, relative to national output, when Government spending is sharply increased or reduced.

Hence a sizable change in the growth rate of output, up or down, can be expected to widen the difference between the distribution of spending among economic units and the distribution of income among them. And as these distributions become increasingly different both deficits

[16] The U.S. economy during the postwar period was probably much closer to the first than to the second extreme: the great bulk of total expenditures was financed by economic units out of their own current incomes. However, in the absence of any data on these distributions, it is not possible to say much more than that. Available data on deficits and surpluses are for broad sectors of economic units—consumers corporate business firms, etc. What is required are data on budget imbalances of the millions of individual economic units.

and surpluses in the economy grow relative to the level of national output. These enlarged budget imbalances tend to increase net issues of primary securities.

What are the determinants of d and s? The average propensities to issue primary securities and to acquire financial assets probably depend on a large number of factors. The most important during the early years of the postwar period was probably the amount of liquid assets in the economy. Excess liquidity is likely to have a depressing influence on primary security issues. It enables and encourages deficit units to finance their excess expenditures by drawing down previously accumulated financial assets rather than by issues of new securities. At the same time, surplus units are encouraged to use their excess incomes to pay off previously accumulated debt rather than to build up already inflated holdings of financial assets. Excess liquidity, therefore, reduces both the average propensity to issue primary securities and the average propensity to acquire financial assets. For these reasons, it reduces net issues of primary securities, at any level of deficits. Conversely, inadequate liquidity positions tend to increase net issues of primary securities. They encourage deficit units to finance excess expenditures by security issues and surplus units to use excess income to build up financial assets (rather than to retire debt).

Liquidity positions, however, have a second effect that works in the opposite direction. It has already been shown that lower ratios of liquid assets to GNP during the postwar period were associated with higher rates of interest. Higher interest rates should lead to smaller deficits, less external financing of deficits, and so to smaller net issues of primary securities. Therefore, reductions in excess liquidity, while making external financing more imperative, at the same time tend to discourage it by raising its cost. On balance, then, there may be little or no net effect on external financing from liquidity positions. It is highly unlikely, though, that these two opposing forces canceled out during the early postwar period, when liquidity positions were far in excess of normal requirements and when reductions in these positions did not lead to significant increases in interest rates. But they might well have canceled out in the later years of the period.

Determinants of postwar ratio of net issues to GNP

In any case, a test can be made of the hypothesis that the annual net issues of primary securities during the postwar period, relative to the level of GNP, were determined by the change in the growth rate of national output and by the degree of excess liquidity in the economy. The results show that these two variables do in fact explain fairly well the issues-GNP ratio during 1947–58, while the first variable alone offers an extremely good explanation of the ratio during 1950–58, when excess liquidity was of lesser importance.

Table 8 shows the annual ratios of net issues to GNP during 1947–58. Also listed are the annual changes in the growth rate of GNP and the annual amounts of excess liquidity in the economy over the same period. The change in the growth rate of GNP is the difference, without regard to sign, between the growth rate in the current year and the growth rate in the previous year. Excess liquidity is measured as the weighted ratio of the public's holdings of liquid assets to GNP in the current year less the ratio in 1942.

The results of multiple correlation between the issues-GNP ratio, as the dependent variable, and the two independent variables in table 8 are shown in chart 9. The actual issues-GNP ratios are compared with the calculated ones for the period 1947–58, the estimating equation being recorded at the bottom of the chart. This equation shows that the issues-GNP ratio was positively related to the change in the growth rate of GNP and negatively related to excess liquidity (R= .75). The equation gives an issues-GNP ratio of 8.1 percent when both the change in the growth rate of output and excess liquidity are zero. These conditions were most closely approached in 1953 and 1957 when the actual ratios were 8.9 percent and 7.9 percent, respectively. The equation produces exceptionally low issues-GNP ratios when there is very little change in the growth rate of output and when excess liquidity is heavy, as in 1948. In that year, in fact, the ratio was at its lowest level for the period, 7 percent. Finally, the equation shows that the highest ratios appear when there is a substantial change in the growth rate of output and when excess liquidity is low. These conditions were most closely approximated in 1955 when the actual ratio was at its peak of 13.3 percent.

TABLE 8.—*The issues—GNP ratio and its determinants, 1947–58*

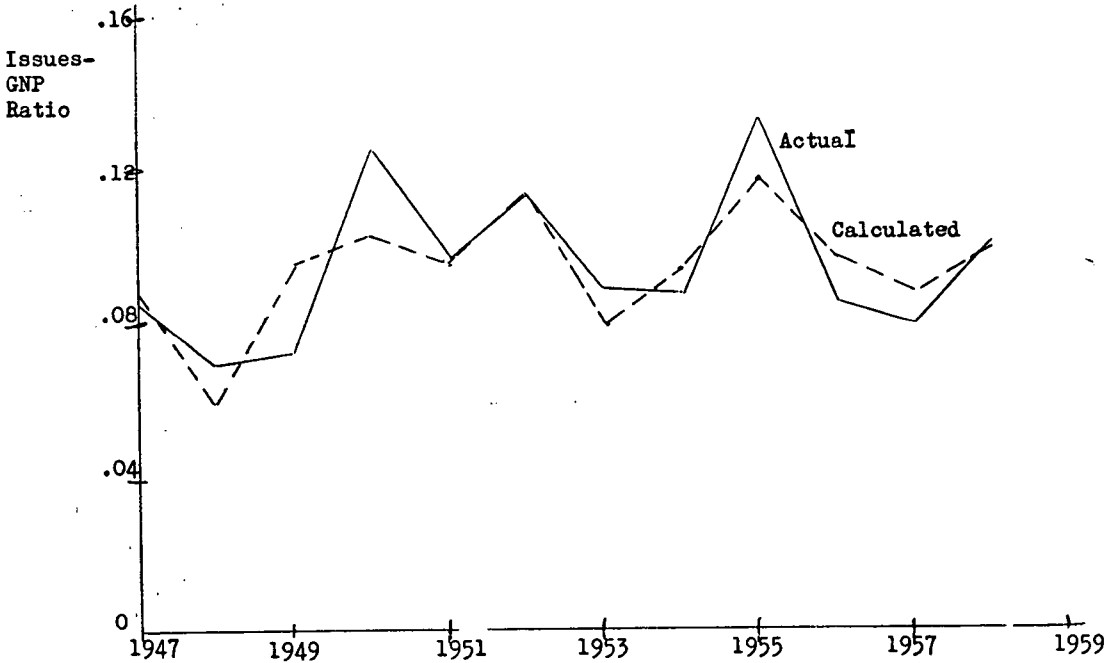
[Percentages]

	Net issues-GNP ratio	Change in growth rate of GNP	Excess liquidity
1947	8.6	12.6	18.2
1948	7.0	.5	10.9
1949	7.3	11.2	12.5
1950	12.6	10.8	8.7
1951	9.7	5.3	2.2
1952	11.4	10.1	1.7
1953	8.9	.2	.6
1954	8.8	5.9	4.1
1955	13.3	10.1	.8
1956	8.5	4.0	−.6
1957	7.9	.4	−2.5
1958	10.1	5.6	1.1

Source: Tables 1 and 7; Survey of Current Business, July 1959.

Inasmuch as excess liquidity, as shown in table 8, was largely worked off by 1950–51, it seems likely that the single independent variable—the change in the growth rate of GNP—might by itself largely explain the issues-GNP ratios during the last two short business cycles. This simple correlation was made for the period 1950–58, and the outcome appears in chart 10. There it may be seen that the relation between the calculated and actual ratios is quite close (r=+.90). Substantial changes in the growth rate of output, as in 1950, 1952, and 1955, led to very high ratios of net issues to GNP. The lowest ratios appeared for the most part during years when there was little change in the growth rate.

CHART 9.—Actual and calculated issues-GNP ratios, 1947–58.

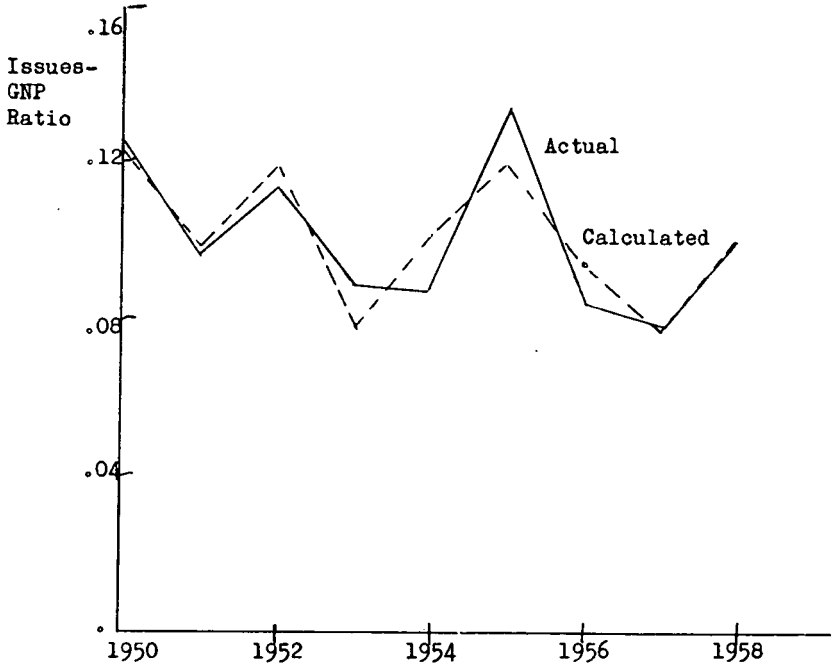


$Y_c = 8.08 + .37X_1 - .21X_2$

X_1 change in growth rate of GNP

X_2 excess liquidity

CHART 10.—Actual and calculated issues-GNP ratios, 1950–58.



$$Y_c = 7.67 + .43X$$

X change in growth rate of GNP

Summary

In summary, net issues of primary securities relative to GNP during the postwar period were positively related to the change in the growth rate of national output, irrespective of the direction of change, and negatively related to excess liquidity. The comparatively low issues-GNP ratios during the early postwar years were due to the presence of substantial amounts of excess liquidity. This enabled economic units to finance a large portion of their deficits by shifting existing financial assets to surplus units. After most of the excess liquidity was worked off, the issues-GNP ratios are almost entirely explained by changes in the growth rate of output. Large changes in this growth rate presumably opened up large budget imbalances among economic units and thus led to heavy primary security issues. When the growth rate was fairly steady from one year to the next, primary issues were light, presumably because deficits and surpluses were relatively small.

THE COMPOSITION OF PRIMARY SECURITY ISSUES, 1947–58

Primary security issues were the raw material from which liquid assets were created by financial institutions. The purchases of primary securities by financial institutions were greatly influenced not only by the quantity of these issues but also by their composition. It

is therefore necessary to examine the mix of primary issues before turning to the process of intermediation.

Primary securities, as already noted, are composed of Federal Government securities, State and local government securities, corporate bonds and stocks, mortgages, consumer debt, trade debt, and bank loans (other than mortgages and consumer debt). During the period 1947–58, net issues of these securities total $396 billion. Table 9 records the components of these issues for the period, in dollar amounts, while table 10 gives the same data in percentages of total net issues.

TABLE 9.—*Net issues of primary securities, 1947–58*

[Dollars in billions]

	Total net issues	Federal Government securities (1)	State and local government securities (2)	Corporate and foreign bonds (3)	Corporate stocks (4)	Mortgages (5)	Consumer debt (6)	Other bank loans (7)	Trade debt (8)
1947	20.1	−2.5	1.3	3.1	1.4	7.1	3.2	3.4	3.1
1948	18.2	−4.1	2.1	4.9	1.2	7.3	2.8	2.0	2.0
1949	18.8	4.3	2.4	3.2	1.5	6.5	2.9	−1.1	−.9
1950	35.8	−.5	3.0	2.3	1.7	10.1	4.1	6.6	8.5
1951	31.8	2.8	2.1	4.1	2.6	9.5	1.2	4.7	4.8
1952	39.4	7.9	2.8	5.0	3.1	9.1	4.8	3.0	3.7
1953	32.4	7.8	3.9	4.9	2.3	9.9	3.8	−.3	.1
1954	31.9	3.6	4.5	3.7	2.6	12.5	1.0	1.3	2.7
1955	52.9	2.0	3.5	4.0	3.0	16.2	6.4	8.7	9.1
1956	35.6	−4.1	3.2	5.0	3.8	14.5	3.4	5.4	4.4
1957	34.8	−1.7	4.7	7.5	4.0	12.1	2.7	2.7	2.8
1958	44.7	8.0	5.7	6.9	4.2	14.6	.3	2.2	2.8

Sources:
Col. (1) Economic Report of the President, January 1959, p. 195.
Col. (2) Federal Reserve Bulletin, August 1959; flow-of-funds data.
Col. (3) Ibid.
Col. (4) Ibid.
Col. (5) Economic Report of the President, January 1959, p. 193.
Col. (6) Ibid., p. 191. 1958 figure from Federal Reserve Bulletin, June 1959.
Col. (7) Federal Reserve Bulletin, August 1959; flow-of-funds data. Includes bank loans n.e.c., security loans from banks, and policy loans from insurance companies.
Col. (8) Ibid. Includes gross data of noncorporate business sector.

TABLE 10.—*Percentage composition of primary security issues, 1947–58*

	Total net issues	Federal Government securities	State and local government securities	Corporate and foreign bonds	Corporate stocks	Mortgages	Consumer debt	Other bank loans	Trade debt
1947	100.0	−12.4	6.5	15.4	7.0	35.3	15.9	16.9	15.4
1948	100.0	−22.5	11.5	26.9	6.6	40.1	15.4	11.0	11.0
1949	100.0	22.9	12.8	17.0	8.0	34.6	15.4	−5.9	−4.8
1950	100.0	−1.4	8.4	6.4	4.7	28.2	11.5	18.4	23.7
1951	100.0	8.8	6.6	12.9	8.2	29.9	3.8	14.8	15.1
1952	100.0	20.1	7.1	12.7	7.9	23.1	12.2	7.6	9.4
1953	100.0	24.1	12.0	15.1	7.1	30.6	11.7	−.9	.3
1954	100.0	11.3	14.1	11.6	8.2	39.2	3.1	4.1	8.5
1955	100.0	3.8	6.6	7.6	5.7	30.6	12.1	16.4	17.2
1956	100.0	−11.5	9.0	14.0	10.7	40.7	9.6	15.2	12.4
1957	100.0	−4.9	13.5	21.6	11.5	34.8	7.8	7.8	8.0
1958	100.0	17.9	12.8	15.4	9.4	32.7	.7	4.9	6.3
Annual average:									
1947–58	100.0	5.9	9.9	13.8	7.9	32.6	9.2	9.7	10.9
1947–49	100.0	−4.0	10.2	19.6	7.2	36.6	15.6	7.5	7.4
1950–54	100.0	12.6	9.5	11.7	7.2	29.8	8.7	8.9	11.6
1955–58	100.0	2.5	10.2	13.9	8.9	34.2	7.6	11.3	11.4
Recovery	100.0	−.9	7.2	8.6	5.6	30.7	12.6	17.2	19.0
Prosperity	100.0	4.5	9.8	16.3	8.8	32.5	9.7	9.1	9.3
Recession	100.0	16.7	13.2	14.5	8.7	35.2	4.4	2.5	4.8

Source: Computed from table 9.

Mortgages comprised one-third of primary security issues for the entire period. In fact, during 3 years of the period mortgage issues reached 40 percent of the total, and they dipped below 28 percent only once. It is clear from the data that mortgage issues were far and away the leading component of the total. Corporate bond issues, averaging around 14 percent, were the second largest component. Bunched around the 10 percent level were State and local government securities, consumer debt, bank loans, and trade debt. At the bottom of the scale were corporate stocks and Federal Government securities.

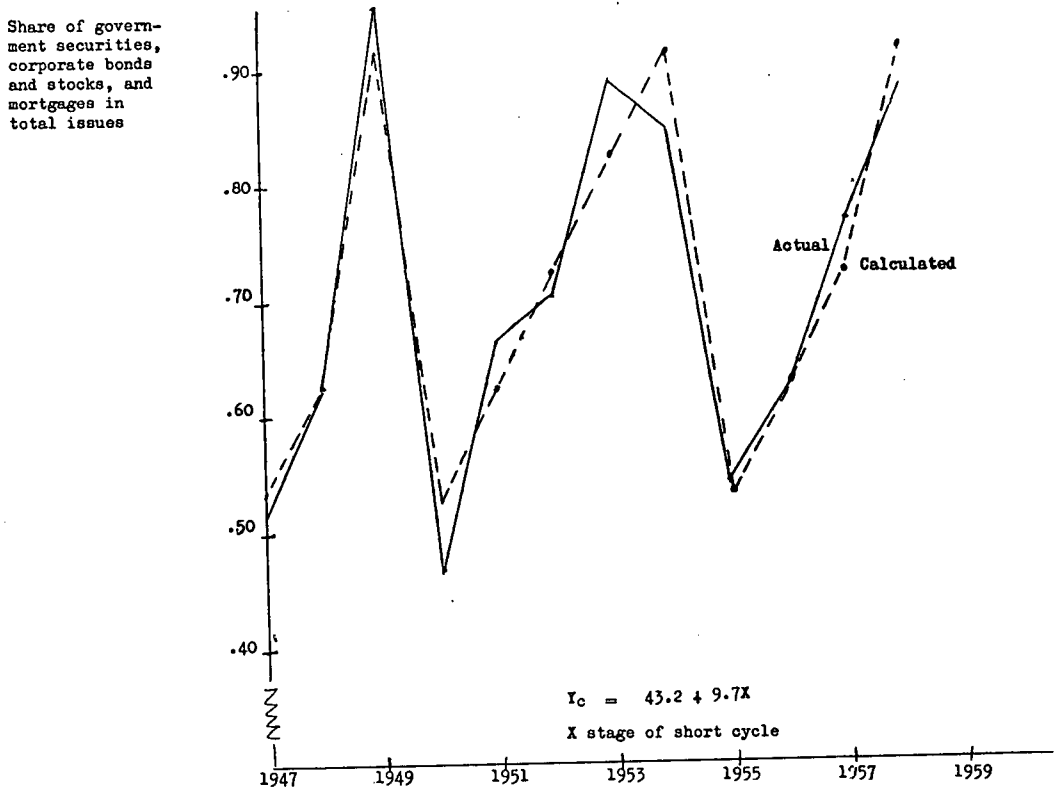
Net issues of Federal Government securities, as a share of total net issues, typically rose from recovery to prosperity to recession years. To a lesser extent, this pattern was followed by State and local government securities and mortgages. Corporate bonds and stocks tended to gain in relative importance from recovery to prosperity years, but then lost some ground in the recession years, though not much. As a group, then, these securities rose in relative importance during the course of the short cycle.

Consumer debt, bank loans, and trade debt all behaved similarly, but in the opposite way to the first group. These securities fell as a percentage of total net issues as each short cycle progressed. Combined increases in these three components made up about 50 percent of total net issues in recovery years, around 30 percent in prosperity years, and only a little more than 10 percent in recession years. The first group of securities—Government securities, corporate issues, and mortgages—obviously displayed opposite movements, rising from 50 percent in recovery to 70 percent in prosperity and to 90 percent in recession years.

The combined annual issues of this first group of securities, as a percentage of total issues, are explained by the stage of the short business cycle. The share of these securities in total issues, it has just been seen, rose from recovery to prosperity years and then reached a peak during the recession years. Accordingly, let 1 stand for each of the recovery years, 2, 3, and 4 for the first, second, and third prosperity years respectively (if and when they occur in the short cycle), and 5 for each of the recession years. Thus, the years in the first short cycle are numbered in order 1, 2, and 5; those in the second 1, 2, 3, 4, and 5; and those in the third 1, 2, 3, and 5. This series of numbers is the independent variable that is meant to explain the dependent one—the annual share of the first group of securities in total issues of all securities.

The results of simple correlation are reflected in chart 11. The equation at the bottom of the chart estimates that these issues are 52.9 percent of total issues in the recovery years (when $X=1$), 62.6 percent in the first prosperity years (when $X=2$), and so on to the recession years when the share is estimated at 91.7 percent (when $X=5$). It may be seen that the results are good, the coefficient of correlation being $+0.96$.

CHART 11.—Actual and calculated shares of group 1 issues in total issues, 1947–58.



The group of securities, then, composed of Government securities, corporate bonds and stocks, and mortgages rose in a predictable way as a percentage of total issues within the short business cycle. Changes in the composition of this group of securities, however, were not as predictable. In some years, Government securities were especially heavy, as in 1952 and 1953 when defense expenditures rose sharply, while the private long-term issues (corporate bonds and stocks and mortgages) were relatively light. In other years, such as 1948 and 1956, the reverse was true. The composition of this group of securities depended in large part on what was happening to Federal Government expenditures, and these expenditures in turn were greatly influenced by autonomous factors. This is mentioned here because it will be shown later that purchases of primary securities by the monetary system, on the one hand, and by nonmonetary intermediaries, on the other, were affected by the composition of this group of securities.

In summary, during recovery years, when the change in the growth rate of national output was large, primary security issues were heavy relative to GNP. At the same time, these issues were divided about evenly between Government securities, corporate securities, and mortgages, on the one hand, and consumer debt, trade debt, and bank loans, on the other. During the prosperity years, primary security issues relative to GNP were somewhat lower because the growth rate of national output tended to be comparatively steady from one year to the next. In these years, primary issues were weighted more heavily toward the first group of securities, with the weight increasing as the number of prosperity years grew. Finally, during recession years, when there was a fairly large change in the growth rate of national output, primary security issues again tended to be large relative to GNP. At these times, the issues were composed almost predominantly of the first group of securities, and there was a virtual drying up of consumer debt, trade debt, and bank loans.

These were the postwar patterns for primary security issues and their composition. We turn now to the process of financial intermediation, to purchases of primary securities by financial institutions.

PURCHASES OF PRIMARY SECURITIES, 1947–58

Ultimate borrowers may sell primary security issues directly to ultimate lenders (direct finance) or indirectly to them through financial intermediaries (indirect finance). Financial intermediaries include the monetary system and nonmonetary financial intermediaries. This section examines the proportions of primary security issues directly and indirectly financed during the postwar period, with the intention of showing how indirect finance led to the growth of liquid claims on financial intermediaries.

Direct and indirect finance

There were almost $400 billion of primary security issues during the period 1947–58. Net purchases of primary securities by financial intermediaries represented a little less than half of total issues, and net purchases by other lenders a little more than half. For purposes of this discussion, financial intermediaries include all institutions that create highly liquid claims—claims that are fixed in price and redeemable into money on demand. These institutions are Federal Reserve banks, commercial banks, life insurance companies, mutual savings banks, savings and loan associations, the Postal Savings Savings System, and credit unions. The first two make up the monetary system, and the others are nonmonetary intermediaries. "Other lenders" are principally business firms and consumers but they also include some financial institutions and trust funds, such as sales finance companies and government trust funds. The data in table 11 give the annual net purchases of primary securities by each of the several financial intermediaries and by all other lenders during the period 1947–58.

Financial intermediation was relatively inactive during the recovery years, increased during prosperity years, and reached peak levels during recession years. Thus, as shown in table 12, the average proportions taken by financial intermediaries in these three stages of the short business cycle rose from 34 percent to 45 percent to 67 percent. Intermediation was twice as heavy on the average in recession years as in recovery years.

The proportion of total net issues purchased by other lenders moved, of course, in precisely the opposite way. Other lenders made relatively heavy purchases in recovery years, reduced their purchases as a percentage of net issues in prosperity years, and cut back even more in the recession years.

TABLE 11.—*Net purchases of primary securities by financial intermediaries and other lenders, 1947–58*

[In billion dollars]

	Total monetary system	Commercial banks	Federal Reserve banks	Total nonmonetary intermediaries	Life insurance companies	Mutual savings banks	Savings and loan associations	Postal Savings System	Credit unions	Total other lenders
1947	1.3	2.3	−1.0	5.6	3.0	1.0	1.4	0.1	0.1	13.2
1948	−2.8	−2.0	−.8	5.5	3.6	.7	1.2	−.1	.1	15.5
1949	4.0	5.9	−1.9	6.3	3.9	1.1	1.3	−.1	.1	8.5
1950	5.3	6.5	−1.2	6.6	3.9	.8	2.0	−.2	.1	23.9
1951	10.3	5.9	4.4	6.7	3.7	.9	2.1	−.3	.3	14.8
1952	9.3	9.0	.3	9.7	4.7	1.7	3.0	.0	.3	20.4
1953	5.7	4.1	1.6	10.3	4.6	2.0	3.6	−.2	.3	16.4
1954	10.1	10.2	−.1	11.8	5.5	2.0	4.3	−.3	.3	10.0
1955	4.3	5.0	−.7	13.4	5.5	2.1	5.6	−.2	.4	35.2
1956	4.0	4.2	−.2	12.1	5.1	2.0	4.8	−.3	.5	19.5
1957	4.6	5.0	−.4	11.3	4.6	1.9	4.6	−.3	.5	18.9
1958	16.5	15.1	1.4	14.7	5.9	2.4	6.2	−.2	.4	13.5

Sources: Various issues of Federal Reserve Bulletin; Life Insurance Fact Book, 1959; and flow-of-funds data, Federal Reserve Bulletin, August 1959. Purchases by other lenders are residuals.

TABLE 12.—*Percentage of primary issues purchased by monetary system, nonmonetary intermediaries, and other lenders, 1947–58*

[Percentages]

	Total financial intermediaries	Monetary system	Nonmonetary intermediaries	Other lenders
1947	34.4	6.5	27.9	65.6
1948	14.8	−15.4	30.2	85.2
1949	54.8	21.3	33.5	45.2
1950	33.2	14.8	18.4	66.8
1951	53.5	32.4	21.1	46.5
1952	48.2	23.6	24.6	51.8
1953	49.4	17.6	31.8	50.6
1954	68.7	31.7	37.0	31.3
1955	33.4	8.1	25.3	66.6
1956	45.2	11.2	34.0	54.8
1957	45.7	13.2	32.5	54.3
1958	69.8	36.9	32.9	30.2
Annual average:				
1947–58	47.2	18.3	28.9	52.8
1947–49	35.0	4.4	30.6	65.0
1950–54	50.2	23.8	26.4	49.8
1955–58	48.3	17.5	30.8	51.7
Recovery	33.6	10.0	23.6	66.4
Prosperity	45.3	16.2	29.1	54.7
Recession	66.8	32.1	34.7	33.2

Sources: Computed from table 11.

The data in table 12 also show the proportions of primary security issues purchased during the postwar period by the monetary system, on the one hand, and by nonmonetary intermediaries, on the other. The monetary system purchased less than one-fifth of total primary security issues for the period as a whole, and less than 40 percent of those purchased by all financial intermediaries. The monetary system's share of total issues was quite low during recovery years, increased during prosperity years, and rose to a peak in recession years. Thus it behaved similarly to all financial intermediaries by raising its percentage of total issues purchased within the short business cycle. This pattern was upset only in 1947–48, when the monetary system's share was reduced from the recovery to the prosperity year. It should also be noted that the monetary system made unusually heavy purchases in 1951, which reflected the financing of the Korean war.

Nonmonetary intermediaries purchased about 30 percent of total primary security issues for the period. Within the short cycles, their behavior was similar to that of the monetary system: they purchased relatively small shares in recovery years, somewhat larger ones in prosperity years, and peak shares in recession years. There was, however, substantially less fluctuation in the proportion of primary issues purchased by nonmonetary intermediaries than there was for the monetary system.

Determinants of nonmonetary intermediation

It has just been shown that nonmonetary intermediaries purchased relatively small proportions of primary security issues during recovery years, larger proportions during prosperity years, and peak ones during recessions. What factors account for this?

The behavior of nonmonetary intermediaries is partly explained by the rate of growth of GNP (in current prices). High rates of output growth generally came in recovery years, when these intermediaries made relatively small purchases of primary securities, and low rates of output growth occurred in recession years, when such intermediation

was heaviest. Simple correlation between the share of primary issues purchased by nonmonetary intermediaries and the rate of growth of GNP, from 1947 through 1958, does in fact reveal an inverse relationship ($r=-.75$).

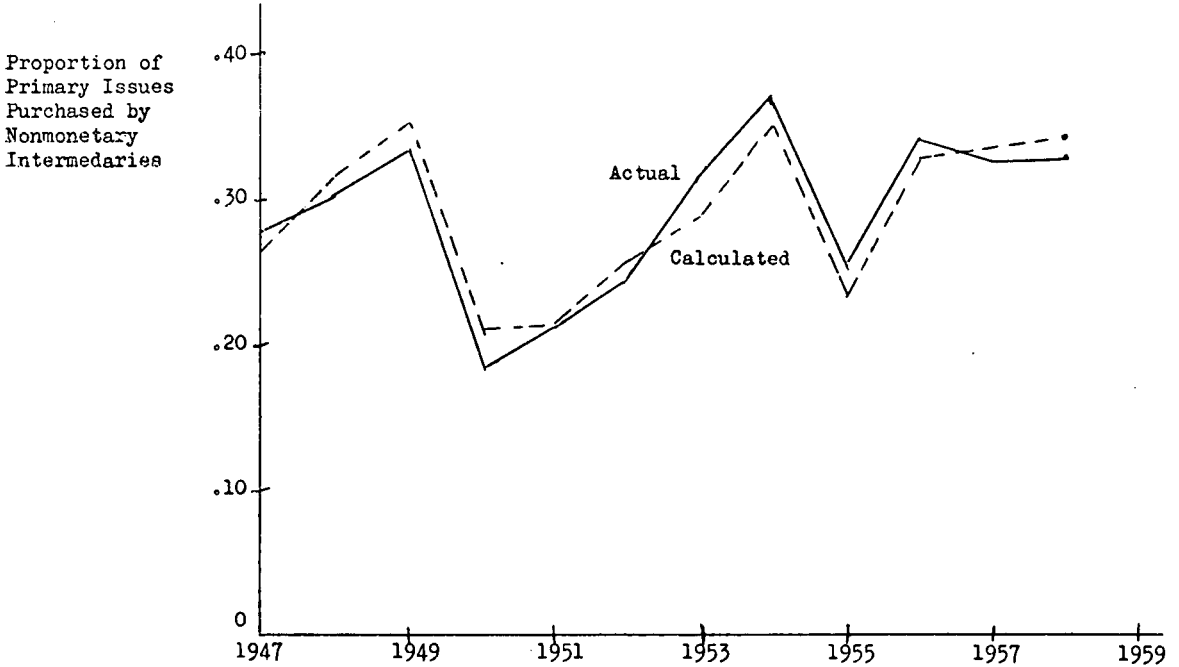
There are several reasons for this. During years of high rates of output growth, the flow of funds to these nonmonetary intermediaries tended to slow down, as economic units increased their demands for current output and for money balances (for transactions purposes). At the same time, primary security issues were relatively heavy. Thus nonmonetary intermediaries tended to purchase relatively small proportions of total issues.

During years of average rates of growth of output (mainly prosperity years), the flow of funds to the intermediaries speeded up. Simultaneously, primary security issues were lighter. These factors led to comparatively large purchases of primary securities by the intermediaries. Finally, during years of low rates of output growth (in recession years), the flow of funds to the intermediaries was especially large, as economic units reduced their demands for current output and money balances. Concurrently, however, primary security issues were generally somewhat larger than in the immediately preceding prosperity years, though not as large as in the recovery years. The net result was that the intermediaries tended to purchase larger proportions of total issues during years of low output growth.

This explanation, though, is not completely satisfactory; it does not adequately take account of the effects on intermediation of the changing composition of primary security issues within the short cycle. It is likely that the activities of nonmonetary intermediaries were more influenced by private long-term issues—corporate bonds, corporate stocks, and mortgages—than by Government securities and the group of issues including trade debt, consumer debt, and bank loans. During years when private long-term issues were especially large relative to total issues, strong pressure was probably exerted from the demand side of the loanable funds market on the nonmonetary intermediaries to obtain additional funds. Conversely, when private long-term issues were comparatively small, pressure might have been eased considerably on the intermediaries, leading to less effort on their part to obtain funds.

This was tested by multiple correlation of the dependent variable, the proportion of primary security issues purchased by nonmonetary intermediaries, with two independent variables, the rate of growth of GNP (in current prices) and the proportion of private long-term securities in total issues. (There is no significant relationship between the two independent variables.)

CHART 12.—Actual and calculated proportions of primary issues purchased by nonmonetary intermediaries, 1947–58.



$Y_c = 15.9 - .7X_1 + .3X_2$

X_1 rate of growth of GNP

X_2 ratio of private long-term issues to total issues

TABLE 13.—*Basic data for estimating proportion of primary issues purchased by nonmonetary intermediaries, 1947–58*

[Percentages]

	Rate of growth of GNP	Private long-term issues as percent of total issues	Net purchases of nonmonetary intermediaries as percent of total issues	
			Actual	Calculated
1947	11.2	57.7	27.9	26.4
1948	10.7	73.6	30.2	31.7
1949	−.5	59.6	33.5	35.1
1950	10.3	39.3	18.4	21.2
1951	15.6	51.0	21.1	21.2
1952	5.5	43.7	24.6	25.9
1953	5.3	52.8	31.8	28.9
1954	−.6	59.0	37.0	35.0
1955	9.5	43.9	25.3	23.2
1956	5.5	65.4	34.0	32.8
1957	5.6	67.9	32.5	33.5
1958	−.2	57.5	32.9	34.2

Sources: Table 9 and Economic Report of the President, January 1959.

Chart 12 shows the results of this test for the period 1947–58; the basic data are in table 13. The equation at the bottom of the chart estimates the share taken by nonmonetary intermediaries at 15.9 percent when both the growth rate of GNP and the proportion of private long-term securities in total issues are zero. A lower rate of output growth tends to increase the intermediaries' share, and relatively heavier issues of private long-term securities work in the same direction. The calculated ratios are very close to the actual ones (R=.95).

Thus nonmonetary intermediaries purchased their smallest proportion of primary issues in 1950, when the growth rate of output was especially high and at the same time private long-term securities were at their lowest level relative to total issues. On the other hand, intermediaries' purchases were at their peak in 1954; in that year the growth rate of GNP was negative and primary issues were made up heavily of private long-term securities.

In summary, nonmonetary intermediaries purchased low shares of total issues during years of high rates of output growth, except when private long-term issues happened to be relatively heavy, as in 1948. During years of lower rates of output growth, nonmonetary intermediaries were unusually active, except when private long-term issues happened to be fairly small, as in 1952. It is clear, therefore, that the growth of nonmonetary intermediaries depended not only on the "normal" flow of funds coming to them but also on the pressure exerted on them from the demand side of the loanable funds market to obtain additional funds for private long-term financing.

Monetary and nonmonetary intermediation

The monetary system appears to have acted more erratically than nonmonetary intermediaries during the postwar period. Purchases of primary securities by the monetary system, as a proportion of total issues, were a negative 15 percent in 1948, only 7 or 8 percent in 1947 and 1955, and as high as 37 percent in 1958. These data are in table 12. Despite these large fluctuations, however, the monetary system tended to purchase relatively small proportions of primary issues

during recovery years, larger proportions in prosperity years, and peak shares in recession years, the averages being 10 percent, 16 percent, and 32 percent, respectively. Only 2 years stand out as definite exceptions: the prosperity year of 1948, when the monetary system's share was −15 percent; and the prosperity year of 1951, when its share was 32 percent. In the former year, large gold purchases by the monetary system largely offset its negative purchases of primary securities; in the latter year, heavy purchases of primary securities by Federal Reserve banks, in response to the needs of Korean war financing, were responsible for the "irregular bahavior" of the monetary system.

The monetary system's share of primary issues, therefore, aside from the two exceptions just noted, was closely associated with the rate of growth of GNP (in current prices), in the same way that the behavior of nonmonetary intermediaries was so associated. That is to say, a high rate of output growth, coming mainly in the recovery years, not only reduced the share of primary issues purchased by nonmonetary intermediaries but also lowered the share taken by the monetary system. A low rate of output growth, coming in the recession years, had the opposite impact on both types of institution. "Normal" rates of output growth were associated with "normal" proportions of primary issues purchased by them.[17]

It was previously shown that nonmonetary intermediaries were influenced not only by the rate of growth of GNP but also by the proportion of total primary security issues taking the form of private long-term issues (corporate bonds, stocks, and mortgages). As these long-term issues gained in relative importance, nonmonetary intermediaries purchased larger proportions of total issues. As the long-term issues declined, nonmonetary intermediation tended to be depressed.

The monetary system behaved in exactly the opposite way. Its purchases tended to be depressed when total primary issues were composed heavily of corporate bonds, stocks, and mortgages. On the other hand, its purchases were stimulated by large issues of Government securities and by heavy short- and medium-term financing by the private sectors. For example, in the three recovery years, during each of which the rate of growth of GNP was about the same, the monetary system did especially well in 1950, when private long-term issues were comparatively light; and it made relatively small purchases in 1947, when private long-term issues were exceptionally large. Moreover, the share of primary issues taken by the monetary system was depressed in both 1956 and 1957, and in these years the proportion of primary issues composed of private long-term issues was at peak levels.

Thus the monetary system and nonmonetary intermediaries were both affected in the same way by the rate of growth of GNP but in opposite ways by the composition of primary security issues. This is brought out clearly in the two estimating equations below, each the result of multiple correlation between the share of primary issues purchased by the monetary system (Y_c) and by nonmonetary intermediaries (Y'_c) and two independent variables—the growth rate

[17] Simple correlation reveals an inverse relationship between the share of primary issues taken by the monetary system and the rate of growth of GNP (in current prices), with $r=-.83$. The estimating equation is: $Y_c=28.1-1.87X$. The period covered is 1947-58, excluding 1948 and 1951.

of GNP (X_1) and the proportion of primary issues composed of private long-term issues (X_2):

Monetary system:

$$Y_c = 52.0 - 2.26X_1 - .40X_2 \text{ (1947–58, excluding 1948 and 1951; } R = .90).$$

Nonmonetary intermediaries:

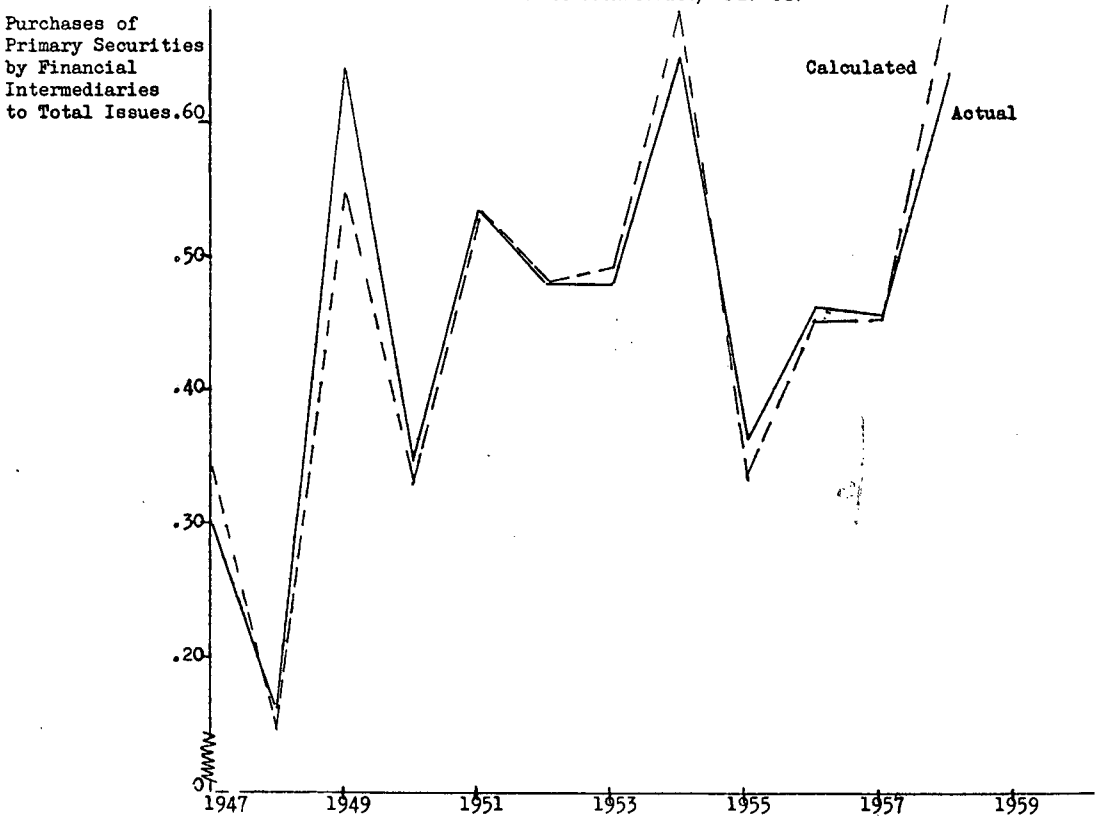
$$Y'_c = 15.9 - .70X_1 + .32X_2 \text{ (1947–58; } R = .95).$$

The equations show that the share of primary security issues purchased by the monetary system was considerably more sensitive to the growth rate of GNP than was the share taken by nonmonetary intermediaries, which accounts for the greater volatility of the monetary system. But both were affected in the same direction by this variable. It can also be seen that both types of institution were about equally sensitive to the composition of primary security issues; however, the monetary system tended to be depressed by the relative growth of private long-term issues while nonmonetary intermediation was stimulated. Hence this second independent variable largely cancels out when the two types of institution are combined, leaving the rate of growth of GNP as the important variable affecting the proportion of primary security issues purchased by the entire group of financial intermediaries. That is to say, given the rate of growth of GNP, and hence the share of primary issues purchased by all financial intermediaries, the composition of these issues determined how much of this share went to the monetary system and how much to nonmonetary intermediaries.

Utilizing the above equations, and taking the monetary system's purchases of primary securities as a proportion of total issues as autonomous (that is, unexplained) in 1948 and 1951, the share of primary issues taken by the entire group of financial intermediaries can be estimated for each of the postwar years. This is shown in chart 13, which compares the actual shares purchased by the intermediaries with the calculated ones. Except for the underestimation in 1949 and the overestimation in 1958, the relationship between the two series is very close.

Why were heavy issues of private long-term securities a depressant on monetary intermediation, and light issues of these securities a stimulant? In lieu of any investigation of this matter, several suggestions may be made. First, heavy issues of private long-term securities, as we have seen, stimulated nonmonetary intermediation. This tended to ease terms of lending throughout the economy. In response to this, the monetary authorities may have tightened up on purchases of primary securities by the monetary system more than they otherwise would have. In this way, the monetary system may have been used as a counterweight to the activities of nonmonetary intermediaries. Second, heavy issues of private long-term securities meant light issues of Government securities and light demands by business and consumers for short- and intermediate-term financing.

CHART 13.—Actual and calculated ratios of primary security purchases by financial intermediaries to total issues, 1947–58.



Since the monetary system specializes in these financing needs, its primary security purchases tended to be depressed. With Government security issues light, Federal Reserve banks were under less pressure to provide funds to the Government. With light demands from business and consumers for short- and intermediate-term financing, commercial banks had little pressure exerted on them from the demand side of the loanable funds market. This may have led them to seek funds less energetically, through the use of rediscounting, through the Federal funds market, and by transfers from demand to time account.

Under the opposite conditions, when private long-term security issues were relatively small, nonmonetary intermediation was less active, so that less restraint was required on the monetary system. At the same time, the relatively large issues of Government securities and the heavy demands from business and consumers for short- and intermediate-term financing placed pressure on the monetary system to purchase additional primary securities. Federal Reserve purchases of Government securities, rediscounting by commercial banks, more vigorous use of the Federal funds market, and the encouragement of shifts from demand to time deposits may have been the result.

Creation of liquid claims by financial intermediaries

During the postwar period, financial intermediaries purchased $187 billion of primary securities, which represented almost half of all primary security issues. These asset gains by financial intermediaries were accompanied by roughly equivalent increases in their liabilities and capital accounts. The bulk of the liabilities took the form of highly liquid claims, which were acquired by ultimate lenders. These lenders chose to hold indirect liquid assets rather than the primary securities, leaving it to the intermediaries to hold the latter.

TABLE 14.—*Primary security purchases by financial intermediaries and the growth of indirect liquid assets, 1947–58*

[Dollars in billions]

	Financial intermediaries		Monetary system		Nonmonetary intermediaries	
	Primary securities	Liquid claims	Primary securities	Liquid claims	Primary securities	Liquid claims
1947	$6.9	$10.6	$1.3	$5.0	$5.6	$5.6
1948	2.7	3.7	−2.8	−1.4	5.5	5.1
1949	10.3	5.6	4.0	−.1	6.3	5.7
1950	11.9	12.1	5.3	6.7	6.6	5.4
1951	17.0	15.1	10.3	8.4	6.7	6.7
1952	19.0	16.3	9.3	7.3	9.7	9.0
1953	16.0	14.2	5.7	4.5	10.3	9.7
1954	21.9	17.7	10.1	7.0	11.8	10.7
1955	17.7	16.8	4.3	5.4	13.4	11.4
1956	16.1	14.9	4.0	3.7	12.1	11.2
1957	15.9	15.5	4.6	4.4	11.3	11.1
1958	31.2	25.7	16.5	12.7	14.7	13.0

Source: Tables 1 and 11.

Table 14 compares the purchases of primary securities by financial intermediaries with the growth of liquid claims on them. The same comparisons are made for the monetary system and for nonmonetary intermediaries. Liquid claims on the monetary system include the money supply and time deposits, while those on nonmonerary intermediaries include mutual savings deposits, postal savings deposits, credit union shares and deposits, savings and loan shares, and policy reserves of life insurance companies. Over the entire period, liquid claims on all financial intermediaries increased by $168 billion, or by about $17 billion less than the purchases of primary securities by them. The difference is due to changes in other assets, other liabilities, and capital accounts of the intermediaries.

The monetary system purchased about $73 billion of primary securities during the period and created $64 billion of liquid claims. Its purchases of primary securities fell short of the growth of liquid claims on it during recovery years and exceeded the growth of these claims in prosperity and recession years. Thus the growth of liquid claims on the monetary system tended to be steadier within the short cycle than the system's purchases of primary securities.

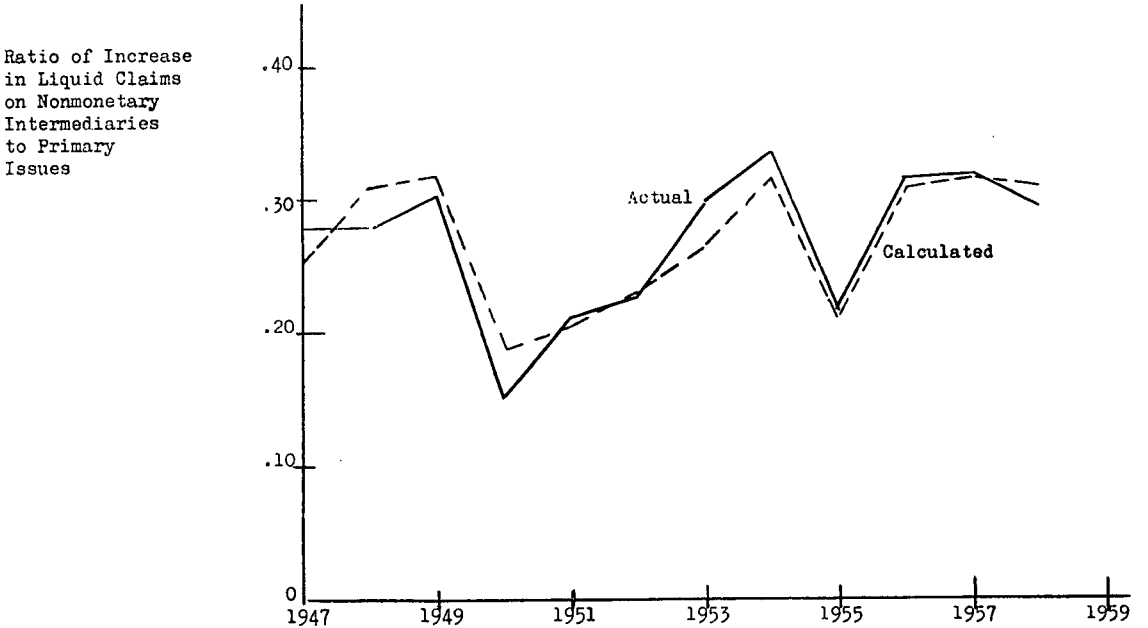
Nonmonetary intermediaries purchased $114 billion of primary securities during the period and created $105 billion of liquid claims. The data show a much closer correspondence between annual purchases and annual creation of claims by these intermediaries than for the monetary system.

It was previously shown that the annual purchases of primary securities by nonmonetary intermediaries, as a percentage of total primary issues, were negatively related to the rate of growth of GNP and positively related to the proportion of total issues taking the form of private long-term securities (corporate bonds and stocks and mortgages). Since the increase in liquid claims on nonmonetary intermediaries paralleled their purchases of primary securities, it is clear that the same two variables explain the increase in these claims as a percentage of primary security issues.

Chart 14 compares the actual and calculated ratios during the period 1947–58. The estimating equation at the bottom of the chart shows that the growth of these nonmonetary liquid assets, relative to primary issues, was depressed by an increase in the growth rate of output and was stimulated by relatively larger issues of private long-term securities. (R=.94.) A higher growth rate of output evidently shifted demand away from nonmonetary liquid assets toward money and current output, and relatively larger issues of private long-term securities put pressure on intermediaries to obtain additional funds. Thus nonmonetary intermediaries did especially poorly in 1950 and 1955 when both factors worked against their growth, and expanded rapidly under opposite conditions, such as in 1949 and 1954.[18]

[18] The annual increase in liquid claims on nonmonetary intermediaries can easily be related to the level of GNP, since $N'/(I/Y)=N/Y$, where N is the increase in such claims, I is primary issues, and Y is GNP. Thus, referring to the estimating equation in chart 14, $N/Y=I/Y(10.1-.52X_1+.36X_2)$. N/Y, therefore, depends on the issues–GNP ratio, which has previously been explained, on the growth rate of GNP, and on the proportion of private long-term issues in total primary issues.

CHART 14.—Actual and calculated ratios of increase in liquid claims on nonmonetary intermediaries to primary issues, 1947–58.



$Y_c = 10.08 - .52\ X_1 + .36\ X_2$

X_1 rate of growth of GNP

X_2 proportion of private long-term issues in total issues

Summary

The main findings of this section are that (1) the purchases of primary securities (or the issues of liquid claims) by nonmonetary intermediaries as a percentage of total primary issues were negatively related to the rate of growth of GNP and positively related to the proportion of primary issues comprising private long-term securities; (2) the purchases of primary securities by the monetary system as a percentage of total issues depended on the same two factors, except that such purchases were negatively related to both factors, and 2 years, 1948 and 1951, were left unexplained; (3) these security purchases by both the monetary system and nonmonetary intermediaries together depended principally upon the rate of growth of GNP—given this growth rate, relatively heavy issues of private long-term securities slowed down the growth of the monetary system and stimulated nonmonetary intermediation about equally; and (4) the increase in liquid claims on the monetary system did not closely parallel its purchases of primary securities.

SUMMARY AND CONCLUSIONS

At the close of the war period, the economy possessed a vast amount of money and close substitutes for money, such as time deposits, savings and loan shares, savings bonds, and so on. The market for these monetary and nonmonetary liquid assets was in equilibrium at abnormally low interest rates and at controlled price levels. The market for current output, on the other hand, at these low interest rate and price levels, was in a disequilibrium position, with excess demands prevailing almost everywhere. Equilibrium in the current output market was attainable only by increases in interest rates and commodity prices—the greater the increase in the one the less the increase required in the other. The principal question facing the monetary authorities at this time was the extent to which commodity prices would have to rise to restore equilibrium in the market for current output.

Given the nominal amount of liquid assets, the level of real output, and the shape of the public's demand schedule for liquidity, the market for current output could have been brought into equilibrium only at substantially higher prices. This was because long-term interest rates were not sensitive to increases in commodity prices, and thus to reductions in real liquidity positions, over long ranges of prices. Consequently, the equilibrating mechanism for a good part of the postwar period had to rely principally on price increases and not on upward movements in interest rates to achieve equilibrium on all markets of the economy.

Real output and nominal liquid assets, however, did not remain constant during the postwar period. The expansion in the supply of real output, which was accompanied by increases in financial-asset portfolios, by reducing excess demand in the current output market and by increasing the demand for liquid assets, diminished the extent to which price inflation was required to establish general equilibrium. Therefore, if nominal liquid assets had remained fairly constant in these years, the required price inflation would have been relatively modest, and the ultimate equilibrium level of interest rates would have been significantly higher. But nominal liquidity continued to

grow rapidly, raising excess demand for current output and excess supply of liquid assets. Consequently, less upward pressure was placed on interest rates, and for this reason additional upward pressure was exerted on the price level. As it turned out, then, for at least a decade of the postwar period, the economy moved toward general equilibrium principally via price inflation rather than by upward movements in interest rates; and the choice of this equilibrating channel was dictated by the expansion of nominal liquid assets.

This long-run adjustment process was accompanied by cyclical movements in economic activity. In the earlier stages of the postwar period, recessions reduced prices by more than interest rates, and the subsequent expansions raised prices by more than interest rates. In the later stages, recessions and expansions had much more impact on interest rates than on prices. This was due to the fact that, in the earlier stages, the public was willing to lose and gain liquidity without much change in long-term interest rates. Therefore, the equilibrating process had to work primarily through changes in commodity prices. In the later stages, however, losses and gains in liquidity were accompanied by sharp changes in interest rates, since the public was highly sensitive to adjustments in its liquidity position, so that equilibrium could be attained without significant changes in commodity prices.

In the absence of direct controls over the nominal supply of liquid assets, the monetary authorities were greatly handicapped in their efforts to halt the growth of liquidity and so the rise in commodity prices. Despite fairly severe restraint on monetary growth, there was a large expansion of nonmonetary liquid assets during the postwar period, which mainly took the form of increases in liquid claims on financial institutions lying outside of the direct controls of the monetary authorities. This liquidity expansion, as already noted, forced the economy to seek general equilibrium by moving at first to substantially higher price levels and only later to higher interest rates.

The growth of nominal liquid assets was based on purchases of primary securities (i.e., debts and equities of nonfinancial sectors) by the monetary system and by nonmonetary intermediaries. Almost $400 billion of primary securities were issued from 1947 through 1958, and financial institutions purchased $185 billion of them, creating approximately the same amount of liquid assets. The largest gains were recorded in liquid claims on nonmonetary intermediaries, the supply of which was not directly controlled by the monetary authorities. In addition, the monetary authorities allowed sizable increases to occur in time deposits in commercial banks. Thus, total liquid assets rose by $170 billion during this period, with $140 billion of them being in nonmonetary form; the increase in the money supply filled the small gap.

It is apparent, therefore, that tight control of the money supply was not sufficient to prevent substantial gains in nominal liquidity generally, though the liquidity problem was aggravated by rapid growth in time deposits, which the monetary authorities could have prevented. With respect to financial factors, then, the postwar price inflation was due largely to the inheritance by the economy of an inflated volume of war-induced liquid assets and to the further expansion of these assets after 1946, which the monetary authorities were either unable or unwilling to control.

The postwar expansion in nominal liquid assets was not smooth year by year. In general, nominal liquidity was poured into the economy during recession years (1949, 1954, and 1958), and increased more slowly during recovery (1947, 1950, and 1955) and prosperity (1948, 1951–53, and 1956–57) years. Liquidity growth was based on purchases of primary securities by financial intermediaries, and these purchases were closely related to total issues of primary securities, which themselves depended on other factors. Thus an explanation of the annual growth of liquidity during the postwar period runs from factors affecting issues of primary securities to those affecting purchases of these securities by financial intermediaries.

Annual issues of primary securities, as a ratio of GNP (in current prices), were an increasing function of the change in the annual rate of growth of national output, regardless of the direction of such change, and a decreasing function of excess liquidity in the economy. With respect to the first factor, during recovery years, when the output growth rate changed markedly, primary security issues were unusually large relative to GNP. During prosperity years, when there were comparatively small changes in the output growth rate, primary issues were relatively light. Finally, during recession years, when there were again significant changes in the growth rate, primary issues rose as a proportion of GNP. That is, aggregate expenditures for current output were financed more externally and less internally during recovery and recession years than in prosperity years. With respect to the second factor, primary issues relative to GNP tended to be small when the economy contained large amounts of excess liquidity, as in 1947–49, and large in opposite circumstances.

Primary security issues were composed almost equally during recovery years of Government securities, corporate bonds and stocks, and mortgages, on the one hand, and of trade debt, consumer debt, and bank loans, on the other. As the cycle progressed into prosperity and recession years, the second group of issues declined in relative importance and the first increased, so that by the recession years total primary issues were almost completely dominated by the first group.

Purchases of primary securities by nonmonetary intermediaries, as a proportion of total primary issues, were negatively related to the growth rate of GNP and positively related to the proportion of total issues comprising the first group of securities excluding Government securities—that is, comprising private long-term securities (corporate bonds, stocks, and mortgages). Nonmonetary intermediaries, then, purchased relatively few primary securities and created relatively few liquid assets during those years when the growth rate of GNP was high and at the same time private long-term securities were a small proportion of total issues. Conversely, their purchases of primary securities and issues of liquid claims were heavy under the opposite conditions.

Purchases of primary securities by the monetary system, as a percentage of total issues, were negatively related both to the growth rate of GNP and to the proportion of total issues comprising private long-term securities, except that such purchases in 1948 and 1951 were the result of other, autonomous factors. Both the monetary system and nonmonetary intermediaries, therefore, were stimulated by a low rate of growth of GNP. Given this growth rate, the monetary system purchased relatively more and nonmonetary intermediaries rela-

tively less when primary security issues were weighted heavily by Government securities, trade and consumer debt, and bank loans. When, on the other hand, primary issues were dominated by private long-term securities, nonmonetary intermediaries spurted ahead and the monetary system lagged.

This pattern of behavior by financial intermediaries within the short business cycles led to increases in nominal liquid assets during recovery years that were less than the growth of real output. During the prosperity years, nominal liquidity growth and real output growth were roughly proportional, and during recession years liquidity moved rapidly ahead of real output. These relationships, together with shifts in the real demand for current output within the short cycle, explain movements in long-term interest rates and commodity prices during recovery, prosperity, and recession years.

APPENDIX

One argument of this paper is that interest rates can be explained by the ratio of (weighted) liquid assets to GNP. The basis for the argument is that an increase in the supply of nonmonetary liquid assets to some extent reduces the public's demand for money balances, so that the whole range of close substitutes for money must be taken into account in interest rate analysis. Yet, it is true that a close relationship can be established between the ratio of money (narrowly defined) to GNP and the level of interest rates, during the postwar period. The purpose of the following pages is to show why this is so.

Imagine that the level of GNP and total primary securities are both given and that, in the initial situation, there is a certain money supply associated with some long-term rate of interest. Assume, further, that there is a group of financial institutions, not directly controlled by the monetary authorities, which creates claims on itself that the public considers to be perfect substitutes for money. These claims are nonmonetary liquid assets, but they are not counted as part of the money supply. The sum of the two is the public's holdings of liquid assets.

The initial situation is depicted in chart 15. The rate of interest is r_1, the money supply is OM, nonmonetary liquid assets are MA, and total liquid assets are OA. Suppose now that the monetary authorities, in a succession of smooth steps, reduce the money supply by selling primary securities. In the first experiment, we imagine that, at each step along the way, nonmonetary financial intermediaries purchase primary securities and create nonmonetary liquid assets exactly equal to the decline in the money supply. Thus, throughout the process, total liquid assets remain the same.

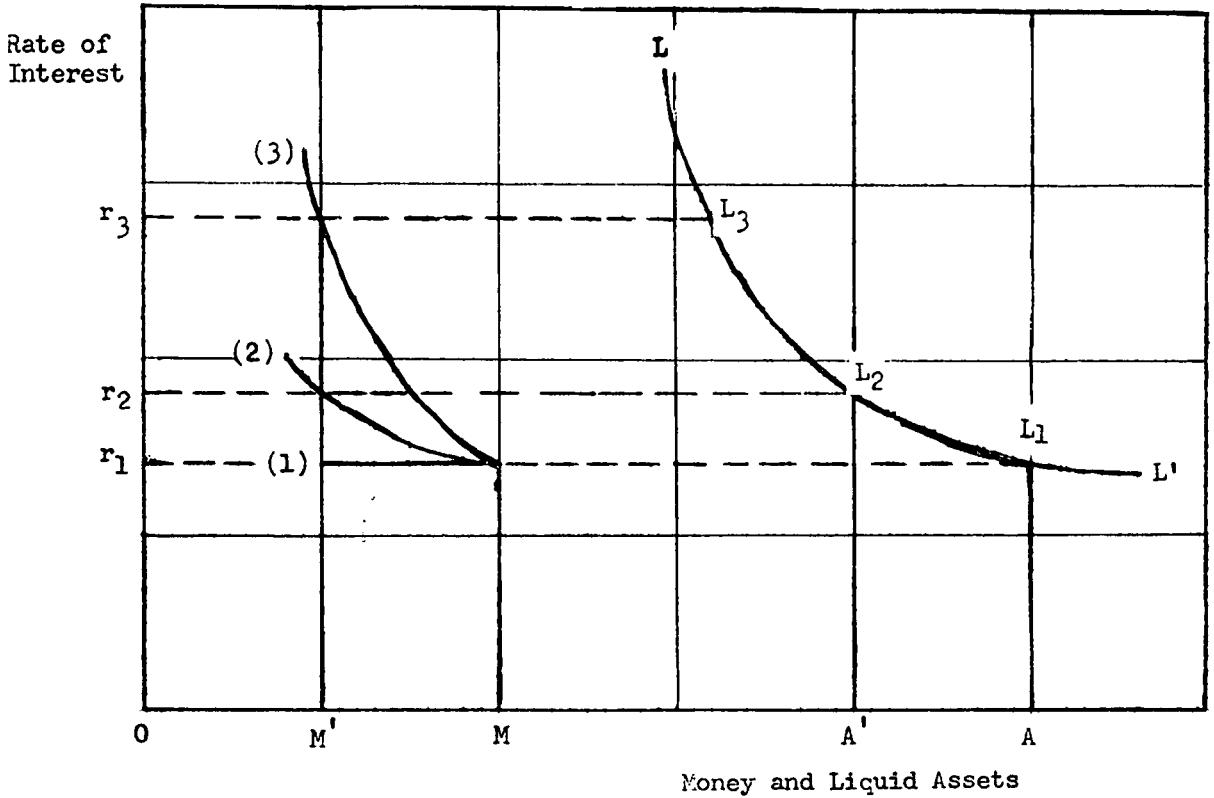
The money supply is eventually reduced to OM'. Since total liquid assets have not changed, they remain equal to OA, and the rate of interest stays at r_1, for nonmonetary liquid assets are assumed to be perfect substitutes for money. In this first experiment, the public's demand schedule for money (in the narrow sense) is shown by the curve labeled (1). This demand schedule is horizontal because the reduction in the money supply has been exactly offset by an increase in nonmonetary liquid assets, which are perfect substitutes for money.

Consider a second experiment. This time the money supply is reduced to the same extent as before, again in a succession of smooth steps, by MM', but nonmonetary liquid assets instead of increasing remain constant. Total liquid assets, therefore, are reduced by AA', equal to the decline in the money supply, and the economy moves to point L_2 on the liquidity schedule. The reduction in liquid assets raises the interest rate to r_2. Since the interest rate has risen from r_1 to r_2, and since the money supply has declined in smooth steps by MM', the public's demand schedule for money would appear as curve (2).

In the third experiment, the money supply is again reduced ty MM'. This time, however, nonmonetary liquid assets are also reduced, so that total liquid assets fall by more than the money supply—that is, by more than AA' $(=MM')$. The economy moves to point L_3 on the liquidity schedule and the interest rate rises to r_3. Since the interest rate has risen from r_1 to r_3, and since the money supply has declined by MM', the public's demand schedule for money would appear as curve (3).

Clearly, then, given the public's demand schedule for liquid assets and the decline in the money supply, the shape of the demand schedule for money depends on whether nonmonetary liquid assets rise, remain constant, or fall. In the first case, the demand schedule for money is relatively elastic; in the second, it is somewhat steeper; and in the third, it is even steeper. In each of the three cases, it must be emphasized, there is a "perfect correlation" between the money supply and the long-term rate of interest. But this definitely does not mean that the rate of interest depends only on the supply of money. In fact, in these experiments, it depends on the sum of the money supply and nonmonetary liquid assets, other things the same. That is, the shape of the demand schedule for money, given the public's demand schedule for liquidity and the reduction in the money supply, depends on how quickly the path along the liquidity schedule, moving from right to left, is traversed. And how quickly it is traversed depends on whether nonmonetary liquid assets are growing, declining, or remaining constant.

CHART 15.—Hypothetical demand schedules for money and liquid assets.



Let us now allow for the possibility that nonmonetary liquid assets may not be perfect subsitututes for money. If these assets are imperfect substitutes for money, an increase in their supply reduces the demand for money less than proportionately. Hence, an increase in nonmonetary liquid assets accompanied by an equivalent decrease in the money supply will leave the public with less liquidity and will therefore be associated with a higher rate of interest. As we have seen, this can be taken into account by weighting the money supply more heavily than nonmonetary liquid assets. The public's total liquid assets become the sum of money (weighted at unity) and some fraction of nonmonetary liquid assets.

Chart 16 reflects the same three experiments as before, in each of which the money supply, in a succession of smooth steps, is reduced by MM'. It is assumed that in the initial position the rate of interest, the money supply, and total liquid assets are the same as before. The latter assumption means that (unweighted) nonmonetary liquid assets are larger than previously assumed, since they are now imperfect substitutes for money. Thus for total liquid assets to be the same the (unweighted) nonmonetary component must be larger.

In the first experiment (unweighted), nonmonetary liquid assets increase by the same amount that the money supply declines. In the previous case, this kept total liquid assets and the rate of interest constant; now liquid assets are reduced because nonmonetary liquid assets are not weighted as heavily as money. Thus, the economy moves up to point L_1 on the liquidity schedule, and the rate of interest rises above its initial level of r_1. There is a rise in the interest rate because the supply of money is reduced by more than the demand for it. The demand schedule for money, therefore, must be the curve labeled (1).

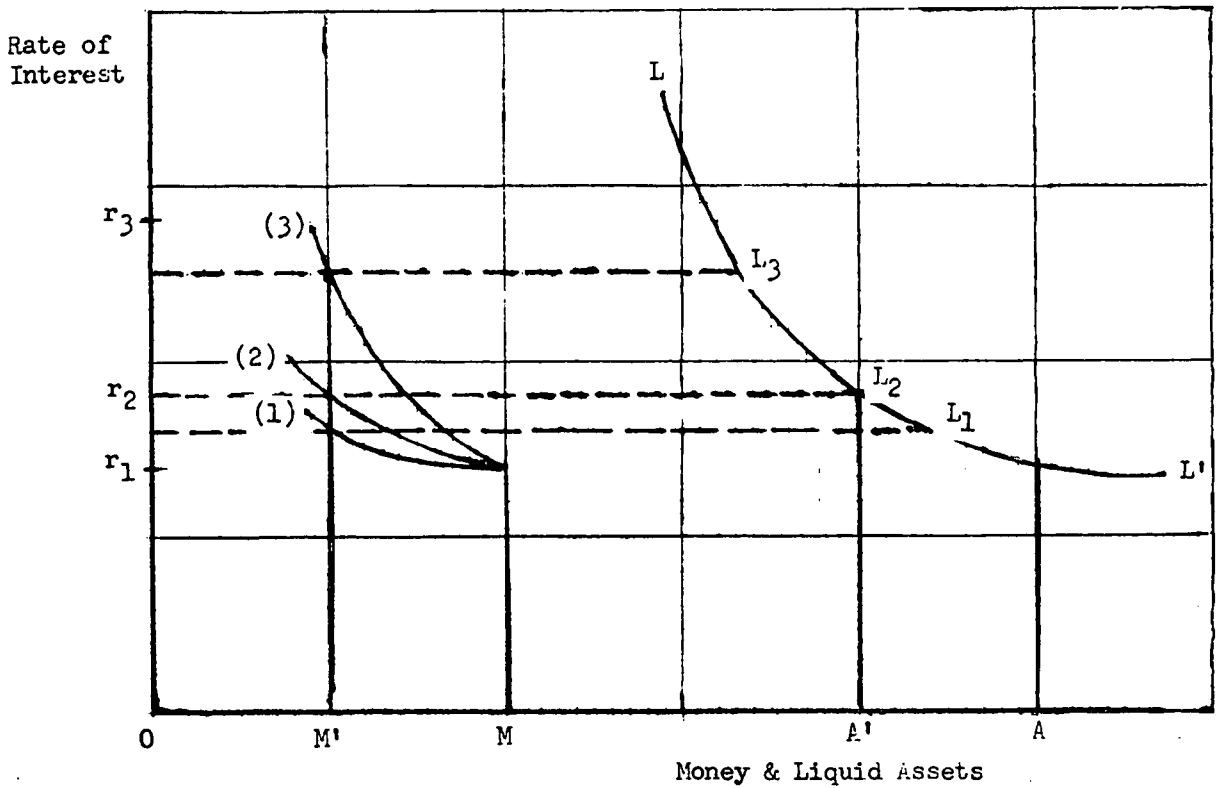
In the second experiment, (unweighted) nonmonetary liquid assets remain constant when the money supply declines by MM'. This reduces total liquid assets by the same amount, AA', and so the rate of interest rises to r_2. The demand schedule for money is now curve (2).

In the final experiment, nonmonetary liquid assets are reduced when the money supply declines by MM'. The decline in nonmonetary liquid assets has less effect on total liquidity this time than it did before, because these assets are only imperfect substitutes for money and so are weighted less than before. Consequently, total liquidity does not decline as much as before, and the rate of interest rises to some level short of r_3. The demand schedule for money in this case is curve (3).

It is evident once again that the shape of the demand schedule for money, given the reduction in the money supply and the public's demand schedule for liquid assets, depends on whether nonmonetary liquid assets rise, remain constant, or fall. And, as before, there may be a "perfect correlation" between the money supply and the interest rate in any of the three experiments, but this relationship cannot be taken to mean that the rate of interest depends only on the money supply. For the shape of the demand schedule for money clearly depends on the shape of the demand schedule for liquid assets, the change in the money supply, and the change in nonmonetary liquid assets, other things constant.

This analysis, can now be applied to postwar experience. The two curves that trace out the dots in chart 17 show the public's demand schedule for money (the money-GNP ratio) and its demand schedule for (weighted) liquidity (the liquidity-GNP ratio) during 1945–58. There is apparently a good relationship between either ratio and the bond rate. The above analysis suggests, however, that these relationships would appear, since both the money-GNP ratio and the liquidity-GNP ratio were reduced, almost hand in hand, throughout the period. It is also suggested by this analysis that the shape of the public's demand schedule for money depends on the shape of the demand schedule for liquid assets, the change in the money supply, and the change in nonmonetary liquid assets. Suppose, for example, that the money-GNP ratio had remained constant throughout the period, but that the liquidity-GNP ratio had declined in exactly the way it did. (This latter assumption, of course, implies a drastic fall in the ratio of nonmonetary liquid assets to GNP.) Then the bond rate would have risen in exactly the same way, so that the public's demand schedule for money would have been the vertical line shown in the chart. Alternatively, suppose that the liquidity-GNP ratio had remained constant throughout the period, but that the money-GNP ratio had declined in exactly the way it did. (This implies a sharp increase in the ratio of nonmonetary liquid assets to GNP.) Then the public's demand schedule for money would have been the horizontal line shown in the chart. These are extreme cases; the likely ones fall somewhere in between.

CHART 16.—Hypothetical demand schedules for money and liquid assets.



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This analysis suggests that postwar price and interest rate movements can be explained by using either the money supply or the wider range of liquid assets. If the money supply variable is used, the model of this paper would be converted to:

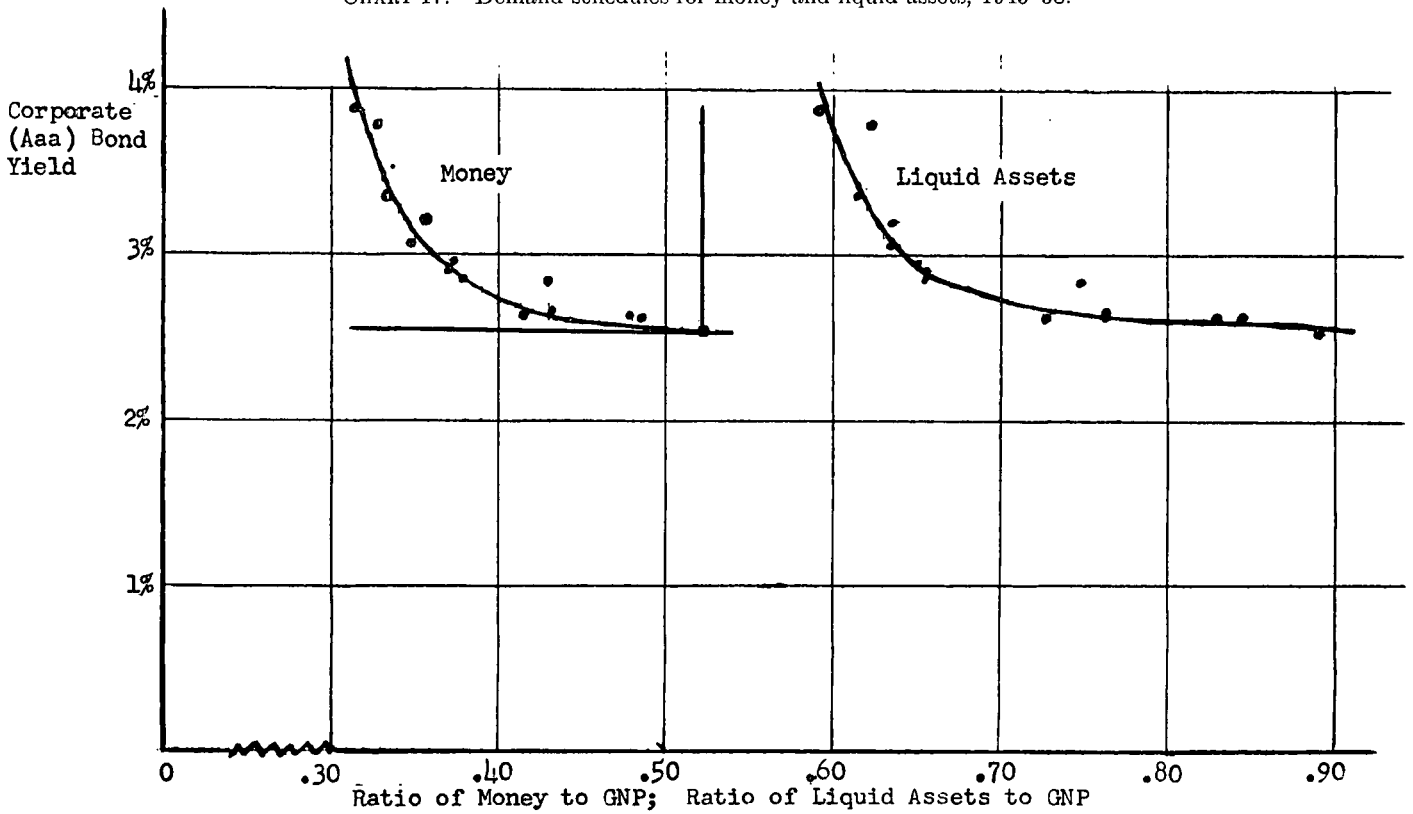
$$Y=E(Y, r, M/p)$$
$$M/p=L(Y, r, M/p).$$

In this case, however, it would be necessary to add that the use of M/p instead of L^*/p assumes that nonmonetary liquid assets move in some stable way with the money supply, an assumption that is roughly true for postwar *annual* data.

This model, whether M/p or L^*/p is used, also assumes that primary securities, or the financial-asset portfolios of spending units, grow in some stable way with real income, so that such financial growth can be ignored.

Thus the equations above comprise a model that excludes both primary securities and nonmonetary liquid assets, on the assumptions that changes in their supplies are closely related to changes in real income, on the one hand, and in the money supply, on the other. The model used in this paper makes the first assumption but explicitly considers nonmonetary liquid assets.

CHART 17.—Demand schedules for money and liquid assets, 1945–58.



STUDY PAPER NO. 15

PROFITS, PROFIT MARKUPS, AND PRODUCTIVITY: AN EXAMINATION OF CORPORATE BEHAVIOR SINCE 1947

(BY EDWIN KUH)

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(Edwin Kuh [1])

SUMMARY

This paper studies the behavior of aggregate corporate profits and profit markups from 1947 to 1958. Because profits are a residual, the difference between receipts and costs, the analysis proceeds in terms of the main determinants of receipts and costs. The receipts considered are corporate national income and the costs given special attention are wages and salaries paid in the corporate sector. Profits have always been measured after deductions for interest payments, inventory valuation adjustments, and ordinarily after capital consumption allowances have been deducted.

Corporate receipts have been divided into a price index times output in constant dollars, while the wage bill has been similarly divided into man-hours and an hourly wage rate. The first part of this study describes the quarterly variations in profits as a result of changes in output, prices, wage rates, and man-hours.

The second part rearranges the basic series into a form that appears to be of great importance in corporate decision making, a markup on variable costs. Here the markup is defined as the ratio of receipts to the wage bill. The markup is first treated as the ratio of net corporate product to the wage bill and second as gross corporate product divided by the wage bill. The trend implications of the two are different although the cyclical behavior of each is quite similar.

In the third and concluding section, the main determinants of profits are discussed in order to find reasons for some of the behavior that has been described. Here we enter an especially controversial area concerning the causal determinants of productivity, economic growth, and inflation.

The main descriptive conclusions reached in parts I and II are outlined below. None of them imply cause and effect relations. Conclusions regarding cause and effect are deferred until part III is summarized.

1. Change in profits

1. Quarter to quarter variations in corporate profits during the postwar period were most closely associated with variations in the level of output.

[1] Thoughtful criticism and suggestions from Sidney S. Alexander, James S. Duesenberry, Richard S. Eckaus, Louis Lefeber, Robert M. Solow, Eli Shapiro, and Thomas Wilson are gratefully acknowledged. I alone am responsible for opinions expressed and errors that remain. I am also much indebted to Audrey Anderson, Don F. Rubovits, and William L. White for expert research assistance, and to Robert Hoodes at the Littauer Statistical Laboratory, Harvard University, for statistical computations.

2. Man-hour variations were of less consequence than output changes in profit changes, but of greater weight than either prices or wages. Compared to other factors associated with profit variations, changes in the price of final product have been least important.

3. Wage changes were of minor importance too, but were a distinctly greater source of profit variation than final product price changes.

4. The association of net quantity changes (changes in output less changes in man-hours) with profits variation has been much more important than net price-wage effects (price changes less wage rate changes).

2. Change in markup

1. The net markup, defined as net corporate product divided by the corporate wage bill, increased during the postwar period until 1950. It has declined since that time. Throughout the postwar period the net markup exhibited a distinct cyclical pattern. The gross markup, defined as net corporate product plus corporate capital depreciation allowances divided by the wage bill, has followed a similar pattern although the downward trend since 1950 has been much less than that of the net markup.

2. The markup can be split into the product of two ratios, the ratio of final product prices to wage rates on the one hand, and the productivity variable, output divided by man-hours, on the other.

(*a*) The price-wage variable has shown a steady downward trend during the postwar period, particularly noticeable since 1950. That is, wage rates have increased in nearly every period faster than final product prices.

(*b*) From 1949 onward, the productivity index measured by output per man-hour increased throughout the period at an average rate of 3 percent per year. The cyclical behavior of the index has a particular pattern. With considerable regularity increases in output per man-hour are heavily concentrated in the early period of recovery from a recession. The later parts of an upswing typically are associated with much slower increases in output per man-hour than the earlier part of the recovery.

3. Some explanations

The main analytical conclusions are the following:

1. An equation which explains variations in the price index for the corporate sector shows that the price level can be explained in terms of demand pressures, wage rates and the productivity variable (output per man-hour). During the later stages of a recovery, prices are under demand pressures. In addition, while increases in productivity tend to decrease prices and increases in wage rates tend to increase prices, we find that the estimated numerical magnitudes are such that equal percentage increases in wage rates and productivity per man-hour would be largely offsetting. The actual percentage increases of the two are seldom equal, instead following a systematic cyclical pattern that puts prices under particularly heavy cost pressures during the later stages of a business recovery.

2. The behavior of output per man-hour is central to both price formation and the behavior of the markup. It is found that the behavior of output per man-hour is subject to two distinguishable effects: the first is a trend effect based on improving technology and substitution of fixed assets for labor, while the second is a cyclical effect related to variations in the level of output.

3. The more rapid rate of growth of output per man-hour in the early stages of a recovery may be related to any one of the following six reasons or combinations of them.

(*a*) Innovations and new techniques from the previous boom require time to become fully effective, and they do so during the early part of a recovery so that output per man-hour increases are especially rapid at this time.

(*b*) Bottlenecks and general supply limitations can develop in the later recovery. While this may explain what happened during the Korean war, it is an insufficient reason by itself to explain convincingly other postwar episodes.

(*c*) Effective demand may slacken in the later recovery.

(*d*) Because overhead labor such as office force and selling and supervisory employees and many categories of production workers are not readily reduced during a cyclical contraction, output per man-hour will fall during periods of declining output and will rise during an early upswing when overhead labor is more efficiently employed. Once this overhead work force has been put back to work efficiently again, further but less rapid increases in output per man-hour must come from technical improvements and more capital per worker.

(*e*) A strong secular trend toward more overhead labor may also affect productivity. This trend will have only minor effects on productivity when output is expanding rapidly. During the last stages of cyclical upswing, when output typically is not increasing at a rapid rate, this continuing trend causes a slowdown in productivity advances at least in the short run.

(*f*) During an early upswing capital and labor are used in their most efficient way in the sense that economies of scale are being fully realized. This efficiency decreases when full employment is reached, which is reflected in a slowdown in output per man-hour increases.

4. Quantitative evidence on the last four reasons collectively has been found which indicates that overhead, labor, and effective demand are of great importance in the cyclical behavior of productivity. According to statistical results, a 1 percent increase in output during the early part of a recovery requires a four-fifths percent increase in man-hours and that a 1 percent decrease in output requires a four-fifths decrease in labor during a downswing. On the other hand, it is found that only a two-thirds percent man-hour increase is required during the later stages of a business cycle upswing for a 1 percent increase in output. The reason for the lower additional man-hour requirements in the later stages of a business cycle recovery are two. First, there is much more overhead labor available at this time. Second, during this stage of the business cycle, capital investment is typically at its highest rate and the substitution of capital for labor will reduce additional man-hour requirements.

5. A more rapid increase in effective demand and hence in output would probably have prevented the slowdown in productivity increases which occurred in the later stages of a business recovery in 1957, and much of 1952. The greater increase in output per man-hour would stem from the efficient utilization of overhead labor in combination with modern capital additions. There are limits on how far the rapid increase in productivity could proceed, imposed by using up overhead labor and diminishing efficiency when increasingly less efficient capital is used at extremely high levels of output. The greater efficiency during the early upswing stems from the reduction in the overhead work force and also the more efficient utilization of capital and labor.

I. QUARTERLY VARIATIONS IN CORPORATE PROFIT LEVELS

Profits and profit markups are central in discussions of economic growth, price level variations and employment. Indeed, the very definition of profits, as the difference between business receipts and outlays already implies that the pervasive economic forces which influence receipts and outlays must be explored, in order to grasp the fundamentals of profit behavior. This study will concentrate on four major elements which determine profits: prices and quantity of output, which together make up receipts, and wage rates and man-hour inputs which form a major part of costs. Attention will be concentrated on national income corporate profits on a value added basis, after adjustment for inventory valuation. This means most importantly that raw material prices and inputs do not enter explicitly, since all intermediate goods are excluded when national income figures are computed. Analysis based on a more gross definition of corporate product including purchases from the noncorporate sphere, mainly farm products, financial services and imports, may modify some conclusions reached in this study.[2]

By focusing attention on the wage bill, two other national income costs have been given secondary position. These are capital consumption allowances which in most of the study have been deducted in order to arrive at a net profit figure and correspondingly a net output figure, a position consistent with the view that depreciation represents the using up of capital which therefore should be treated as an intermediate good. At various relevant points, the gross output figures will be studied, since some implications about profit movements are changed materially by this alteration. Also excluded are interest charges, primarily because net corporate interest payments are relatively small and change comparatively slowly. In studying particular sectors, of course, interest payments often loom large. For the corporate aggregate, however, ignoring interest payments simplifies the analysis without in any way doing serious damage to the qualitative or quantitative nature of the conclusions.[3]

The recent Department of Commerce volume, "National Income and Output," presents data on income or value product originating in the corporate sector for each quarter from 1947 through 1957. First, a price index was constructed by combining various national income implicit price deflators most relevant to the corporate universe.[4] Next, a measure of real corporate product or output was derived simply by dividing the current dollar corporate value product by the price index. Second, the wage bill was split into a man-hour figure and a wage rate figure. In order to do so, a corporate man-hour

[2] The aggregative approach adopted here enables a broad relatively simple perspective on the variations in corporate profits and profit markups. There are costs to gaining this perspective, however, which ought to be recorded here. Strategic differences in the cyclical behavior of durable and nondurable goods are obscured by aggregation, and certain industries may dominate in one period only to diminish in importance later on. In view of these interesting possibilities, disaggregation, along industry lines, is contemplated for a later date.

[3] For income originating in the corporate sector, net interest is an extremely small magnitude, ranging from $605 million in 1947 to −$22 million in 1956. The series according to a footnote ". . . is net only of imputed interest received, and of cash interest received by firms engaged in lending as a principal activity; cash interest received by other proprietors is considered to be received in the proprietors personal capacity," National Income and Output, table I-12, p. 134, footnote 1. Thus many financial intermediaries have been excluded.

[4] The full details of the construction of this index are presented in app. A, pt. 1. Current dollar corporate national income will be found in table I-14, "National Income by Corporate and Noncorporate Form of Organization, Quarterly Totals at Annual Rates, 1946-57," "National Income and Output. A Supplement to the Survey of Current Business," Department of Commerce, 1959. Later data of similar design can be found in various issues of the "Survey of Current Business."

index was devised by determining the ratio of corporate to noncorporate employment in major industries primarily from Census of Manufactures data, and then using these weights to combine Bureau of Labor Statistics' industry average weekly hours worked and Department of Commerce employment figures to arrive at an estimate of man-hours worked in the corporate sector.[5] An implicit hourly wage rate figure was obtained by dividing the total wages and salaries figure by estimated man-hours per year. Wage rates constructed in this way averaged about 19 percent higher than Bureau of Labor Statistics average hourly earnings in manufacturing. This difference could be due to a variety of causes which are discussed in appendix A. The discrepancy observed, however, is unlikely to damage the analysis of parts I and II which in no event relies upon the estimated wage rate figure in its original form. In particular, changes have been analyzed and in appendix A it is shown that a bias in the estimate of the man-hour figure will in no way affect the change in profits figures based upon them, if the percentage bias remains unchanged over the period.

Let us briefly recapitulate. We are going to describe variations in corporate profits measured according to national income concepts for the corporate universe for each quarter beginning with 1947. Causal analysis has been deferred until part III of this paper, because the first objective will be to describe what happened to profits and then look at theories about what caused the observed variations. Corporate value product is defined to be equal to corporate profits plus corporate wages and salaries. From these basic data two indices have been constructed, one a price index for output and the second an index of man-hours, so that corporate profits can be defined as $\pi_t = PX_t - RM_t$, where

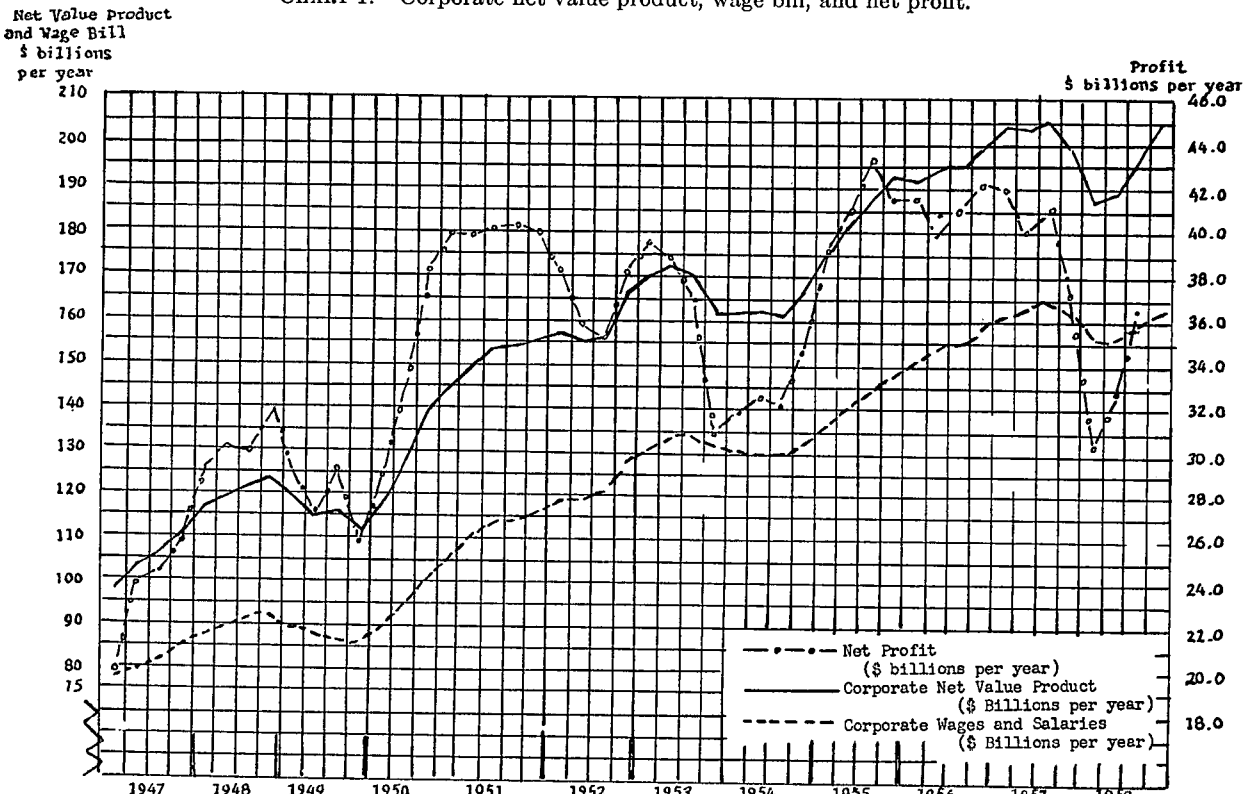
π_t = net corporate profits with inventory valuation, quarterly figures at annual rates,
P_t = price index of final corporate product,
X_t = constant dollar corporate product or output, quarterly figures at annual rates,
R_t = hourly wage rate in corporate sector,
M_t = man-hours worked in corporate sector, quarterly figures at annual rates.

Chart 1 shows corporate value product, the corporate wage bill and the difference between the two—corporate profits.[6] The following widely known facts emerge from chart 1. First, corporate profits are extremely volatile. Second, variations in corporate value product appear greater than variations in the wage bill. Third, during the early years of recovery from a recession, for which we have three experiences—1949–50, 1954–55, and 1958–59 (first half), profits increase sharply and in later years of the cycle do not change very much.

In order to examine these broad patterns in more detail and pinpoint the main sources of variation, we must begin by looking at chart 2 and chart 3, the first chart showing the price index as well as net and gross output, the second showing the wage rate and man-hours.

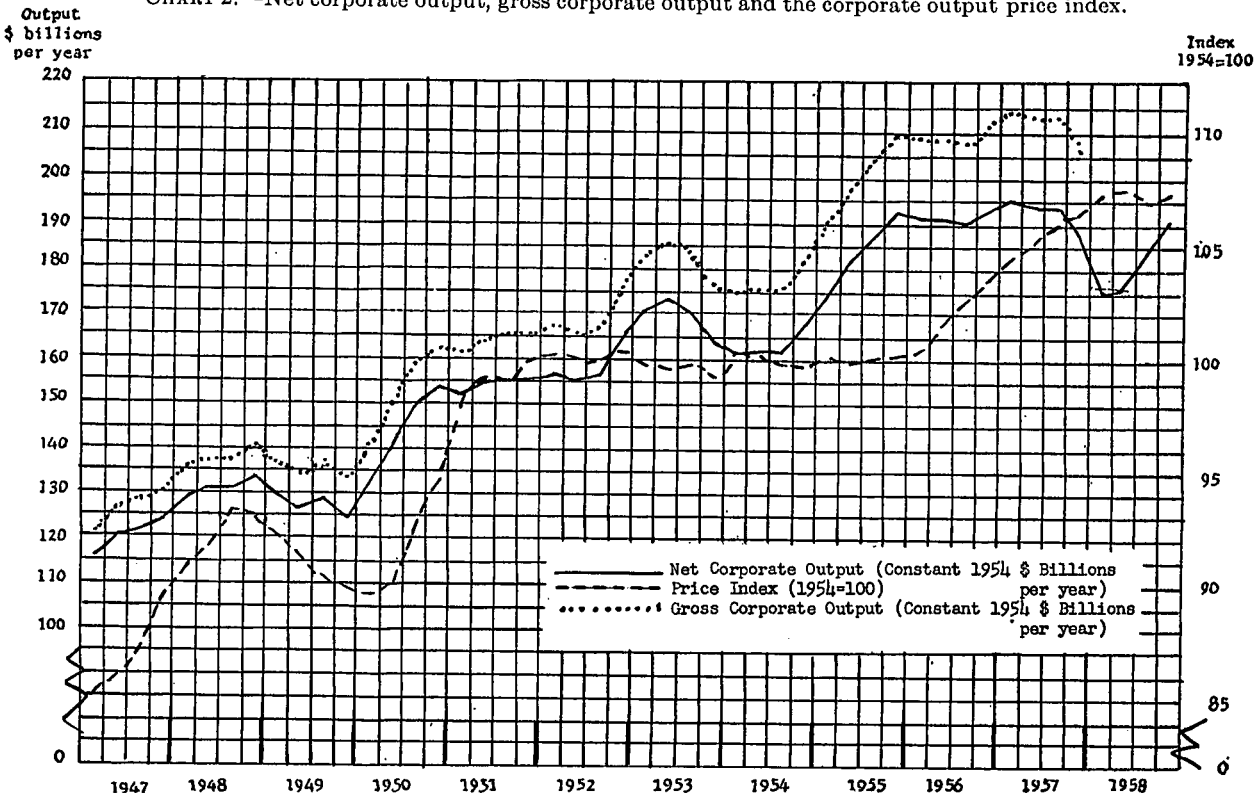
[5] The construction of the man-hour total estimate is described more fully in app. A, pt. 2. Corporate employment on an annual basis appears in the "Survey of Current Business," November 1959.
[6] The time series for this and all subsequent charts will be found in app. B.

CHART 1.—Corporate net value product, wage bill, and net profit.



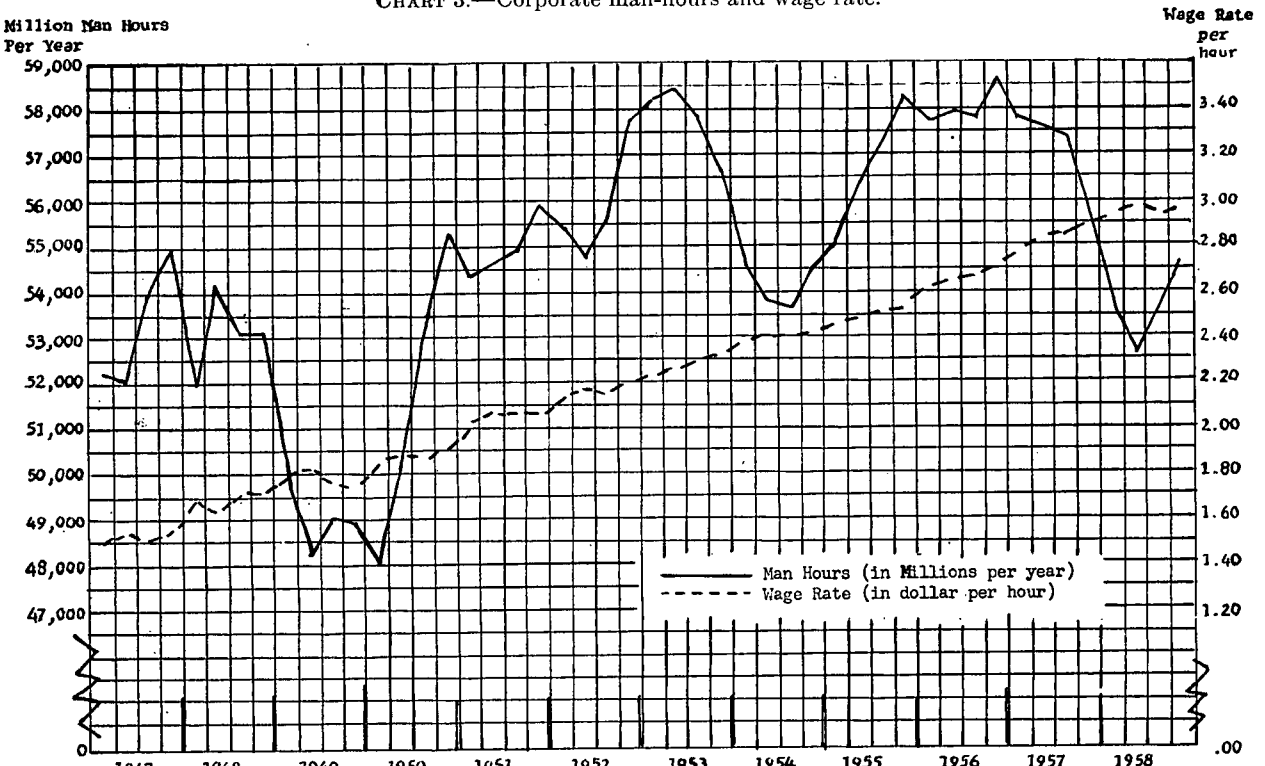
Source: App. B, table 1.

CHART 2.—Net corporate output, gross corporate output and the corporate output price index.



Source: App. B, table 2.

CHART 3.—Corporate man-hours and wage rate.



Source: App. B, table 3.

The features of output and price during the postwar period cannot be simply characterized. First of all, from 1947 through 1951 the two series move largely in unison although not in proportion. Thereafter, the two paths diverge. Prices remained essentially constant from 1952 through the first quarter of 1956. During this period there were two sharp increases in output and the 1953–54 recession. When output stabilized at the end of 1955, prices began to rise rapidly. For the entire period the correlation between price and output is very slight indeed, according to certain quantitative measures to be presented later.

Chart 3 breaks down the wage bill into man-hours and wage rates. Here two obvious patterns can be perceived. First, with only a few minor retreats, the wage rate has increased steadily, year in and year out. A small wage rate decrease occurred at the end of 1949, and a leveling off took place during three quarters of 1951. Man-hours on the other hand showed fairly sharp variations, and if the output series from chart 2 is compared with the man-hours series of chart 3, we observe quite naturally that the two series move in sympathy with each other.

To this point some of the main features in the behavior of profits over the postwar period have been graphically presented. In order to proceed further, the concept of weighted changes in the principal determinants of profits must be introduced. From elementary algebraic considerations, we may calculate the change in profits from one period to the next by the following approximate formulation:[7]

$$(1) \qquad \triangle\pi_t = P_t \triangle X_t + X_t \triangle P_t - R_t \triangle M_t - M_t \triangle R_t.$$

In the above, $\triangle$ means the change in the variable from one quarter to the next; for example,

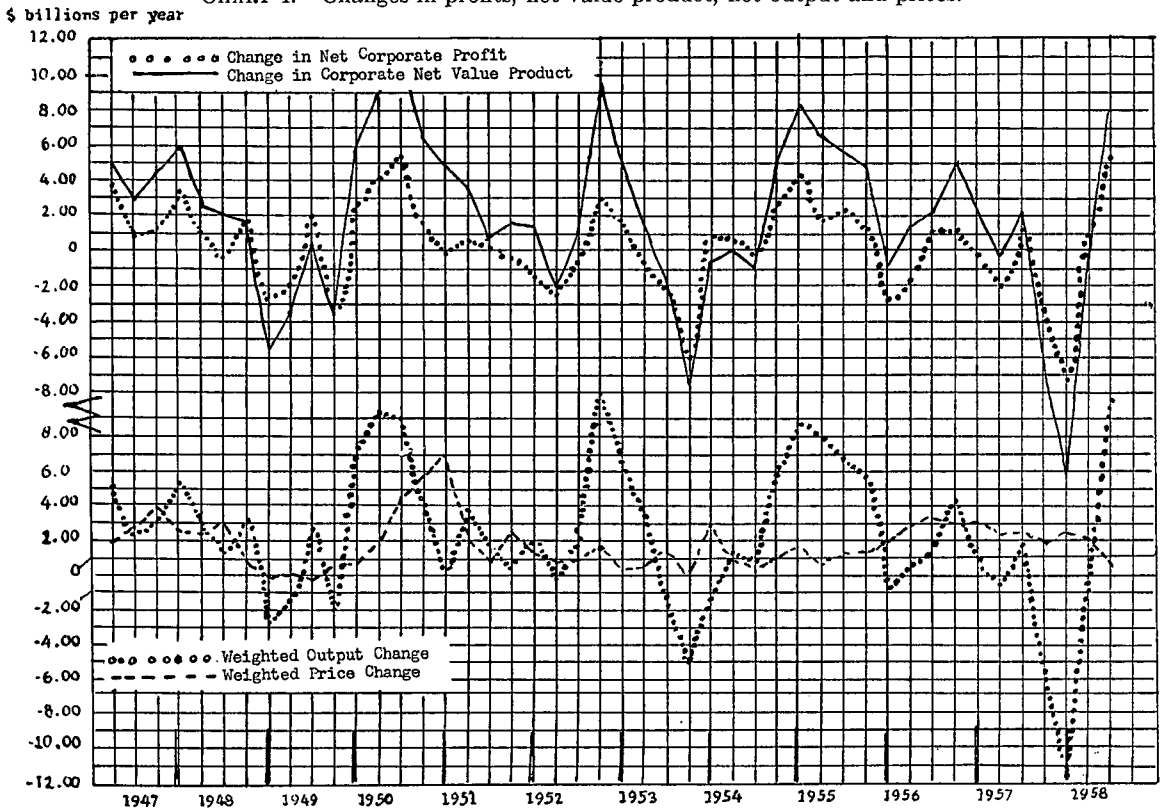
$$(2) \qquad \triangle X_{1948\text{–}4Q} = X_{1948\text{–}4Q} - X_{1948\text{–}3Q} \text{ by definition}$$

where the time subscript refers to the year and quarter.

In equation (1) we must weight the change in output, price, man-hours and wage rate by the appropriate number, which turns to be the "mate" in the definition of corporate profits. Hence, $P_t \triangle X_t$ is the revenue effect of a weighted output change and $M_t \triangle R_t$ is the cost effect of a weighted wage rate change, and so on. Chart 4 shows the revenue effects from changes in weighted price and output while chart 5 portrays the cost effects from weighted changes in the wage rate and man-hours. The clearest impression to be gained from looking at chart 4 is that the variations in corporate value product, PX, have been dominated by output rather than price effects. There are certain exceptions to this generalization. These occurred during 1947–48, 1950–51, and a brief period in 1956. Nevertheless, from 1951 through 1955 changes in corporate value product were dominated by output effects and even when price effects were prominent, variations in the level of output were even more significant. The three cyclical downturns—1948, third quarter, 1949, fourth quarter; 1953, second quarter, 1954, second quarter; and 1957, third quarter, 1958, second quarter—were all dominated by variations in output. Similarly, the upswings subsequent to each of the three downturns mentioned were also dominated by quantity variations although the Korean inflation was superimposed on the recovery from the 1949 downturn.

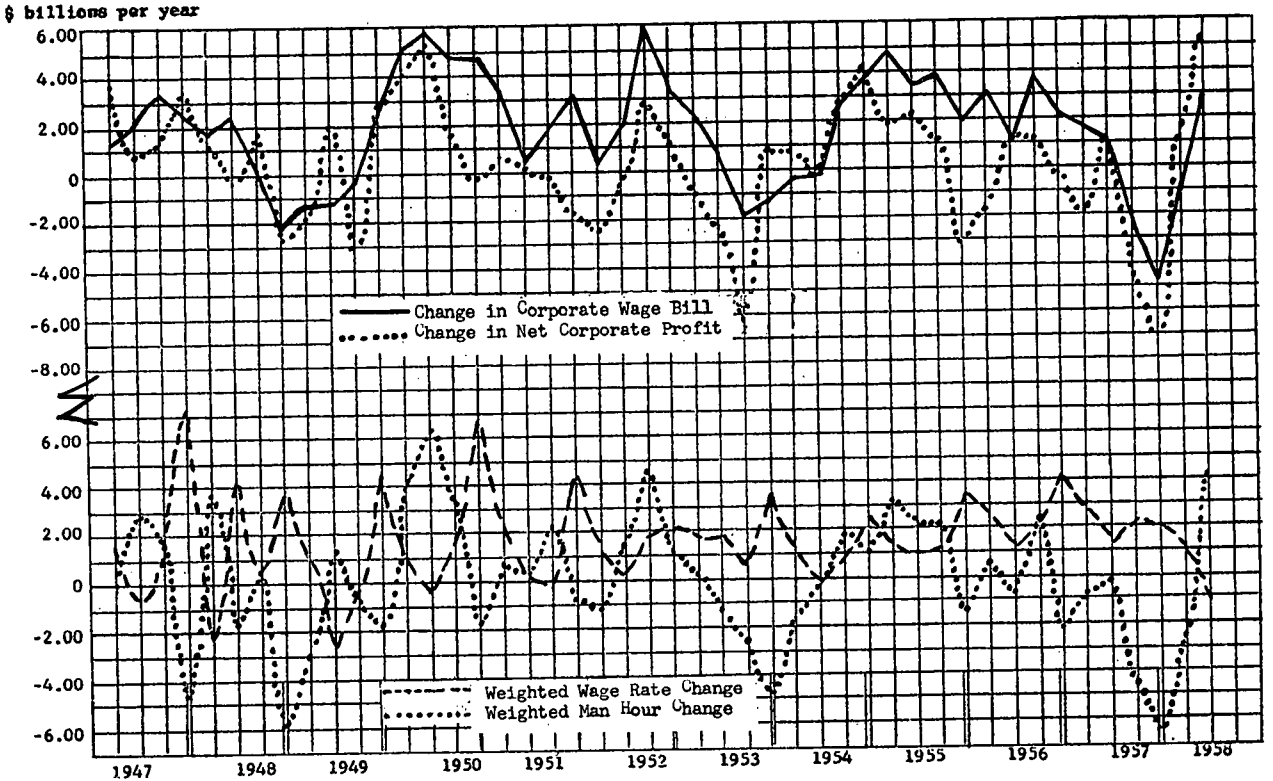
[7] This approximation is explained in app. A, pt. 4.

CHART 4.—Changes in profits, net value product, net output and prices.



Source: App. B, table 4.

CHART 5.—Changes in profits, wage bill, man-hours and wage rates.



Source: App. B, table 4 and 5.

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When the change in the wage bill is separated into wage rate and man-hours as in chart 5, it can be observed that man-hour effects are more important than wage bill changes although the wage rate effect on costs is far from negligible. In some periods the wage rate effect dominates the man-hours effect even though in the majority of instances the man-hours effect on cost is more important. In the 1947–48 boom, in the Korean war period, and generally during recoveries from recession, we find that the wage effect is relatively most potent, sometimes even exceeding the effect of man-hours on costs. However, during the later stages of the upswing, particularly in 1953 and in 1957, the dominant changes in the wage bill came from variations in man-hours. Elaboration on the analytical significance of this and the observations pertaining to changes in corporate value product will be deferred until part III.

A third portrayal of profit variation comes from partitioning the profit change into a quantity effect comprised of the weighted output change minus weighted man-hours change and, in addition, a price effect represented by the difference between the weighted final product price change and the weighted wage rate. The values for these newly defined series, which amount to recombining the elements shown in charts 4 and 5, can be seen in chart 6. An obvious feature of this chart is the fact that the weighted price change is, with few exceptions, negative. That is, wage rate effect on costs exceeded the price effect on revenues most of the time. This was particularly true in the period 1948 through 1949, 1952 and 1954–55. The quantity effect is nearly always positive with the regular exception of recession periods. In general, the quantity effects dominated the price effects but there is sufficient diversity in the importance of price and quantity effects visible to the naked eye so that generalizations of the type we have made from charts 4 and 5 cannot be made with the same force here.

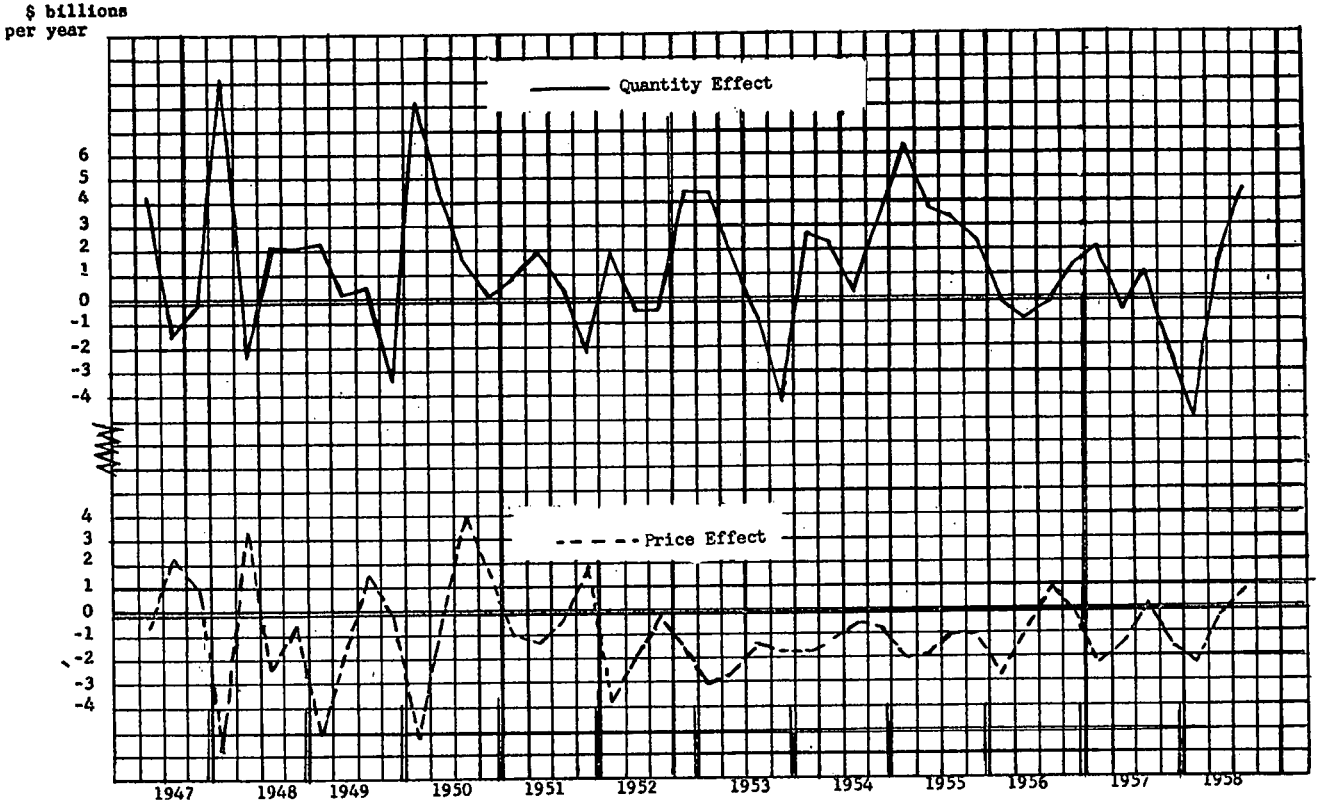
Numerical measures of variability can be applied to the time series shown in charts 4 to 6 in order to indicate variation but not causality. A standard measure for the dispersion in a particular series is the variance. In particular when the variance is the sum of two variables it is written as follows:

$$\sigma^2_{(v_1+v_2)}=\sigma^2_{v_1}+\sigma^2_{v_2}+2\sigma_{v_1v_2}, \tag{3}$$

where $\sigma^2_v=\dfrac{\sum_{t=1}^{T}(y-\bar{y})^2}{T}$ and, $\sigma_{v_1v_2}=\dfrac{\sum_{t=1}^{T}(y_1-\bar{y}_1)(y_2-\bar{y}_2)}{T}$

this reads: the variance of y_1 plus y_2 is equal to the variance of y_1 plus the variance of y_2 plus twice the covariance of y_1 and y_2, where the covariance term measures how closely the two variables y_1 and y_2 are related. The first two terms show the independent effects of the two variables while the last term shows the intermingled or correlated effects. With this definition in mind, the variance for the variables

CHART 6.—Price and quantity effect on profit change.



Source: App. B, table 6.

in charts 4 through 6, for the period 1947–59–II can be computed and the magnitudes discussed briefly.[8]

(4) $$\sigma^2_{(P\Delta X+X\Delta P)}=\sigma^2_{(\Delta PX)}=\sigma^2_{(X\Delta P)}+\sigma^2_{(P\Delta X)}+2\sigma_{(X\Delta P)(P\Delta X)}$$
$$=1.777+22.069-0.598=23.248$$

(5) $$\sigma^2_{(-R\Delta M-M\Delta R)}=\sigma^2_{(\Delta RM)}=\sigma^2_{(M\Delta R)}+\sigma^2_{(R\Delta M)}+2\sigma_{(M\Delta R)(R\Delta M)}$$
$$=3.019+7.313-3.925=6.407$$

(6a) $$\sigma^2_{(X\Delta P-M\Delta R)}=\sigma^2_{(X\Delta P)}+\sigma^2_{(-M\Delta R)}+2\sigma_{(X\Delta P)(-M\Delta R)}$$
$$=1.777+3.019-1.331=3.465$$

(6b) $$\sigma^2_{(P\Delta X-R\Delta M)}=\sigma^2_{(P\Delta X)}+\sigma^2_{(-R\Delta M)}+2\sigma_{(P\Delta X)(-R\Delta M)}$$
$$=22.068+7.313-20.683=8.698$$

For instance, equation (4) breaks down the variance of the charge in value product into the variance of the weighted change in output and the weighted change in price plus the covariance of the two. The covariance is relatively small so that it can be safely ignored. The weighted price has a variance of about 2 and the weighted output has a variance of about 23, so that according to this measure the weighted output change is about 11 times as important in the change in value product as the weighted price change. In the case of the change in the wage bill, the independent components, the variances themselves, indicate that the man-hour effects almost are 2½ times as large as the wage effect, although there is a moderately large covariance term. Equation (6a) shows the breakdown between weighted price and weighted wage rate, the different components of the weighted total price change. Here the weighted wage rate change is almost twice the magnitude of the weighted price change, again neglecting the relatively large covariance. Equation (6b) shows the relative importance of the weighted change in output and the weighted change in man-hours as sources of variation in profits. In this context the change in the quantity of output was about three times as important as the change in man-hours, although the relatively large covariance term, which reflects the dominant input-output relation, prevents us from going further in partitioning the effects of the two variables. A comparison of (6a) with (6b) reveals that the quantity effect was a relatively much greater source of variation than price-wage effects during the period to which these data apply.

In summary, then, it has been found that: (1) changes in receipts are heavily dominated by changes in output, (2) changes in the wage bill arise mostly from man-hour changes, although changes in the wage rate are influential too, (3) man-hours are relatively much more important than the wage rate change, while the wage rate change in

[8] In evaluating the signs of the covariance terms, it must be remembered that all changes in MR have a negative sign, since it is the effect on the change in profit that we are after. For example, the negative covariance in (6b) reflects the fact that outputs and inputs are highly positively correlated ($r=+.8$ for weighted changes). Because they move together, positive revenue effects from $P\Delta X$ are largely offset by negative cost effects, $R\Delta M$; hence the variance of the difference is lessened for this reason. If the two were perfectly correlated, the variance of the difference would be zero since $\sigma^2_{P\Delta X}+\sigma^2_{-R\Delta M}=2\ \sigma_{(P\Delta X)\ (-R\Delta M)}$. For the period 1949–58, the importance of price change relative to wage change increased, although both variances remained small. For comparative purposes the complete set of variance and covariances for this subperiod has been recorded below.

$$\sigma^2_{(P\Delta X+X\Delta P)}=\sigma^2_{(\Delta PX)}=\sigma^2_{(X\Delta P)}+\sigma^2_{(P\Delta X)}+2\sigma_{(X\Delta P)\ (P\Delta X)}=1.910+23.353-0.940=24.313$$
$$\sigma^2_{(-R\Delta M-M\Delta R)}=\sigma^2_{(\Delta RM)}=\sigma^2_{(M\Delta R)}+\sigma^2_{(R\Delta M)}+2\sigma_{(M\Delta R)\ (R\Delta M)}=2.470+7.022-4.136=5.353$$
$$\sigma^2_{(X\Delta P-M\Delta R)}=\sigma^2_{(X\Delta P)}+\sigma^2_{(-M\Delta R)}+2\sigma_{(X\Delta P)\ (-M\Delta R)}=1.910+2.470-1.419=2.964$$
$$\sigma^2_{(P\Delta X-R\Delta M)}=\sigma^2_{(P\Delta X)}+\sigma^2_{(-R\Delta M)}+2\sigma_{(P\Delta X)\ (-R\Delta M)}=23.353+7.022-21.932=8.443$$

turn is more important than the price change with associated profit variations, (4) the output change is relatively more important than the man-hours change in profits fluctuations, and finally (5) quantity effects were substantially larger than price-wage effects associated with profit changes.

II. QUARTERLY VARIATIONS IN PROFIT MARKUPS

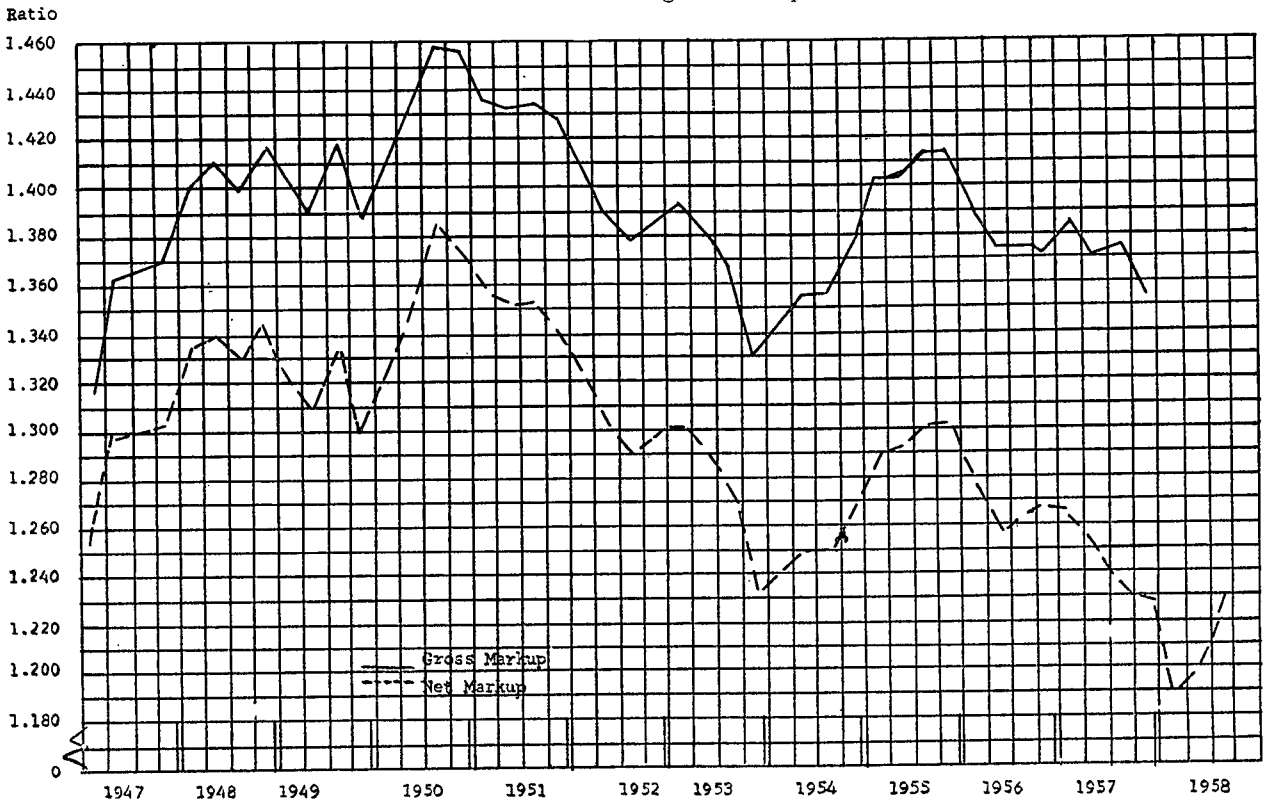
Studies of business behavior have focused attention on the widespread business practice of a markup on variable costs providing the basis for pricing decisions. The implications of this procedure are of the utmost importance for profit realization.[9] In order to evaluate the behavior of this decision criterion, the data have been put in the form of a markup, by the simple device of dividing the value product by the wage bill. The reciprocal of this measure is the wage share of net corporate product.

Chart 7 shows the behavior of the net and gross markups, over the postwar period. The net markup (namely, the markup in which corporate depreciation has been deducted from corporate value product) varied between 1.19, a value reached in the trough of the 1957–58 recession and 1.38, the peak value reached in the entire postwar period, during the Korean war. The markup does not behave like the other series although it combines the same ingredients. The markup increased fairly steadily from the middle of 1947 until the end of 1948 and then declined until the first quarter of 1950. The postwar inflation was the only period of increasing output during which the latest stages of the business cycle showed an increasing markup. With striking regularity the markup followed the pattern we next observe for the (trough to trough) 1949–54 cycle, the 1954–57 cycle, and the 1958– cycle, although not enough time has passed to allow much confirmatory evidence to accumulate for the 1958– cycle, except for the early recovery phase.

Revival of the markup to its peak value, achieved in the third and fourth quarters of 1950, took place in about a year. From that time on the markup continued downward, interrupted briefly by a leveling out at the end of 1952 and the beginning of 1953, to reach a cyclical trough in the fourth quarter of 1953, coinciding with the cyclical low point in output. The subsequent pattern was similar, although the markup did not reach a maximum within a year but instead about 2 years after the lower turning point, at the end of 1955. Then, despite stability or increases in the level of output, the markup declined gradually, only to plummet abruptly in sympathy with output, thus paralleling the pattern of the 1953–54 recession. While there are only data for four quarters with which to trace developments from the latest trough, this pattern also appears to have the same relatively sharp increase that was observed in the previous two cyclical recoveries.

[9] See especially Richard B. Heflebower, "Full Costs, Cost Changes, and Prices," and Richard Ruggles, "The Nature of Price Flexibility and the Determinants of Relative Price Changes in the Economy," in "Business Concentration and Price Policy," 1955, Charles L. Schultze, Study Paper No. 1, "Recent Inflation in the United States," materials prepared in connection with the study of employment, growth, and price levels for consideration by the Joint Economic Committee, Congress of the United States, September 1959, Washington, D.C., James S. Duesenberry, "Business Cycles and Economic Growth," 1959, ch. 6, and John R. Meyer and Edwin Kuh, "The Investment Decision: An Empirical Study," 1957, pp. 192–195.

CHART 7.—Net and gross markup.



Source. App B, table 7.

The behavior of the net markup can be summarized in the following way: it reaches a cyclical low about coincident with the business cycle trough and then recovers very rapidly, early in the next cyclical recovery. Subsequently, the net markup declines despite stability or increases in the level of output. A cyclical downturn then leads to a very sharp drop in the net markup.

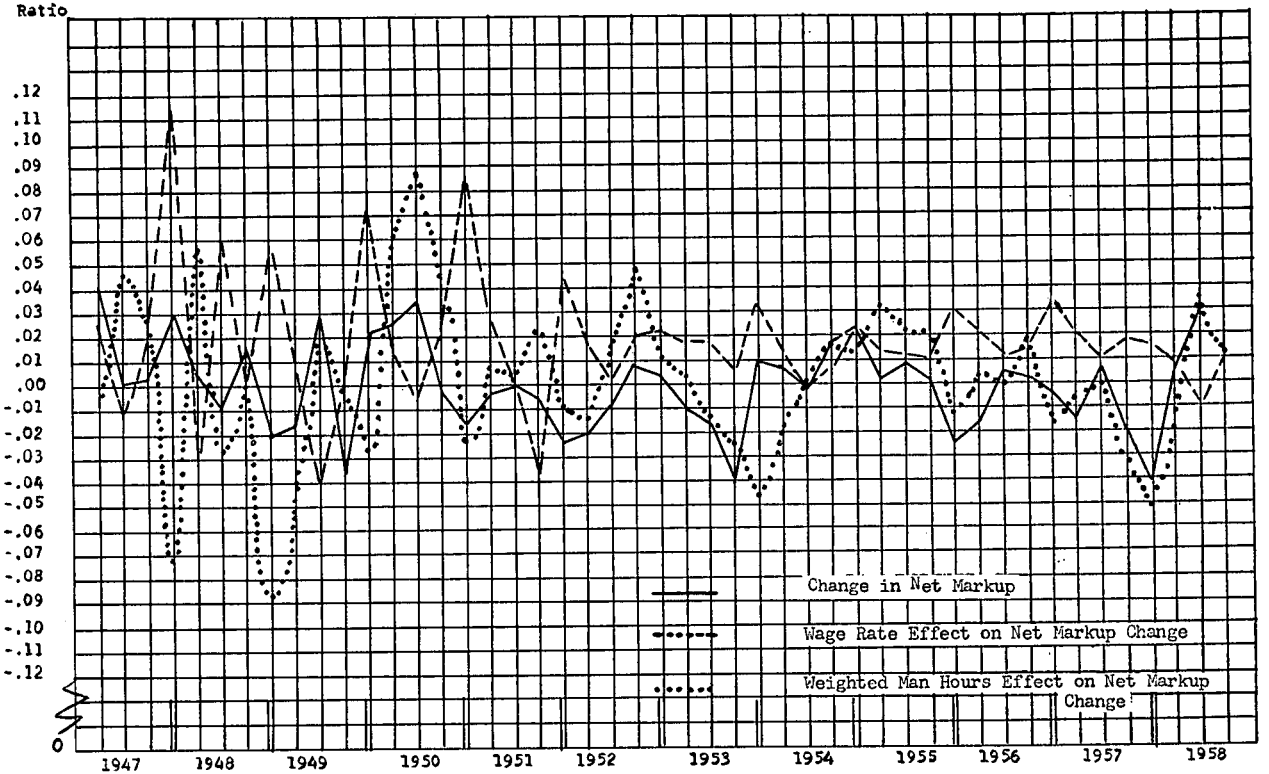
Chart 7 also indicates the path of the related measure, the gross markup. The values for this ratio of course are substantially greater than for the net markup. A somewhat different trend is evident. The timing of the two main peaks in the series coincide during the Korean war and at the end of 1955, and for both markups the late 1955 peak is noticeably below the Korean one. However, the gross markup did not decline nearly as much during 1957 as the net markup. Presumably increased reliance upon accelerated depreciation arising from revisions in depreciation procedure in the 1954 Revenue Code, in combination with an extremely heavy investment boom during 1956–57 led to this difference in behavior. In short, some trend implications of the gross series are different from those for the net series, although the cyclical pattern discussed in such detail above remain about qualitatively the same. Henceforth primary attention will be devoted to the net markup, although occasionally certain conclusions drawn on the basis of its behavior must be qualified by reference to this alternative gross concept.

It is possible to proceed in a manner qualitatively similar to that pursued in the description of the weighted changes in profits by calculating the weighted net markup change. This weighted markup change is described by equation (7).

$$(7) \qquad \Delta\left(\frac{PX}{MR}\right)_t=\left(\frac{PX}{MR}\right)_t\left[\frac{\Delta P_t}{P_t}+\frac{\Delta X_t}{X_t}-\frac{\Delta R_t}{R_t}-\frac{\Delta M_t}{M_t}\right].$$

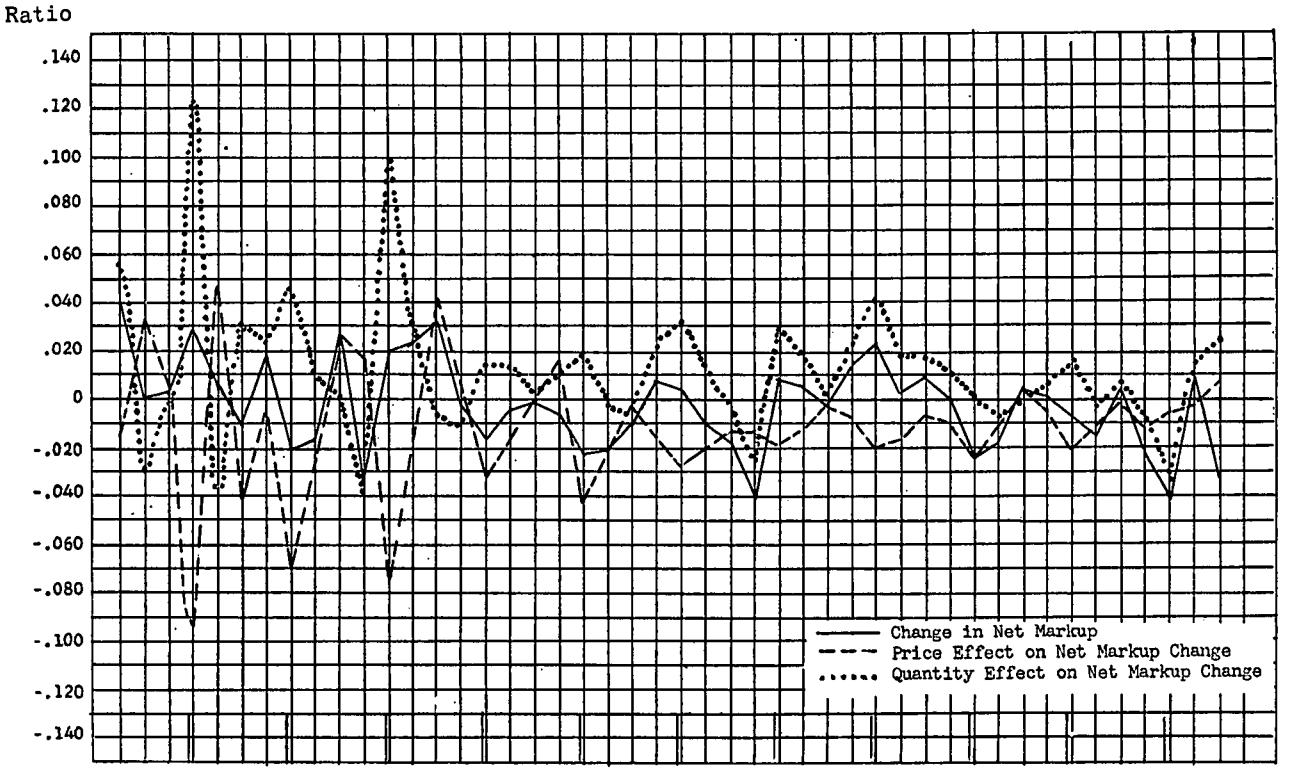
In this instance, the weight for each percentage change happens to be the markup itself, and the total change possesses the useful property that the change in the markup can be partitioned into the sum of the weighted percentage changes of the markup numerator variables minus the sum of the weighted percentage changes of the denominator variables. The effect of changes in the numerator and changes in the denominator of the net markup are presented in charts 8 and 9. With remarkable clarity the impression emerges that the markup will increase only during periods of extremely rapid increases in the percentage rates of growth of combined price and output. This is clearly visible during the Korean war, toward the end of 1952, again toward the end of 1954, and finally during the upswing beginning in the first quarter of 1958. Nearly every other time the markup was either declining or growing very slowly. This suggests that markups can have only brief periods of increase, since periods of highly accelerated growth in receipts occur relatively infrequently. High markups, of course, should not be confused with high profits, since even declining markups can coincide with increasing profits if applied to a greater total value of output. Chart 10 indicates graphically how different factors influence the change in the net markup. Here the changes have been split into weighted price and quantity markup effects (weighted percent change in price minus weighted percent change in

CHART 8.—Markup change, and effects from wage rate and man-hour changes.



Source: App. B, table 8.

CHART 9.—Markup change and effects from weighted price and quantity changes.



Source: App. B, table 9.

wage rate and weighted percent change in output minus weighted percent change in man-hours, respectively) analagous to results presented above for the change in profits shown by chart 6. The actual change in the markup is more often than not the net resultant of quite diametrically conflicting forces. While not universally evident, the markup quantity effect is large and positive when the markup price effect is simultaneously large and negative. This was especially true until 1952 and appeared to hold even after that time, although more irregularly. In this chart, too, it is impressive to observe the degree to which the change in the markup is quantity dominated during the recession and early upswing while during other periods of the business cycle the conflicting pulls with price prevail.

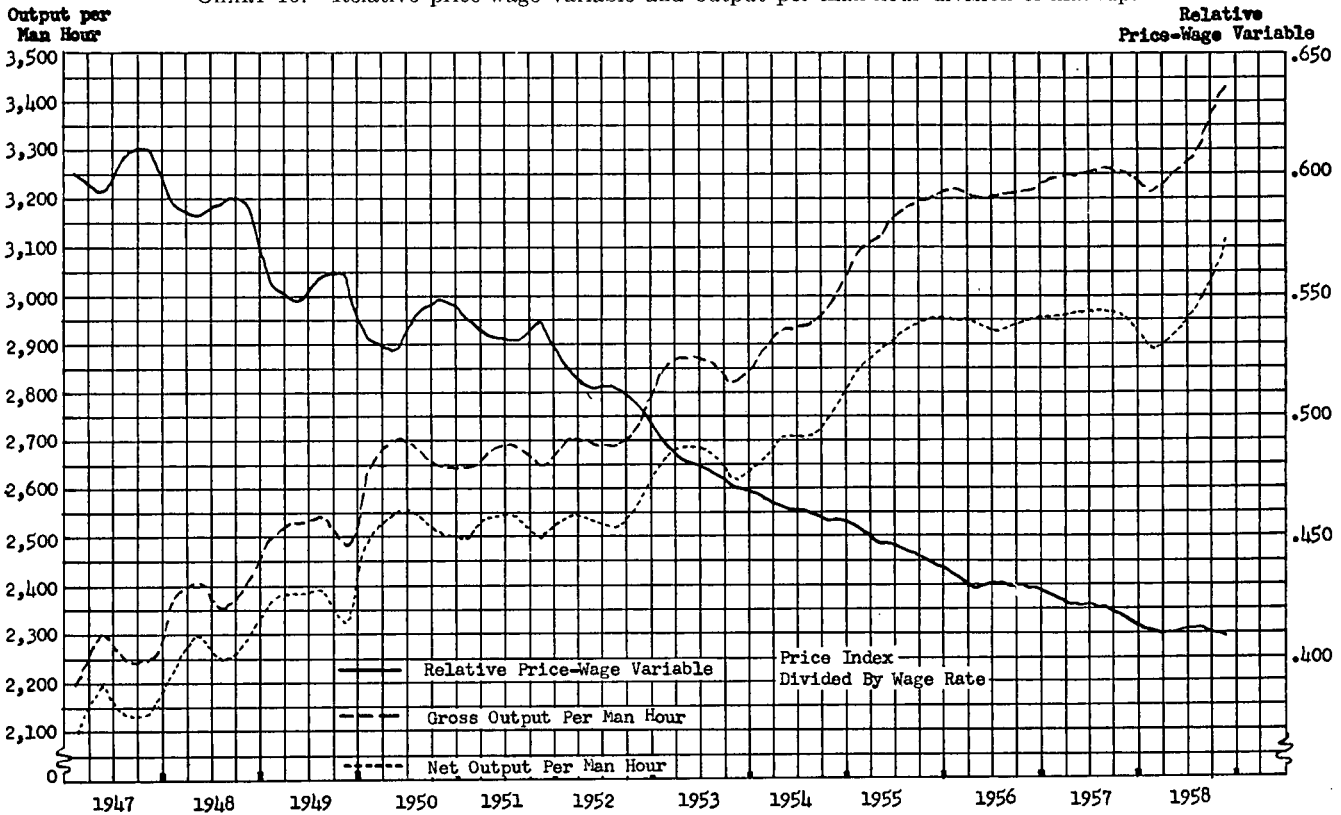
To this point the change in profits and the change in profit markups have been described. In order to proceed one step further, the change in markups will be divided into the product of two critically important ratios, the price-wage variable and the output per man-hour variable. These are shown in equation (8), where $\frac{P}{R}$ is the price-wage variable and $\frac{X}{M}$ is output per man-hour or productivity index.

$$\text{Markup}=\left(\frac{PX}{MR}\right)_t \equiv \left(\frac{P}{R}\right)_t \left(\frac{X}{M}\right)_t \tag{8}$$

While this only amounts to a redefinition of the markup, it isolates two variables which themselves are of independent interest. Without extended comment, it is evident from chart 10 that the price of final product relative to wages has declined from the beginning of 1947. While occasionally the price-wage variable would increase from one quarter to the next, the overwhelming tendency has been the regular decline in the relative price variable, particularly since 1950. An explanation of the markup which accords with the particular cyclical pattern discussed earlier, then, must be found in the productivity or output per man-hour variable. Indeed, output per man-hour follows a cyclical pattern strikingly similar to that of the markup, which it must do, given the trendlike behavior of the relative price variable.

A graphic history of the productivity variables in chart 10 shows certain observable regularities. Generally speaking, net output per man-hour increases from the trough for a little while and then levels out. Leaving aside the 1947–49 upswing which was dominated by reconversion from war to peacetime activity, output per man-hour had essentially stabilized by the second quarter of 1950 during the recovery from the 1949 recession, and then increased slightly in 1953 before turning down somewhat during the 1953–54 recession. Then a relatively rapid increase occurred from the beginning of 1954 until the end of 1955 to be followed by a 2-year period during which the net output per man-hour figure remained virtually unchanged. These results correspond closely to findings of the National Bureau of Economic Research using annual data for the private domestic economy from 1889 to the present. However, the National Bureau results showed, according to Solomon Fabricant, that "productivity rose most rapidly as a rule toward the end of a contraction and during

CHART 10.—Relative price-wage variable and output per man-hour division of markup.



Source: App. B, table 10.

the early stages of expansion." [10] Our results, which use different measurements than those of the National Bureau, do not show most rapid increases toward the end of a contraction, although we do find most rapid expansion during the early stages of a recovery.

In summary, the cyclical behavior of the markup can be characterized as follows: Emerging from a downswing productivity increases sharply enough so that it more than offsets the adverse effects of the trend movement in final product prices relative to wages on the net markup. Then, a year or two after the lower turning point, output per man-hour ceases to climb and wages continue to increase faster than final product prices and thereby cause a decline in the markup. In the concluding section of this study, some explanations for the behavior of output per man-hour will be suggested. The analysis, which will necessarily be tentative, depends upon a number of considerations to which we now turn.

III. SOME POSSIBLE EXPLANATIONS FOR OBSERVED BEHAVIOR

A. The formation of prices

Variations in certain of the vital series which in combination determine the changes in profits and profit markups have now been surveyed. We next report on some statistical results that bear on aggregate price level determination in a highly simplied way.[11]

Since the corporate universe is most heavily weighted by manufacturing, a price equation should reflect practices prevalent in that sector. The widespread practice of markup on cost provided justification for the discussion of markups in part II. Of course prices will be influenced by costs according to every reasonable theory and empirical generalization about price formation, and the markup policy appears to be especially prevalent in oligopolistic markets which are so characteristic of U.S. industry. Demand too must enter into a complete explanation of price. When excess capacity exists, price shading and price reductions are most likely to occur for a given level of costs. Conversely, when demand is pressing against capacity, prices tend to rise for a given level of costs, although one would suppose that responses to cost changes would be greater than to demand shifts, because of primary reliance on costs in the pricing decision. These cursory remarks cannot be amplified here although references cited in footnote 9 provide a fuller rationale for the propositions asserted here.

To the extent that prices are cost influenced, it is assumed that the wage rate of the previous quarter provides one relevant cost indicator. A second cost factor would also influence prices, but in the opposite direction. For a given level of wages, improvements in productivity will lead to lower prices in markets subject to some degree of price competition, an effect whose influence is measured by the output per

[10] Solomon Fabricant, "Basic Facts on Productivity Change", Occasional Paper 63, National Bureau of Economic Research, 1959. This is a summary document based on numerous studies for the national bureau, particularly those by John W. Kendrick and Thor Hultgren. Fabricant carefully points out that more correct indexes of productivity include all factor inputs, not just man-hours, and that the physical quantities should most appropriately be given price weights. Nevertheless, the graphs presenting alternative measures of productivity in this volume show distinctly similar patterns over time, although at different levels. See especially their chart 1.

[11] A useful volume of theoretical and empirical material bearing on inflation is the recent study undertaken for the Joint Economic Committee by Charles L. Schultze, "Recent Inflation in the United States," op. cit.

man-hour variable. The ratio of these two variables, $R \div (X/M)$ is an aggregate measure of unit wage costs. Costs will influence prices either when pulled up by a demand pull inflation or when pushed up by autonomous wage increases arising from a cost push inflation.[12] Hence, our results are neutral in this particular controversy. A third factor bearing a prominent role in discussions of aggregate price formation, is the effect of demand. During periods when demand is extremely strong, prices will respond in the upward direction. In order to measure high-level demand, a variable called the demand ratchet has been contrived which is similar in construction to one devised by James S. Duesenberry.[13] The demand ratchet is the ratio of current output to peak previous output, but to adjust for increased productive capacity since the previous output peak, peak previous ouput has been multiplied by a growth rate of 3¾ percent per year which represents the rate of growth in the net fixed capital stock in manufacturing over the postwar period.[14] This measure can only be approximate since the precise concept underlying excess demand or high-level demand is not readily measured, although since in effect it is a ratio of output to capacity, it provides a highly pertinent measure of excess demand. Nevertheless an alternative measure based upon unfilled orders or some other excess demand proxy (all of which have important conceptual defects) might have been superior, but for present purposes this variable should suffice. The results of combining these alternative hypotheses in a regression analysis are shown below in equation (9). Coefficients have been estimated for the period 1949–58 in this and subsequent regressions to avoid the distorting influence of the immediate post-World War II readjustment period.

$$(9) \qquad P_t = .305\, R_{t-1} - .227\left(\frac{X}{M}\right)_{t-1} + .130\, H_t + .230\, H_{t-2} + .625$$

	(.043)		(.053)		(.089)		(.059)	
Partial correlations	0.791		−0.612		0.253		0.576	
Elasticities [15]	.648		−.616		.124		.221	

$R = 0.949$ Multiple correlation
$S = 0.013$ Standard error of estimate
$N = 36$ Sample size
P_t = Price index of current quarter,
R_{t-1} = Wage rate of previous quarter,
$\left(\frac{X}{M}\right)_{t-1}$ = Output per man-hour of previous quarter,
H_t = Demand ratchet of current quarter,
H_{t-2} = Demand ratchet lagged two periods.

In terms of relative independent influence on price level (measured by partial correlations), the wage rate cost factor is strongest followed by

[12] Paul A. Samuelson and Robert M. Solow, "Analytical Aspects of Anti-Inflation Policy," American Economic Review, "Papers and Proceedings of the American Economic Association, May 1959," summarize the extreme difficulties of identifying demand pull from cost push inflation using aggregate data.
[13] James S. Duesenberry, "Income, Saving, and the Theory of Consumer Behavior, Cambridge, Harvard University Press, 1949.
[14] The data for this were taken from material contained in "National Income and Output," Department of Commerce, table V-15, p. 197. The variable construction itself is more fully described in App. A, pt. 3.
[15] Elasticities have been evaluated at sample means for all variables. Means, standard deviations and extreme values for each variable are reported in app. A, pt. 5, for this and later regression equations.

the productivity factor, and the lagged demand ratchet which have about equal strength. The current demand ratchet shows a negligible independent influence. Since the coefficients of the various independent variables have been measured with considerable accuracy (except for that of H_t), elasticities, which show the estimated percentage change in price for a 1-percent change in the independent variable, are of primary interest in evaluation of alternative influences on price.

It is first interesting to note that the two cost variables have substantially larger elasticities than that for the sum of the excess demand or demand ratchet variable elasticities. In fact, the demand responsiveness appears to be less than half that of each cost factor taking into account the unreliable estimate of the current demand ratchet, H_t. Other things equal, it thus appears that the price level is more responsive to cost changes than to demand changes although the response to demand pressures is far from negligible as reflected in the elasticity of 0.345 for both H_t and H_{t-2}, or .221 if H_t is ignored, and the two cost factors partially offset each other. Since the wage rate and the output per man-hour variable both enter into the markup, it is interesting to observe here that the sum of the two elasticities is almost zero, so that a 1-percent increase in output per man-hour and a 1-percent increase in the wage rate, will leave the price level virtually unchanged because the two types of cost change have neutralized each other. Since the ratio of the two forms unit wage costs, it follows that, given the level of demand, prices will change in the same direction as unit wage costs according to the present hypothesis. Now, it should be recalled from an earlier discussion that wage rates increase fairly steadily through time while output per man-hour is subject to a repetitive cyclical pattern, namely sharp increases during the early upswing and then either a slow increase or a leveling out during the later stages of the business cycle boom. Hence, during the late upswing when output per man-hour is changing negligibly there will be cost pressures on prices. Wage rates will therefore dominate cost changes through most of this business cycle phase. At the same time, of course, the demand ratchet reinforces the effects of wage rates during this part of the cycle, since the demand ratchet sometimes reaches its highest values at this particular phase, although this did not occur in 1956–57.

It is possible to distinguish a number of influences which have been proposed by alternative inflation theorists from the regression equation. While it is not our purpose to discuss the merits of alternative inflation theories, this particular result indicates that the major factors ordinarily given consideration bear up under statistical scrutiny. Such findings are only provisional, since they have not been established within the context of a complete model. In particular, these findings cannot be used to support a cost push inflation theory, because of other price-wage interactions which we have not considered, and the proposition mentioned earlier that a demand inflation too will lead to cost and price increases.[16]

[16] L. R. Klein and R. J. Ball, "Some Econometrics of the Determination of Absolute Prices and Wages," Economic Journal, September 1959, pp. 465–482, present a more complete model of price and wage determination for Great Britain in which the wage rate, average weekly earnings, hours worked, and import prices are simultaneously determined. Thus, lagged price influences current wages according to one Klein-Ball equation, an interaction of the sort I have not included here. The Klein-Ball price equation has for its main explanatory variables weekly earnings, lagged import prices, and indirect tax rates. Unlike my results, they found a productivity variable to be statistically unimportant.

B. Determinants of man-hours and productivity

Output per man-hour appears to have played the crucial cyclical role in the determination of profit markups. What are the causes of variation in output per man-hour and man-hours themselves? It is patently obvious that output per man-hour and man-hours must be intimately related. Clearly, output generates demand for labor while in turn output per man-hour depends on technological change and the introduction of new capital equipment, and the level of output.

For want of a better device to measure long run technological change, the commonly employed practice of introducing a linear trend term to represent this factor has been followed.[17] To measure short-run effects on output per man-hour when capital stock and techniques are assumed fixed, the level of output itself was introduced. Final results are shown in equation (10). This equation should only be expected to hold within a given range of output, since diminishing returns would cause a decline in output per man-hour for extremely large levels of output with a given capital stock and labor force.

(10) $$\left(\frac{X}{M}\right)_t = \underset{(.00086)}{0.00409}X_t + \underset{(.0015)}{0.0114}t + 1.800$$

Partial correlations	.617	.775
Elasticities [18]	+.249	+.086

R=0.977 Multiple correlation
$\overline{S}$=.046 Standard error of estimate
N=40 Sample size
$\left(\frac{X}{M}\right)_t$=Output per man-hour
X_t=Current output
t=time trend

The most convenient way to interpret this expression in terms of output per man-hour is to ask the following question of the estimated trend coefficient: what is the percentage increase in output per man-hour per year, net of the effect of variations in output.[19] The average increase in output per man-hour net of the effect of variations in output from equation (10) can be evaluated by dividing the trend coefficient by the mean value of output per man-hour. This calculation provides the average rate of increase per man-hour per quarter over the period observed equal to .0042. When multiplied by four to put it on an annual basis, the more familiar magnitude of 1.68 percent per year increase in output per man-hour is observed—but net of the level of output effect in this particular case. The increase in output per man-hour since 1949, the initial year used in the regressions, has averaged 3 percent per annum. Since the net trend is about 1.7 percent, 1.3 percent of the effect represents everything else,

[17] An interesting alternative way of evaluating the rate of technological progress has been proposed by Robert M. Solow, "Technical Change and the Aggregate Production Function," Review of Economics and Statistics, August 1957.

[18] Elasticities have been evaluated at sample means for all variables. Least squares bias from having X_t on both sides of the equality sign in (10) is negligible, since coefficients estimated with $\frac{1}{M_t}$ as the dependent variable yielded highly similar coefficient estimates.

[19] Straightforward elasticities involving trend variables are in most cases open to ambiguous interpretation so we have adopted this approach instead.

in this case primarily variations in the level of output. Hence, while most of the variation to be explained falls, as should be expected, upon the long run factors of technological change and capital additions, a highly important residual cyclical component measured by output remains to be explained.

Explanation of the cyclical behavior of output per man-hour involves selecting from among numerous competing hypotheses, all of which contain at least a grain of truth and plausibility. First, it is entirely possible that innovations in combination with capital additions accumulated during the previous boom require time to become fully effective. It can then be argued that the consolidation of new techniques and new capital is concentrated in the early part of the upswing and thereafter only normal increases in productivity occur. While undoubtedly there is some merit in this proposition, it presupposes a greater degree of synchronization of investment plans for different firms in the economy than actually appears plausible. Should there be a considerable diversity in timing of the introduction of capital additions, as seems probable, it is unlikely that one would find synchronization in quantity impressive enough to account for the strong asymmetry in timing observed in the cyclical variability of output per man-hour.

Second, limitations on supply may have restricted output so that the failure of output per man-hour to increase after the early cyclical upswing could be attributable to general supply stringencies or strategic bottlenecks. It is certainly probable that in 1950–51 the spurt of activity generated by the Korean war caused production to hit a ceiling in many lines. This reason, however, by itself fails to account for the fact that, even many quarters after the leveling of output per man-hour, productivity increases did not resume as might have been expected because of new capital installed and the redirection and increases in labor supply during the intervening periods. The possibilities are much weaker that supply restrictions can explain the productivity index behavior during the 1954–57 upswing, especially since the increase in output per man-hour was spread over a 2-year period and then abruptly ceased. Once again, a resumption in the rate of growth and output per man-hour at a steep rate would have been expected when enough time had elapsed to ease supply shortages, but this resumption in fact did not occur.

Third, the increase in output per man-hour might have terminated because of insufficient effective demand. It is entirely possible that reasons two and three have operated in tandem. For instance, during the Korean war bottlenecks might have prevented the rate of growth in output per man-hour from increasing and subsequent failure to resume increases in output per man-hour might be attributed to deficient effective demand. This reasoning applies with even greater force to the termination of the rate of growth in output per man-hour which occurred in the period 1956–57, during which period net corporate product remained about stationary in real terms, declining sharply only at the very end of 1957.

A somewhat different set of factors related to those discussed above also must be seriously considered. These concern the increasingly important role of overhead labor such as office force, salesmen, foremen, etc., in relation to production workers, and the possibilities that returns to scale may be different in the early phase of a business cycle

recovery than in later phases. I group these different hypotheses together because certain of their quantitative manifestations to be explored further are similar. The returns to scale proposition holds that output per man-hour increases sharply because of the more efficient combination of productive factors including both capital and labor. Partly included in this reason is the very first reason mentioned, namely, that innovations and capital additions in the previous boom only became fully effective at a date well beyond the date of their original installation. According to this explanation, increasing returns are exhausted rather early in the business cycle so that output per man-hour, in part determined by returns to scale, will not increase at the same pace as it did during the time period when returns to scale were coming fully into effect.

While the returns to scale hypothesis is based upon the presumption that both capital and labor resources are variable, the overhead labor argument has separate shortrun and longrun strands. During a sharp decline in output, according to the shortrun argument, output per man-hour will decline abruptly because the overhead labor component is not reduced proportionately, even though there is, say, a proportionate reduction in the production line work force. There may not even be a proportional reduction in the production line work force immediately at the start of a slump because of uncertainty over the continuation of the downturn and the high cost of rehiring and retraining workers if the downturn is short but workers have been released. This influence should be especially strong when expectations are geared to a full employment growth economy. For whatever reasons, if there is a fairly large fixed component in the labor force a decline in output will lead to a sharp reduction in output per man-hour. Correspondingly, there will then be an increase when output increases, since in the present instance variations in the productivity variable come about through more rapid variations in the numerator relative to the more slowly changing denominator, man-hours. It should be borne in mind, however, that this shortrun argument can by its nature account for only a small part of the total explanation of the cyclical behavior in the output per man-hour index since the subsequent cyclical peak in output per man-hour level peak far exceeds the level reached during the previous peak. If, however, output per man-hour remained near that of the previous peak, much greater significance could be attributed to the shortrun influence of overhead labor. Within its limited range of influence, however, it is likely to be of real importance.

The longrun argument about the influence of overhead labor on cyclical man-hour productivity can be put in the following way. A structural change is going on in the American labor force because of a sharp increase in overhead labor relative to production line labor.[20]

The trend toward more overhead labor will not noticeably influence productivity during the early upswing when output is increasing rapidly. During the later part of an upswing, however, when the rate of increase in output diminishes sharply, as occurred in the postwar cycles examined here, the overhead labor trend continues so that the man-hours of the relatively fixed variety have a large weight,

[20] I owe this particular line of reasoning to Prof. James S. Duesenberry. Also, see Charles L. Schultze, op. cit., who places great emphasis on the importance of overhead labor in explaining the 1955–57 inflation. He points out that in manufacturing salary payments increased 152 percent while wage payments increased only 78 percent over the 1947–57 decade using national income accounting definitions. (See Schultze, op. cit., table 4–4, p. 82.) Schultze also includes capital consumption allowances in overhead costs.

leading to a leveling out or decline in output per man-hour. Thus, while the overhead labor trend should not have adverse effects on labor productivity in the long run, cyclical dynamic effects could prove detrimental to productivity.

In order to study some of the main features of the cyclical disparity in the output per man-hour index, an equation has been developed to explain variations in man-hours by an output variable where two separate behavior coefficients, slope and intercept, are estimated in the three main phases of the business cycle, plus a common trend term. The first phase occurs during the period when output is rising from a trough but has not yet leveled out. This roughly corresponds to the period of reemployment of overhead labor but goes beyond the previous peak output in all periods. It will be designated as the early upswing. The next phase, the late upswing, is confined to periods when output has not only passed its previous peak and in nearly every instance is increasing slowly (or not at all) until the current cyclical peak level has been reached. The third phase includes periods when the level of output is predominantly decreasing from the cyclical peak and will be called the downturn.[21] The results of least squares estimation of the coefficients for this relation are shown in equation (11).

Early upswing

(11a) $M_{1t}=.286X_{1t}-.248t+17.44$
(.022) (.033) (3.16)

Partial correlations	.916	−.797
Elasticities [22]	.796	−.084

Late upswing

(11b) $M_{2t}=.231X_{2t}-.248t+28.62$
(.022) (.033) (3.19)

Partial correlations	.883	−.797
Elasticities	.630	−.080

Downswing

(11c) $M_{3t}=.313X_{3t}-.248t+14.71$
(.033) (3.01)

Partial correlations	.925	−.797
Elasticities	.835	−.088

$R=.999$ Multiple correlation
$\overline{S}=.728$ Standard error of estimate
$N=40$ Sample size

Certain aspects of the estimated coefficients are quite striking. First, the intercept terms, which can be interpreted as estimates of overhead labor hours, are about equal in the early upswing and the downswing. In order to have some quantitative notion of the importance of this term which measures man-hours in billion hours per year, it should be

[21] The precise time periods for each variable are listed in table 11, app. B.

[22] The three equations were simultaneously estimated with Mt as the dependent variable and intercept and slope coefficient for each cycle phase, plus the common trend term. Elasticities have been evaluated at average values for each cycle phase. Elasticities evaluated at the sample mean for the entire period irrespective of cycle phase do not differ appreciably from those in the main body of the text. Elasticities based on sample period average man-hours, output, and trend are these:

Output in early upswing	0.790
Output in late upswing	.653
Output in downswing	.794
Time trend	−.084

mentioned that the average man-hours per year are 61 billion during the 1949–58 sample period. Hence, the overhead component can be considered to be roughly one quarter of the average hours in the early upswing and downswing. By contrast, the overhead labor component during the late upswing is approximately twice that of the other two periods, and equals about one-half of the average man-hours for the total period. Second, marginal man-hour requirements defined as man-hour increases required for a given increase in output and measured by the slope coefficient of the output variable, have similar values averaging 0.300 for the early upswing and the downswing but the slope coefficient for the late upswing is only 0.231.[23] That marginal labor requirements are lower in the late upswing can best be explained by the proposition that the relatively larger overhead labor component (represented by the intercept term) is a good substitute for additional labor, and cyclically large capital outlays reduce incremental man-hour requirements. The differences in the slopes are reflected in the different elasticities which show that a 1 percent increase in output requires a four-fifths of 1 percent increase in man-hours during the early upswing (and corresponding decreases during the downswing) while a 1 percent increase in output will require only a two-thirds percent increase in man-hours during the late upswing. The large intercept term reflects the trend toward overhead labor discussed previously which will certainly lead to adverse productivity effects in the early part of the downswing. However, the low value for the intercept during the downswing indicates that the overhead man-hours have been only a short run impediment to productivity increases, because the average value during the downswing is so much less than the value during the late upswing. In short, overhead labor is substantially diminished during the downswing. It is only somewhat higher during the early upswing.

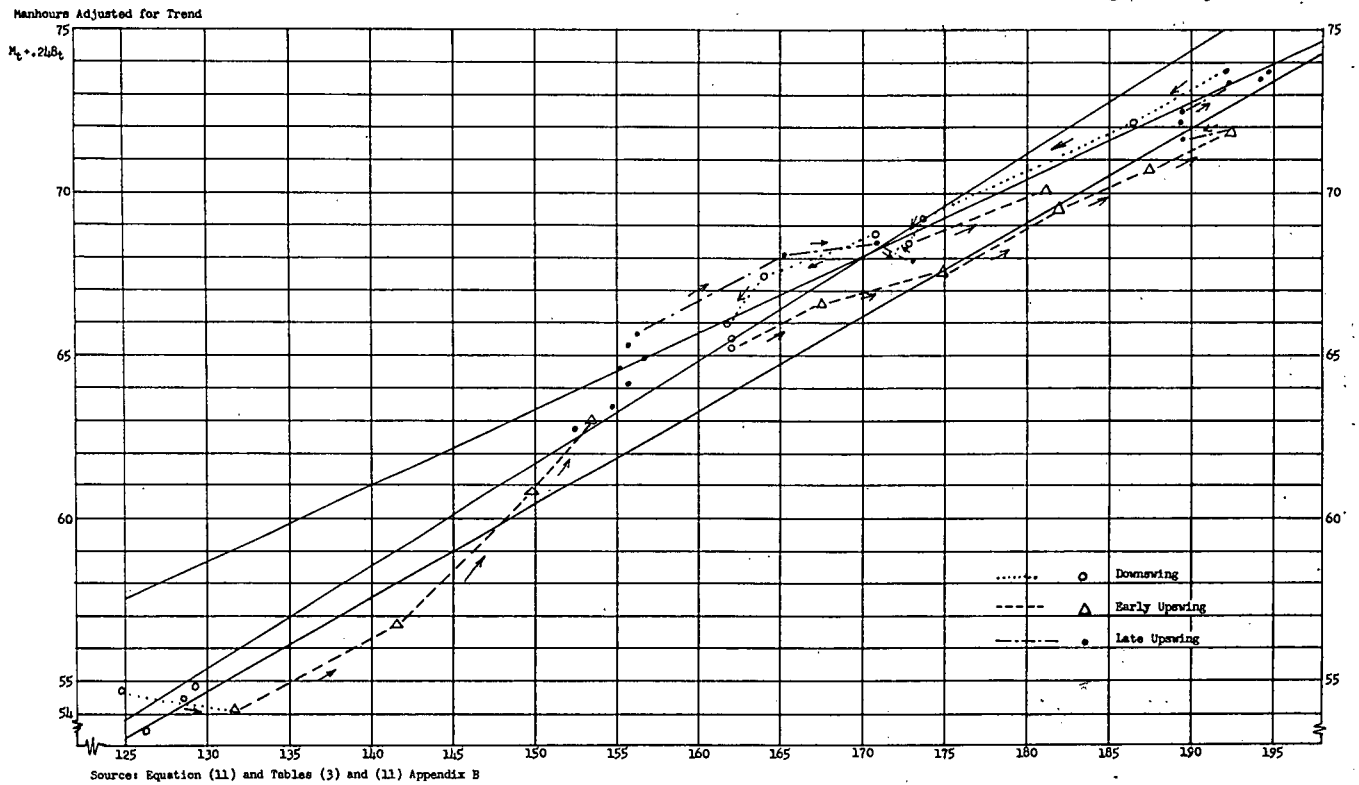
In order to further relate these results to those contained in equation (10), which, it will be recalled, expresses output per man-hour in terms of the level of output and a trend term, chart 11 has been drawn, showing the regression equation for each cycle phase, with actual output plotted against man-hours adjusted for trend.

As might have been anticipated from previous discussion about the behavior of the productivity variable, during the 1950–51 recovery man-hour requirements gradually increased but as the late upswing is approached man-hour requirements per unit of output steadily rise, driving the man-hour output relation up toward the late upswing equation. When output declined briefly in 1953–54, the adverse effects of overhead labor acquired during the late upswing became evident although the results were temporary since the actual relationship converged toward the downswing equation with its lower average overhead labor component. A similar cycle of behavior occurred during the 1954–57 recovery and the 1957–58 downswing. There is one highly significant difference between the two recessions however. In the waning period of the 1950–53 boom, output increased very rapidly with only a relatively small increase in corresponding man-hours. During the late upswing for the 1954–57 recovery, output did not increase much at all, nor significantly, did productivity.

Marginal labor requirements in the late upswing are less than marginal labor requirements in the early upswing. If diminishing returns prevailed in the late upswing, we would have instead found the late

[23] The difference between 0.231 and either of the other two slopes is significant by ordinary significance tests at the 5 percent level.

CHART 11.—Relation of man-hours to output during early upswing, late upswing, and downswing: Intercycle.



Source: Equation (11) and tables 3 and 11, app. B.

upswing marginal labor requirements higher than the early upswing requirements. This apparently surprising result can be readily explained. Because overhead labor is accumulated so rapidly, on the average, during the late upswing and at the same time labor-saving investment is proceeding at a fast pace, output increases in the late upswing require little in the way of additional man-hours. If this proposition is valid, it follows that average productivity, measured by the ratio of output to man-hours, could have increased further than it did in 1952 and 1957 had effective demand been greater. This conclusion is subject to two obvious and highly important qualifications. First, the additional overhead labor during the late upswing which in part makes possible the low marginal labor requirements in the late upswing will be exhausted, and, eventually, seriously diminishing returns in many lines of activity are likely to appear. Second, these statistical results depend upon observations over only two-and-a-half business cycles and hence must be extremely tentative, although the basic similarity between the behavior of the different cycle phases in each of the periods observed suggests that the pattern is not an accidental one.

One last possibility of a statistical nature must be checked. Statistical biases might have been created by measuring cycle phase reactions for widely different time periods. To evaluate whether bias was introduced through this procedure regression equations were estimated for each cycle phase for which the man-hours and output observations in each cycle phase are deviations from each separate cycle average. These results are shown in chart 12 and corresponding equations are also presented in equation (12).[24]

(12a) Early Upswing

$$M_{1t}=0.261X_{1t}+17.32$$
$$(.039$$

Elasticity 0.713

$r=0.930$ simple correlation
$S=$ .890 standard error of estimate
$N=9$ sample size

(12b) Late Upswing

$$M_{2t}=0.189X_{2t}+30.74$$
$$(.018)$$

Elasticity .515

$r=0.938$
$S=$ .376
$N=17$

(12c) Downswing

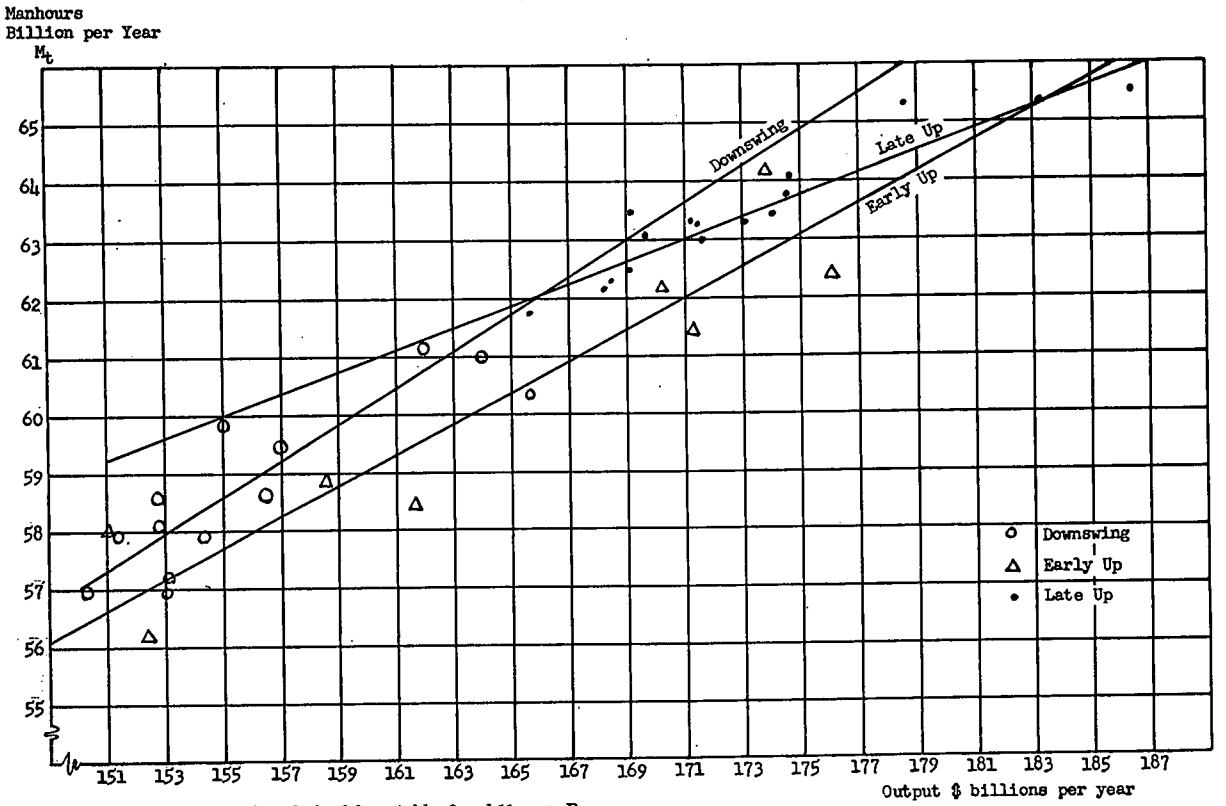
$$M_{3t}=0.315X_{3t}+9.80$$
$$(.050)$$

Elasticity 0.833

$r=0.895$
$S=$ .619
$N=12$

[24] Trend terms measured for these equations prove to be completely insignificant and hence have not been taken into account in these equations or in the graph. The output observations underlying the late upswing regression will be illustrated here. Turning to table 11, col. 5, we see two late upswings. The means for each upswing were computed and observations were formed by subtracting each late upswing mean from the observations for that period, and the resulting deviations from mean were pooled together. Similar operations were performed on man-hours and output in other cycle phases. Intercepts for each equation were derived using the cycle phase mean and elasticities were also evaluated at the same three set of means.

CHART 12.—Relation of man-hours to output during early upswing, late upswing, and downswing: Intracycle.



Source: Equation (12) and data derived from tables 3 and 11, app. B.

A comparison of the estimated coefficients between equation (11) and equation (12) reveals that the estimated coefficients are quite similar, with the exception of the intercept for the downswing. The early upswing and downswing marginal labor requirement coefficients are extremely close while the late upswing coefficient is moderately lower here than the coefficient estimated in the previous equation although the differences are not statistically significant. All in all, the results are sufficiently consistent so that inferences drawn from the first set of estimates would be similar in nature to those drawn from this set of estimates.

C. Conclusions

In this analytical section explanations have been sought for movements in two of the four critical variables which so strongly influenced profit. No explanations have been presented here for the level of output or wage rates. To explain the level of output requires much more explaining than our restricted inquiry permits, while an explanation of wage rates calls for a detailed explanation of labor markets and many diverse aspects of the national economy.

Two other major determinants of profits have been explored, price levels and man-hours and its counterpart, man-hour productivity. In explaining prices, the two important ingredients of unit costs—wage rates and output per man-hour and a measure of pressure on capacity proved to be of definite importance in the determination of the aggregate price index. From the second section of the paper it will be recalled that in actuality wages have moved upward steadily. Hence, productivity, which varies closely with the cyclical level of output, puts pressure on wages at the later portions of the business cycle recovery since typically output per man-hour at that time is hardly increasing so that its earlier effect, which was to offset wage increases, diminishes. Unit costs rise in the later part of the cycle, while at the same time demand pressures ordinarily are strong. Both factors cause prices to rise during the later phase of the business cycle. During the early part of the business cycle recovery, pressures for price increases are not strong from either costs or demand. Neither the cost factors nor the demand factor can be taken to represent evidence for or against cost push or demand pull inflation, since in either case one would expect to find significant pressures on price from these variables.

A more precise formulation of output per man-hour has been defined in terms of the level of output and the time trend, the former representing cyclical variations in output per man-hour, while the latter represents trend effects of substitution of capital for labor and technological improvements. Both effects were found to be quite powerful, slightly more than half of the increase in output per man-hour being attributable to trend and slightly less than half to the level of output.

The more rapid rate of growth of output per man-hour in the early stages of a recovery may be related to any one or all of the following five reasons. First, innovations and new techniques become fully effective in the early part of a recovery so that output per man-hour increases are especially rapid at this time. Second, bottlenecks or quite general limitations on supply may develop in the later recovery although this reason is insufficient by itself to explain convincingly

postwar episodes other than that during the Korean war. Third, because overhead labor such as office force and selling and supervisory employees as well as many categories of production workers are not speedily displaced during a cyclical contraction, output per man-hour will fall during periods of declining output and will rise during an early upswing when overhead labor is efficiently re-employed. Fourth, a strong secular trend exists toward more overhead labor so that when the rate of increase in output begins to decline during the later stages of a recovery and overhead labor increases are not reduced in proportion, cyclically adverse effects on productivity can occur. Fifth, effective demand may slacken in the later recovery.

Quantitative measures of the relationship between man-hours and output at different stages in the cycle revealed the great importance of the overhead labor component in slowing down the increase in output per man-hour in the late part of a business cycle upswing. It was found that the overhead labor component is especially large in the late recovery. It is roughly one-half as important during both the early upswing and the downswing, both of which have similar behavior. Furthermore, marginal man-hour requirements are less during the late upswing than during the early upswing or downswing. This is largely explainable on the grounds that overhead labor is much more available to increase output during the late stages of a recovery and investment is at high levels. It seems probable that a sufficiently rapid increase in effective demand could make it possible for output per man-hour to continue increasing at least for a limited time. This last qualification is important since increases in output would ultimately be limited by available labor and capital. Nevertheless, it appears that particularly during the 1956–57 late upswing and in 1952 during a late upswing, important productivity gains were lost because of the failure of demand to increase sufficiently.

APPENDIXES

Appendix A

Description of Basic Series

1. Price index

Basically, the implicit price deflator for corporate income, which we have called the price index, has been obtained by suitably weighting implicit price deflators for three categories of output: durable goods, nondurable goods, and producers durable equipment. The weights chosen were the constant dollar values corresponding to the price indexes, i.e., constant dollar value of durable goods, nondurable goods, and producers durable equipment. The Implicit price deflators were obtained from "implicit price deflators for seasonally adjusted quarterly gross national product or expenditure," table VII–3, "U.S. Income and Output," pp. 222–223. The corresponding seasonally adjusted real GNP component came from "Gross national product or expenditure, seasonally adjusted quarterly totals at annual rates, in constant dollars," table I–5, "U.S. Income and Output," pages 124–125.

A weighted mean of the implicit price deflators was obtained as follows:

p_1=implicit price index for durable goods
p_2=implicit price index for nondurable goods
p_3=implicit price index for producers durable equipment
x_1=constant dollar output of durable goods
x_2=constant dollar output of nondurable goods
x_3=constant dollar output of durable producers equipment

$$p=\frac{p_1x_1+p_2x_2+p_3x_3}{x_1+x_2+x_3}$$

The defense of this particular selection of implicit price indexes rests largely on the fact that the excluded components—principally services, governmental activity, and farm products—are exclusively or predominantly noncorporate in nature, whereas durable goods, nondurable goods, and producers durable equipment are mostly produced by corporations. Further, it is improbable that prices for noncorporate production in these areas would differ significantly from those of corporate producers.

2. Estimated man-hours in corporate activity

Man-hour figures were derived by taking the product of estimated corporate employment times estimated average weekly hours per worker. Annual corporate employment data will be found in the November 1959 Survey of Current Business. To obtain quarterly interpolation, estimates from seasonally adjusted monthly employment figures for industries employment reported in various editions of the Economic Report of the President were averaged by quarter. These employment figures by major industrial sector were weighted by the proportion of corporate to noncorporate employment according to figures taken from the 1954 Census of Manufactures or Trade. In some cases the figures were assumed where

no readily available alternative source of information could be found. The weights are the following:

Percentage corporate employee figures taken from the census of manufacturers or trade

	Corporate employment	Noncorporate employment	Percent corporate
Manufacturing	14,279,000	1,372,000	91
Retail trade	3,848,142	3,276,189	
Wholesale	1,829,689	760,527	
Total	5,677,831	4,036,716	58
Mining	628,735	156,793	80
Construction		Assumed	50
Finance		Assumed	50
Transportation and public utilities	Taking a weighted average of— (a) Transportation: 3,009,000 (assume 50 percent corporate) (b) Public utilities: 1,104,000 (assume 100 percent corporate) $\frac{(3,009).50+(1,104)1.00}{3,009+1,104}=$		63

Since the amount of corporate employment in farming is extremely small, this was excluded, as was Government employment too. Some of the guesses, particularly in construction and transportation and public utilities could have been improved by alternative estimation techniques but even a relatively large error in either one of these components would not seriously damage the estimated totals which are heavily weighted by manufacturing and retail and wholesale trade. Total employment figures for each sector were then combined into our estimate of the quarterly corporate employment level in the corporate sector by taking a weighted average using the weights from the table above and interpolating annual corporate employment on a quarterly basis with this series.

Bureau of Labor Statistics data underlie our figures for average hours worked per quarter at an annual rate. The information is reported in Business Statistics, a supplement to the Survey of Current Business, Office of Business Economics, U.S. Department of Commerce, for the years 1951, 1955, and 1957 in a table entitled "Employment and Population—Labor Conditions—Average Weekly Hours Per Worker." In general, a weighted average of hours was constructed for four sectors—transportation and public utilities, contract construction, manufacturing, and trade. Each of the hour figures are weighted by the fraction of total corporate employees in each industry.

The product of the two series, the one for average hours, the other for employment, provides the estimate of man-hours. In order to obtain an estimate of the wage rate, we have divided the wage bill, i.e., the total of wages and salaries, by our estimate of corporate man-hours. This series is presented in table 3, appendix B. A graphic comparison of the implicit wage rate and average hourly earnings in manufacturing is made in chart 13. There are several possible reasons why the estimate of the wage rate turns out to have exceeded that for manufacturing by about 19 percent. First of all, supplements have been included in the wage and salary figure for our industries while these have not been included in the wage and salary figures reported for manufacturing in the "Economic Report of the President." These typically amount to about 6 percent of the wage and salary figure. A second possibility is that on the average corporate pay is higher than noncorporate pay, a proposition impossible to evaluate quantitatively. Since, however, most manufacturing industry is of the corporate form, this should not account for a large part of the observed discrepancy. Third, the different industrial compositions of our sample causes comparisons with the manufacturing sector to be valid. It is worth taking manufacturing seriously, however, because a number of plausible but untested assumptions went into deriving our own figures. This leads us to the fourth and last main possibility, namely that the estimates of corporate employment and/or corporate hours have a downward bias so that when the product of these two numbers is divided into the wage bill, we find a corresponding upward bias in the implicitly estimated wage rate.

It will be recalled that analysis in parts I and II of this paper have been based upon changes in the variables, for instance, wage rate and man-hours, where the wage rate has been obtained by dividing the wage bill by estimated man-hours. We can show very readily that when variables have been obtained in this manner

the bias in the change will be zero, provided that the bias is fixed. The demonstration of this follows using the wage bill as an example although the same conclusion applies to the corporate product.

M = Man-hours,
R = Wage rate,
MR = Wage bill,
$M' = \lambda M$, where M' is an estimate of M but differs from it according to the fraction λ,
$R' = MR \div M'$, estimated wage rate

$$\begin{aligned}\Delta(MR) &= M'\Delta R' + R'\Delta M' \\ &= \lambda M \Delta\left(\frac{MR}{M'}\right) + \left(\frac{MR}{M'}\right)\Delta(\lambda M) \\ &= \lambda M \Delta\left(\frac{MR}{\lambda M}\right) + \left(\frac{MR}{\lambda M}\right)\Delta(\lambda M) \\ &= M\Delta R + R\Delta M\end{aligned}$$

The above result shows that if there is a bias in estimating man-hours, this imparts a bias to a number estimated from it—in the present instance, the wage rate. The biases, however, are exactly offsetting when estimating weighted changes, provided that the bias remains constant over the period of observation or approximately so.

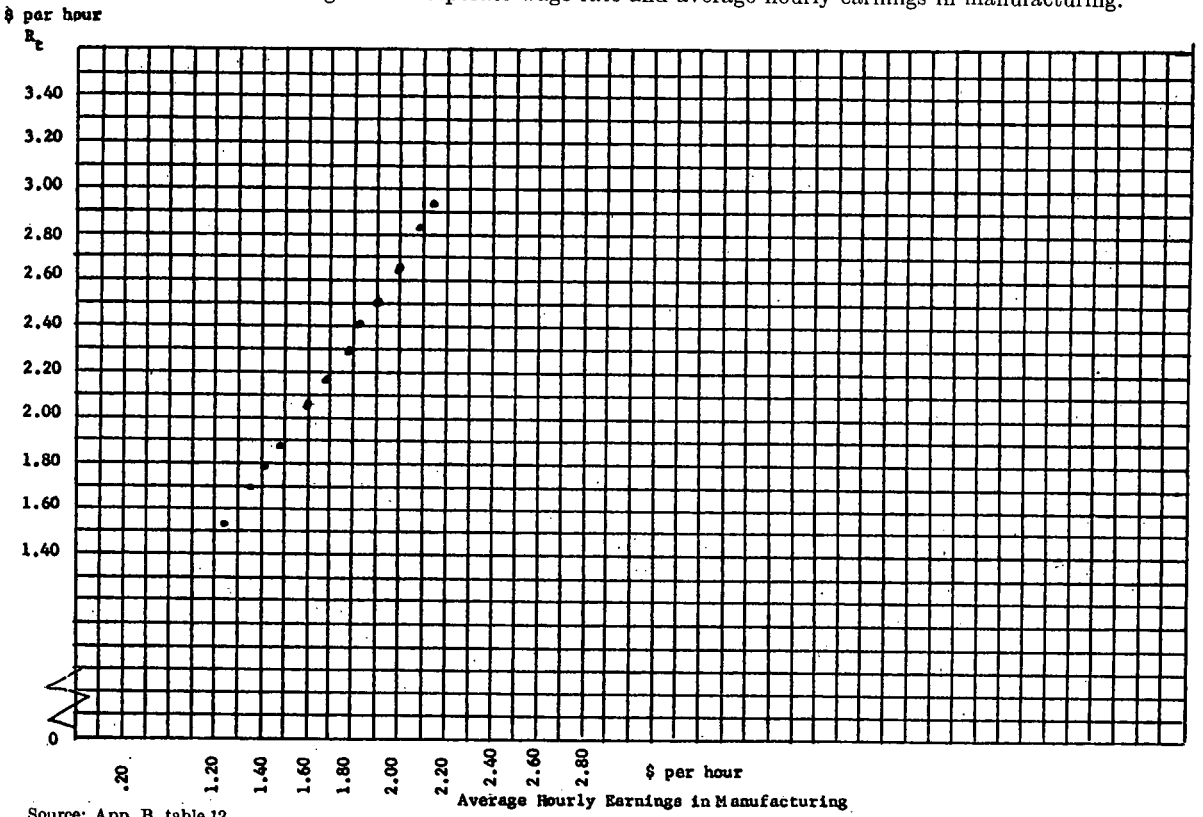
A second reason why we should have some confidence in the way we have selected to estimate wage rates on the one hand and corporate product in a corresponding manner on the other is that in the present instance our estimate of the corporate wage rate is very highly correlated with the manufacturing average weekly wage rate. This is indicated by chart 13 which shows a scatter diagram of the two variables. It is evident to the naked eye that the two are so highly correlated that when covariances are involved similar results for inferences about behavior will be obtained from either wage rate. Even though regression coefficients will be biased in these circumstances, elasticities will not, and primarily reliance has been put upon these measurements.

3. The construction of the demand ratchet

The purpose of the demand ratchet is to provide an index showing levels of demand which are large or small relative to existing capacity. A more narrowly correct definition of what we are after is situations in which in some average sense marginal costs are changing relatively rapidly. In order to measure this, we have constructed the demand ratchet which is the ratio of current to previous peak output where the previous peak output has been multiplied by a compound growth factor. The reason for resorting to a compound growth factor (whose numerical magnitude will be discussed shortly) can be quickly stated. If productive capacity has increased from last quarter to this, output must not only exceed previous output in absolute amount but must do so by more than the rate of growth in the corresponding capacity if demand pressures on capacity are to have increased relative to those of the preceding periods. Put in a slightly different way, if output remained stationary in two adjacent quarters, but capacity had increased between these same two quarters, demand pressures relative to capacity would have decreased. It is these considerations which we have sought to embody in the demand ratchet.

The particular compound rate of growth selected was 3¾ percent which is the rate at which manufacturing net plant and equipment grew from 1947 through 1957, the majority of the period covered by this study. At first thought serious consideration was given to modifying a constant rate of growth by variations in the rate of investment. This particular approach was abandoned since there is an extremely complicated relation between investment of the current period and increases of utilizable capacity. If, for instance, a large fraction of investment consisted of construction, the increment in utilizable capacity on this account would be negligible. Even apart from this consideration, the differences in capital-output relations between two different points of time is likely to be such that for a given real volume of investment, the dollar increment in output can vary considerably. In light of these uncertainties about the relationship between increments in investment and increments in utilizable capacity, it seemed preferable to stick with the constant rate of growth rather than introduce more capricious variations into the variable definition.

CHART 13.—Scatter diagram of corporate wage rate and average hourly earnings in manufacturing.



Source: App. B, table 12.

The symbolic representation for the ratchet then is the following:

(1) $$\text{Demand ratchet, } H_t = \frac{X_t}{X_p\,(1.0375)^{\,t-p}}$$

In the denominator expression, we have X_p which represents the previous peak multiplied by the compound interest factor whose properties we have described above. The values for the demand ratchet and for the denominator of the demand ratchet are reproduced in table 11, appendix B.

4. *Approximation for changes in variables which are products*

From the calculus of finite differences, the differential of a product of two independent variables can be written as:

(1) $$z = xy$$

(2) $$\Delta z = x\Delta y + y\Delta x + \Delta x\Delta y$$

When the changes, Δy and Δx, are small relative to y and x, the second order term $\Delta x\Delta y$ is negligible compared to the other components and therefore can be neglected as we have done in text equations (1) and (7). The errors from adoption of this procedure are mostly very small as the reader may verify by comparing the approximation formed by the sum of columns (2) and (3) with the exact change in value product, column (1) in table 4 and making similar comparisons in table 5 for the wage bill. As illustrated in the footnote to table 4 (and table 8 for the markup), each weighted change has been computed by using the average weight for the two successive quarters over which the change occurred. This procedure improves the accuracy of the approximation.

5. *Means, standard deviations and range for variables in regression equations*

	Variable	Mean	Standard deviation	Range	
				Smallest value	Largest value
Equation 9:					
Beginning quarter t=1950, I	Pt	1.006	0.0426	0.895	1.077
Ending quarter t=1958, IV	Rt^{-1}	2.137	.291	1.606	2.629
	$\left(\frac{X}{M}\right)_{t-}$	2.729	.193	2.325	2.987
	Ht	.963	.0532	.826	1.061
	Ht^{-3}	.966	.0497	.826	1.061
Equation 10:					
Beginning quarter t=1949, I	$\left(\frac{X}{M}\right)_t$	2.713	.215	2.368	3.114
Ending quarter t=1958, IV	Xt	166.38	20.51	124.83	193.82
	t	20.50	11.54	1	40
Equation 11:					
Beginning quarter t=1949, I	Mt	61.15	3.576	53.001	65.680
Ending quarter t=1958, IV	X_1t	168.41	19.89	131.96	192.31
	X_2t	172.96	16.91	152.24	193.82
	X_3t	155.21	20.87	124.83	186.47
	t	20.50	11.54	1	40

APPENDIX B

LIST OF SYMBOLS

Symbol	Variable	Table
$\pi = PX - MR$	Net corporate profit	1
D	Depreciation	1
P	Price index of corporate product	2
X	Constant dollar corporate net product	2
M	Man-hours	3
R	Wage rate	3
H	Demand ratchet variable	11
$\frac{PX}{MR}$	Net markup	7
$\frac{X}{M}$	Net output per man-hour	10
$\pi + D$	Gross corporate profit	1
$\Delta\pi$	Change in profits	4
$\frac{PX+D}{P}$	Constant dollar corporate gross product	2
PX	Corporate net value product	1
$PX+D$	Corporate gross value product	1
ΔPX	Change in net value product	4
$\overline{P}\Delta X$	Weighted change in output	4
$\overline{X}\Delta P$	Weighted change in price	4
MR	Corporate wages and salaries (wage bill)	1
ΔMR	Change in wages and salaries	5
$\overline{M}\Delta R$	Weighted change in wage rate	5
$\overline{R}\Delta M$	Weighted change in man-hours	5
$\overline{X}\Delta P - \overline{M}\Delta R$	Weighted price-wage effect on profits	6
$\overline{P}\Delta X - \overline{R}\Delta M$	Weighted quantity effect on profits	6
$\frac{PX+D}{MR}$	Gross markup	7
$\Delta\left(\frac{PX}{MR}\right)$	Total change in net markup	8
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta X}{\overline{X}}\right)$	Weighted output effect on change in net markup	8
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta P}{\overline{P}}\right)$	Weighted price effect on change in net markup	8
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta M}{\overline{M}}\right)$	Weighted man-hour effect on change in net markup	8
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta R}{\overline{R}}\right)$	Weighted wage rate effect on change in net markup	8
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta X}{\overline{X}} - \frac{\Delta M}{\overline{M}}\right)$	Weighted quantity effect on change in net markup	9
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta P}{\overline{P}} - \frac{\Delta R}{\overline{R}}\right)$	Weighted price-wage effect on change in net markup	9
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta M}{\overline{M}} + \frac{\Delta R}{\overline{R}}\right)$	Weighted wage-bill effect on change in net markup	9
$\left(\frac{\overline{PX}}{MR}\right)\left(\frac{\Delta X}{\overline{X}} + \frac{\Delta P}{\overline{P}}\right)$	Weighted net value product effect on change in net markup	9
$\frac{P}{R}$	Ratio of price index to wage rate	10
$\frac{\frac{PX+D}{P}}{M}$	Gross output per man-hour	10

NOTE 1.—The terms "corporate product" and "output" are used interchangeably.
NOTE 2.—A bar over a symbol indicates an average for 2 adjacent values of the variable whose change is being measured.

APPENDIX C

TABLE 1.—*Corporate value product, wage bill and profits*

[Quarterly figures at annual rates]

[Current billion dollars]

Year	Quarter	Corporate gross value product PX+D (1)	Corporate net value product PX (2)	Corporate wages and salaries MR (3)	Net corporate profit π (4)=(2)−(3)	Gross corporate profit π+D (5)=(1)−(3)
1947	1	$103.1	$98.3	$78.3	$20.0	$24.8
	2	108.5	103.3	79.6	23.7	28.9
	3	111.7	106.3	81.8	24.5	29.9
	4	116.6	110.9	85.1	25.8	31.5
1948	1	122.8	116.7	87.5	29.2	35.3
	2	125.8	119.5	89.2	30.3	36.6
	3	128.1	121.8	91.7	30.1	36.4
	4	130.2	123.6	91.8	31.8	38.4
1949	1	125.7	118.8	89.7	29.1	36.0
	2	122.4	115.3	88.2	27.1	34.2
	3	123.2	115.9	86.8	29.1	36.4
	4	119.6	112.1	86.2	25.9	33.4
1950	1	125.8	118.1	89.4	28.7	36.4
	2	135.1	127.3	94.5	32.8	40.6
	3	146.5	138.6	100.4	38.2	46.1
	4	153.3	145.1	105.3	39.8	48.0
1951	1	158.4	149.8	110.2	39.6	48.2
	2	162.4	153.5	113.3	40.2	49.1
	3	163.5	154.2	113.9	40.3	49.6
	4	165.3	155.7	115.7	40.0	49.6
1952	1	167.3	157.1	118.8	38.3	48.5
	2	165.5	155.1	119.2	35.9	46.3
	3	166.7	156.2	121.0	35.2	45.7
	4	176.4	165.7	127.5	38.2	48.9
1953	1	182.1	170.5	130.8	39.7	51.3
	2	184.1	172.2	133.2	39.0	50.9
	3	182.7	170.5	133.7	36.8	49.0
	4	175.1	162.7	131.9	30.8	43.2
1954	1	175.5	162.2	130.5	31.7	45.0
	2	175.9	162.3	129.8	32.5	46.1
	3	175.4	161.6	129.4	32.2	46.0
	4	181.2	167.0	132.0	35.0	49.2
1955	1	190.4	175.1	135.9	39.2	54.5
	2	197.4	181.7	140.7	41.0	56.7
	3	203.7	187.6	144.3	43.3	59.4
	4	208.9	192.5	147.9	44.6	61.0
1956	1	209.0	191.6	150.0	41.6	59.0
	2	210.8	193.1	153.3	39.8	57.5
	3	213.5	195.4	154.4	41.0	59.1
	4	219.0	200.6	158.4	42.2	60.6
1957	1	222.0	202.6	160.5	42.1	61.5
	2	222.4	202.5	162.4	40.1	60.0
	3	225.0	204.8	163.6	41.2	61.4
	4	218.8	198.4	161.3	37.1	57.5
1958	1	207.0	186.4	156.7	29.7	50.3
	2	206.9	186.1	155.3	30.8	51.6
	3	215.4	194.5	158.2	36.3	57.2
	4	226.0	204.8	160.6	44.2	65.4
1959	1	234.1	212.5	168.2	44.3	65.9
	2	246.5	224.6	174.6	50.0	71.9

Source:
Col. 1: Table I–14, line 2, plus corporate depreciation linearly interpolated to obtain quarterly data from table VI–18, "National Income and Output," 1958.
Col. 2 and 3: Table I–14, ibid., line 2 and 3.
Col. 4: ibid.
Col. 5: Net corporate profits plus corporate depreciation interpolated linearly, table VI–18, "National Income and Output."

TABLE 2.—*Constant dollar corporate gross and net constant dollar product and price index of corporate output*

[Dollar figures in billions]

Year	Quarter	Constant 1954 dollars—quarterly figures at annual rates		Price index of corporate product P
		Constant dollar corporate gross product $\frac{PX+D}{P}$ (1)	Constant dollar corporate net product $X=\frac{PX}{P}$ (2)	(3)
1947	1	$121.15	$115.51	0.851
	2	126.30	120.25	.859
	3	127.94	121.76	.873
	4	130.27	123.91	.895
1948	1	135.39	128.66	.907
	2	137.18	130.31	.917
	3	137.44	130.68	.932
	4	140.15	133.04	.929
1949	1	136.63	129.13	.920
	2	134.21	126.42	.912
	3	136.85	128.49	.902
	4	133.18	124.83	.898
1950	1	140.55	131.95	.895
	2	149.94	141.28	.901
	3	158.37	149.83	.925
	4	162.05	153.38	.946
1951	1	160.97	152.23	.984
	2	163.87	154.89	.991
	3	165.15	155.75	.990
	4	165.30	155.70	1.000
1952	1	166.96	156.78	1.002
	2	165.50	155.10	1.000
	3	166.70	156.20	1.000
	4	175.87	165.20	1.003
1953	1	182.46	170.84	.998
	2	185.02	173.06	.995
	3	183.06	170.84	.998
	4	176.51	164.01	.992
1954	1	174.97	161.71	1.003
	2	175.54	161.97	1.002
	3	175.75	161.92	.998
	4	181.56	167.33	.998
1955	1	190.20	174.92	1.001
	2	197.59	181.88	.999
	3	203.70	187.60	1.000
	4	208.69	192.30	1.001
1956	1	207.96	190.64	1.005
	2	207.88	190.43	1.014
	3	208.08	190.44	1.026
	4	211.59	193.81	1.035
1957	1	212.23	193.69	1.046
	2	211.20	192.30	1.053
	3	212.26	193.20	1.060
	4	205.63	186.46	1.064
1958	1	193.09	173.88	1.072
	2	192.10	172.79	1.077
	3	200.55	181.09	1.074
	4	210.62	190.86	1.073
1959	1	217.56	197.49	1.076
	2	228.45	208.15	1.079

Source:
Cols. 1 and 2: Obtained by dividing current dollar corporate product (cols. 1 and 2 in table 1) by the price index contained in this table, col. 3.
Column 3: Described in app. A, pt. 1.

TABLE 3.—*Corporate man-hours and wage rate*

Year	Quarter	Wage rate per hour R (1)	Man-hours (billions per year) M (2)	Year	Quarter	Wage rate per hour R (1)	Man-hours (billions per year) M (2)
1947	1	$1.4210	55.1020	1953—Con.	2	$2.0681	64.4071
	2	1.4501	54.8925		3	2.0946	63.8305
	3	1.4360	56.9625		4	2.1103	62.5030
	4	1.4674	57.9940	1954	1	2.1500	60.6978
1948	1	1.5403	56.8072		2	2.1700	59.8152
	2	1.5725	56.7258		3	2.1685	59.6721
	3	1.5799	58.0417		4	2.1786	60.5885
	4	1.5795	58.1204	1955	1	2.2121	61.4360
1949	1	1.6446	54.5426		2	2.2334	62.9990
	2	1.6641	53.0007		3	2.2531	64.0460
	3	1.6152	53.7398		4	2.2741	65.0372
	4	1.6055	53.6906	1956	1	2.3239	64.5470
1950	1	1.6862	53.0194		2	2.3631	64.8730
	2	1.7071	55.3582		3	2.3820	64.8197
	3	1.6994	59.0797		4	2.4117	65.6802
	4	1.7237	61.0903	1957	1	2.4570	65.3229
1951	1	1.8191	60.5806		2	2.5043	64.8486
	2	1.8582	60.9731		3	2.5202	64.9154
	3	1.8582	61.2950		4	2.5557	63.1132
	4	1.8568	62.3099	1958	1	2.6104	60.0288
1952	1	1.9263	61.6727		2	2.6290	59.0718
	2	1.9501	61.1242		3	2.6095	60.6255
	3	1.9529	61.9605		4	2.6203	61.2913
	4	1.9860	64.1992	1959	1	2.7355	61.4875
1953	1	2.0365	64.2264		2	2.7439	63.6316

Source:
Col. 1: Obtained by dividing corporate wages and salaries (col. 3, table 1) by estimated man-hours (col. 2, this table).
Col. 2: See app. A, pt. 2.

TABLE 4.—*Change in profits, change in net corporate value product and weighted changes in output and price*

[Billion dollars]

Year	Quarter	Change in net value product $\Delta(PX)$ (1)	Change in output $\overline{P}\Delta X$ (2)	Change in price $\overline{X}\Delta P$ (3)	Change in profits $\Delta\pi$ (4)
1947	1				
	2	5.0	4.05	.94	3.7
	3	3.0	1.30	1.69	.8
	4	4.6	1.89	2.70	1.3
1948	1	5.8	4.28	1.51	3.4
	2	2.8	1.50	1.29	1.1
	3	2.3	.34	1.95	−.2
	4	1.8	2.19	−.39	1.7
1949	1	−4.8	−3.62	−1.17	−2.7
	2	−3.5	−2.47	−1.02	−2.0
	3	.6	1.87	−1.27	2.0
	4	−3.8	−3.29	−.50	−3.2
1950	1	6.0	6.38	−.38	2.8
	2	9.2	8.38	.81	4.1
	3	11.3	7.80	3.49	5.4
	4	6.5	3.31	3.18	1.6
1951	1	4.7	−1.10	5.80	−.2
	2	3.7	2.62	1.07	.6
	3	.7	.85	−.15	.1
	4	1.5	−.05	1.55	−.3
1952	1	1.4	1.08	.31	−1.7
	2	−2.0	−1.68	−.31	−2.4
	3	1.1	1.10	0	−.7
	4	9.5	9.01	.48	3.0
1953	1	4.8	5.64	−.84	1.5
	2	1.7	2.21	−.51	−.7
	3	−1.7	−2.21	.51	−2.2
	4	−7.8	−6.79	−1.00	−6.0
1954	1	−.5	−2.29	1.79	.9
	2	.1	.26	−.16	.8
	3	−.7	−0.5	−.64	−.3
	4	5.4	5.40	0	2.8
1955	1	8.1	7.58	.51	4.2
	2	6.6	6.95	−.35	1.8
	3	5.9	5.71	.18	2.3
	4	4.9	4.71	.19	1.3
1956	1	−.9	−1.66	.76	−3.0
	2	1.5	−.21	1.71	−1.8
	3	2.3	.01	2.28	1.2
	4	5.2	3.47	1.72	1.2
1957	1	2.0	−.13	2.13	−.1
	2	−.1	−1.45	1.35	−2.0
	3	2.3	.95	1.34	1.1
	4	−6.4	−7.15	.75	−4.1
1958	1	−12.0	−13.44	1.44	−7.4
	2	−.3	−1.16	.86	1.1
	3	8.4	8.93	−.53	5.5
	4	10.3	10.48	−.18	7.9
1959	1	7.7	7.11	.58	.1
	2	12.1	11.49	.60	5.7

Source: Each weighted change has been computed by using the average value for 2 successive quarters over which change occurred. As an example, take the weighted change in output for the 2d quarter of 1950 of $8.38 billion. This number equals

$$[X_{50-2}-X_{50-1}]\cdot\left[\frac{P_{50-2}+P_{50-1}}{2}\right]=(9.33)(89.8)=8.38$$

(See table 4, col. 2, line 13:)

Table 4, col.—	Change from—	Weight from—
2	Table 2, col. 2	Table 2, col. 3.
3	Table 2, col. 3	Table 2, col. 2.

TABLE 5.—*Change in wage bill and weighted changes in man-hours and wage rate*

[Billion dollars]

Year	Quarter	Change in wage bill $\Delta(MR)$ (1)	Change in man-hours $R\Delta M$ (2)	Change in wage rate $M\Delta R$ (3)
1947	1			
	2	1.3	−.30	1.60
	3	2.2	2.98	−.78
	4	3.3	1.49	1.80
1948	1	2.4	−1.78	4.18
	2	1.7	−.12	1.82
	3	2.5	2.07	.42
	4	.1	.12	−.02
1949	1	−2.1	−5.76	3.66
	2	−1.5	−2.55	1.05
	3	−1.4	1.21	−2.61
	4	−.6	−.07	−.52
1950	1	3.2	−1.10	4.30
	2	5.1	3.96	1.13
	3	5.9	6.33	−.43
	4	4.9	3.44	1.45
1951	1	4.9	−.90	5.80
	2	3.1	.72	2.37
	3	.6	.59	0
	4	1.8	1.88	−.08
1952	1	3.1	−1.20	4.30
	2	.4	−1.06	1.46
	3	1.8	1.63	.16
	4	6.5	4.40	2.09
1953	1	3.3	.05	3.24
	2	2.4	.37	2.02
	3	.5	−1.20	1.70
	4	−1.8	−2.79	.99
1954	1	−1.4	−3.84	2.44
	2	−.7	−1.90	1.20
	3	−.4	−.31	−.08
	4	2.6	1.99	.60
1955	1	3.9	1.86	2.03
	2	4.8	3.47	1.32
	3	3.6	2.34	1.25
	4	3.6	2.24	1.35
1956	1	2.1	−1.12	3.22
	2	3.3	.76	2.53
	3	1.1	−.12	1.22
	4	4.0	2.06	1.93
1957	1	2.1	−.86	2.96
	2	1.9	−1.17	3.07
	3	1.2	.16	1.03
	4	−2.3	−4.57	2.27
1958	1	−4.6	−7.96	3.36
	2	−1.4	−2.50	1.10
	3	2.9	4.06	−1.16
	4	2.4	1.74	.65
1959	1	7.6	.52	7.07
	2	6.4	5.87	.52

NOTE.—A full explanation of the methods for calculating weighted changes will be found in the source for table 4.

Source:
Col. 1: Quarter to quarter change in table 1, col. 3.
Col. 2: Quarter to quarter change in table 3, col. 2, weighted by average wage rate for the 2 related quarters.
Col. 3: Quarter to quarter change in table 3, col. 1, weighted by average man-hours for the 2 related quarters.

TABLE 6.—*Profit change divided into quantity and price-wage effects*

Year	Quarter	Quantity effect $\bar{P}\Delta X - \bar{R}\Delta M$ (1)	Price-wage effect $\bar{X}\Delta P - \bar{M}\Delta R$ (2)	Year	Quarter	Quantity effect $\bar{P}\Delta X - \bar{R}\Delta M$ (1)	Price-wage effect $\bar{X}\Delta P - \bar{M}\Delta R$ (2)
1947	1			1953—Con.	3	−$1.01	−$1.18
	2	$4.35	−$0.65		4	−4.00	−1.99
	3	−1.68	2.48	1954	1	−1.55	−.65
	4	.40	.89		2	2.16	−1.36
1948	1	6.06	−2.66		3	.25	−.55
	2	1.63	−.53		4	3.40	−.60
	3	−1.73	1.53	1955	1	5.72	−1.52
	4	2.07	−.37		2	3.48	−1.68
1949	1	2.14	−4.84		3	3.36	−1.06
	2	.07	−2.07		4	2.46	−1.16
	3	.66	1.33	1956	1	−.53	−2.46
	4	−3.21	.01		2	−.97	−.82
1950	1	7.48	−4.68		3	.14	1.05
	2	4.41	−.31		4	1.40	−.20
	3	1.46	3.93	1957	1	.73	−.83
	4	−.12	1.72		2	−.27	−1.72
1951	1	−.20	.00		3	.78	.31
	2	1.90	−1.30		4	−2.58	−1.51
	3	.25	−.15	1958	1	−5.47	−1.92
	4	−1.94	1.64		2	1.34	−.24
1952	1	2.29	−3.99		3	4.86	.63
	2	−.62	−1.77		4	8.74	−.84
	3	−.53	−.16	1959	1	6.59	−6.49
	4	4.60	−1.60		2	5.61	.08
1953	1	5.58	−4.08				
	2	1.84	−2.54				

Source:
Col. 1: Table 4, col. 2, minus table 5, col. 2.
Col. 2: Table 4, col. 3, minus table 5, col. 3.

NOTE.—See equation (1) and surrounding text for further explanation.

TABLE 7.—*Net and gross markup*

Year	Quarter	Net markup $\frac{PX}{MR}$ (1)	Gross markup $\frac{PX+D}{MR}$ (2)	Year	Quarter	Net markup $\frac{PX}{MR}$ (1)	Gross markup $\frac{PX+D}{MR}$ (2)
1947	1	1.2554	1.3167	1953	2	1.2928	1.3821
	2	1.2977	1.3631		3	1.2752	1.3665
	3	1.2995	1.3655		4	1.2335	1.3275
	4	1.3032	1.3702	1954	1	1.2429	1.3448
1948	1	1.3337	1.4034		2	1.2504	1.3552
	2	1.3397	1.4103		3	1.2488	1.3555
	3	1.3282	1.3969		4	1.2652	1.3727
	4	1.3464	1.4183	1955	1	1.2884	1.4010
1949	1	1.3244	1.4013		2	1.2914	1.4030
	2	1.3073	1.3878		3	1.3001	1.4116
	3	1.3353	1.4194		4	1.3016	1.4124
	4	1.3005	1.3875	1956	1	1.2773	1.3933
1950	1	1.3210	1.4072		2	1.2596	1.3751
	2	1.3471	1.4296		3	1.2655	1.3828
	3	1.3805	1.4592		4	1.2664	1.3826
	4	1.3780	1.4558	1957	1	1.2623	1.3832
1951	1	1.3593	1.4374		2	1.2469	1.3695
	2	1.3548	1.4334		3	1.2518	1.3753
	3	1.3538	1.4355		4	1.2300	1.3565
	4	1.3457	1.4287	1958	1	1.1895	1.3210
1952	1	1.3224	1.4082		2	1.1983	1.3323
	2	1.3012	1.3884		3	1.2295	1.3616
	3	1.2909	1.3777		4	1.2752	1.4072
	4	1.2996	1.3835	1959	1	1.2634	1.3918
1953	1	1.3035	1.3922		2	1.2864	1.4118

Source:
Col. 1: Table 1, col. 2, divided by table 1, col. 3.
Col. 2: Table 1, col. 1, divided by table 1, col. 3.

TABLE 8.—*Change in net markup and weighted changes in output, price, man-hours and wage rate*

Year	Quarter	Effects of weighted changes on net markup from—				Total change in net markup $\Delta\left(\frac{PX}{MR}\right)$
		Net output $\frac{PX}{MR}\left(\frac{\Delta X}{X}\right)$	Price $\frac{PX}{MR}\left(\frac{\Delta P}{P}\right)$	Man-hours $\frac{PX}{MR}\frac{\Delta M}{M}$	Wage rate $\frac{PX}{MR}\frac{\Delta R}{R}$	
		(1)	(2)	(3)	(4)	(5)
1947	1					
	2	.0514	.0119	−.0049	.0259	.0423
	3	.0162	.0210	.0481	−.0127	.0018
	4	.0227	.0324	.0234	.0281	.0037
1948	1	.0496	.0176	−.0273	.0639	.0305
	2	.0170	.0147	−.0019	.0276	.0060
	3	.0038	.0216	.0306	.0063	−.0114
	4	.0239	−.0043	.0018	−.0004	.0182
1949	1	−.0399	−.0130	−.0848	.0539	−.0220
	2	−.0279	−.0115	−.0377	.0155	−.0172
	3	.0214	−.0146	.0183	−.0394	.0280
	4	−.0381	−.0059	−.0012	−.0079	−.0348
1950	1	.0727	−.0044	−.0165	.0643	.0206
	2	.0911	.0089	.0576	.0164	.0261
	3	.0801	.0358	.0887	−.0061	.0334
	4	.0322	.0310	.0462	.0196	−.0025
1951	1	−.0103	.0539	−.0115	.0737	−.0186
	2	.0235	.0096	.0088	.0289	−.0045
	3	.0075	−.0014	.0071	.0000	−.0010
	4	−.0005	.0136	.0222	−.0010	−.0081
1952	1	.0093	.0027	−.0137	.0490	−.0233
	2	−.0142	−.0026	−.0117	.0161	−.0212
	3	.0092	0	.0176	.0018	−.0103
	4	.0726	.0039	.0460	.0218	.0087
1953	1	.0437	−.0065	.0006	.0327	.0039
	2	.0168	−.0039	.0036	.0200	−.0107
	3	−.0166	.0039	−.0115	.0164	−.0175
	4	−.0512	−.0076	−.0264	.0094	−.0417
1954	1	−.0175	.0137	−.0363	.0231	.0094
	2	.0020	−.0012	−.0183	.0116	.0075
	3	−.0004	−.0050	−.0030	−.0009	−.0015
	4	.0413	0	.0192	.0058	.0163
1955	1	.0566	.0038	.0177	.0194	.0233
	2	.0503	−.0026	.0324	.0124	.0030
	3	.0401	.0013	.0214	.0114	.0087
	4	.0322	.0013	.0200	.0121	.0015
1956	1	−.0112	.0051	−.0098	.0279	−.0242
	2	−.0014	.0113	.0064	.0212	−.0177
	3	.0001	.0149	−.0010	.0101	.0059
	4	.0222	.0111	.0167	.0157	.0009
1957	1	−.0008	.0134	−.0069	.0235	−.0041
	2	−.0090	.0084	−.0091	.0239	−.0154
	3	.0058	.0083	.0013	.0079	.0049
	4	−.0441	.0047	−.0349	.0174	−.0218
1958	1	−.0845	.0091	−.0606	.0256	−.0405
	2	−.0075	.0056	−.0192	.0085	.0088
	3	.0570	−.0034	.0315	−.0091	.0311
	4	.0658	−.0012	.0137	.0052	.0458
1959	1	.0433	.0035	.0041	.0546	−.0118
	2	.0670	.0035	.0437	.0039	.0230

Source: Each weighted percent change has been computed by multiplying the percentage change of the component (the change in the component divided by the average value of the component over the 2 periods involving the change) by the average value of the net markup over the 2 periods involving the change.

$$\left[\frac{X_{48-1}+X_{48-2}}{2}\right]\left[\frac{\left(\frac{PX}{MR}\right)_{48-2}+\left(\frac{PX}{MR}\right)_{48-1}}{2}\right]=\left[\frac{2.8}{116.7}\right]\left[1.3371\right]=0.03208$$

Table 8, col.—	Percent change from—	Weight from—
1	Table 2, col. 2	Table 7, col. 1.
2	Table 2, col. 3	Table 7, col. 1.
3	Table 3, col. 2	Table 7, col. 1.
4	Table 3, col. 1	Table 7, col. 1.
5	Changes in table 7, col. 1	

TABLE 9.—*Quantity, price-wage, net value product and wage bill effects on net markup*

Year	Quarter	Quantity effect $\frac{\bar{P}X}{MR}\left(\frac{\Delta X}{\bar{X}}-\frac{\Delta M}{\bar{M}}\right)$ (1)	Price-wage effect $\frac{\bar{P}X}{MR}\left(\frac{\Delta P}{\bar{P}}-\frac{\Delta R}{\bar{R}}\right)$ (2)	Wage bill $\frac{\bar{P}X}{MR}\left(\frac{\Delta M}{\bar{M}}+\frac{\Delta R}{\bar{R}}\right)$ (3)	Net value product $\frac{\bar{P}X}{MR}\left(\frac{\Delta X}{\bar{X}}+\frac{\Delta P}{\bar{P}}\right)$ (4)
1947	1				
	2	.0562	−.0139	.0633	.0210
	3	−.0319	.0337	.0372	.0354
	4	−.0006	.0043	.0551	.0515
1948	1	.0769	−.0464	.0672	.0367
	2	.0190	−.0130	.0317	.0257
	3	−.0268	.0154	.0254	.0369
	4	.0221	−.0040	.0196	.0015
1949	1	.0449	−.0669	−.0529	−.0309
	2	.0099	−.0270	−.0393	−.0222
	3	.0031	.0249	.0069	−.0211
	4	−.0369	.0021	−.0439	−.0091
1950	1	.0892	−.0686	.0683	.0478
	2	.0335	−.0075	.1000	.0740
	3	−.0086	.0420	.1160	.0826
	4	−.0139	.0114	.0632	.0657
1951	1	.0012	−.0198	.0436	.0622
	2	.0147	−.0193	.0331	.0376
	3	.0004	−.0014	.0062	.0072
	4	−.0227	.0146	.0131	.0212
1952	1	.0230	−.0463	.0119	.0353
	2	−.0025	.0187	.0168	.0044
	4	−.0085	−.0018	.0092	.0194
	4	.0266	−.0179	.0765	.0678
1953	1	.0431	−.0392	.0372	.0333
	2	.0131	−.0239	.0129	.0236
	3	−.0051	−.0125	−.0127	.0048
	4	−.0248	−.0169	−.0587	−.0170
1954	1	.0188	−.0094	−.0038	−.0132
	2	.0203	−.0128	.0008	−.0067
	3	.0026	−.0041	−.0054	−.0039
	4	.0222	−.0058	.0413	.0250
1955	1	.0389	−.0156	.0605	.0372
	2	.0179	−.0149	.0477	.0448
	3	.0187	−.0101	.0414	.0327
	4	.0123	−.0108	.0335	.0321
1956	1	−.0014	−.0228	−.0060	.0182
	2	−.0078	−.0099	.0099	.0276
	3	.0011	.0048	.0149	.0090
	4	.0055	−.0046	.0332	.0324
1957	1	.0061	−.0102	.0125	.0167
	2	.0002	−.0155	−.0006	.0148
	3	.0045	.0004	.0141	.0092
	4	−.0091	−.0127	−.0394	−.0176
1958	1	−.0239	−.0166	−.0754	−.0350
	2	.0117	−.0029	−.0019	−.0107
	3	.0255	.0057	.0536	.0225
	4	.0521	−.0063	.0646	.0189
1959	1	.0392	−.0511	.0468	.0587
	2	.0233	−.0004	.0706	.0476

Source:
Col. 1: Table 8, col. 1, minus table 8, col. 3.
Col. 2: Table 8, col. 2, minus table 8, col. 4.
Col. 3: Table 8, col. 3, plus table 8, col. 4.
Col. 4: Table 8, col. 1, plus table 8, col. 2.

TABLE 10.—*Productivity and price-wage components of net and gross markup*

Year	Quarter	Net output per man-hour $\frac{X}{M}$ (1)	Gross output per man-hour $\frac{\frac{PX+D}{P}}{M}$ (2)	Ratio of price index to wage rate $\frac{P}{R}$ (3)
1947	1	2.0963	2.1987	0.5989
	2	2.1908	2.3010	.5924
	3	2.1376	2.2462	.6079
	4	2.1366	2.2464	.6099
1948	1	2.2650	2.3833	.5888
	2	2.2973	2.4184	.5832
	3	2.2516	2.3681	.5899
	4	2.2891	2.4114	.5882
1949	1	2.3675	2.5050	.5594
	2	2.3854	2.5322	.5480
	3	2.3910	2.5416	.5584
	4	2.3250	2.4806	.5593
1950	1	2.4888	2.6511	.5308
	2	2.5522	2.7086	.5278
	3	2.5362	2.6808	.5443
	4	2.5108	2.6526	.5488
1951	1	2.5129	2.6572	.5409
	2	2.5404	2.6877	.5333
	3	2.5411	2.6944	.5328
	4	2.4988	2.6529	.5385
1952	1	2.5422	2.7073	.5202
	2	2.5375	2.7076	.5128
	3	2.5210	2.6904	.5121
	4	2.5733	2.7395	.5050
1953	1	2.6600	2.8410	.4900
	2	2.6871	2.8727	.4811
	3	2.6765	2.8680	.4765
	4	2.6241	2.8241	.4701
1954	1	2.6643	2.8827	.4665
	2	2.7079	2.9349	.4617
	3	2.7136	2.9453	.4602
	4	2.7618	2.9967	.4581
1955	1	2.8473	3.0961	.4525
	2	2.8871	3.1365	.4473
	3	2.9291	3.1805	.4438
	4	2.9569	3.2088	.4402
1956	1	2.9536	3.2218	.4325
	2	2.9355	3.2046	.4291
	3	2.9381	3.2103	.4307
	4	2.9509	3.2216	.4292
1957	1	2.9651	3.2490	.4257
	2	2.9655	3.2569	.4205
	3	2.9763	3.2699	.4206
	4	2.9545	3.2583	.4163
1958	1	2.8966	3.2167	.4107
	2	2.9252	3.2521	.4097
	3	2.9872	3.3082	.4116
	4	3.1141	3.4364	.4095
1959	1	3.2119	3.5384	.3933
	2	3.2713	3.5902	.3932

Source:
Col. 1: Table 2, col. 2 divided by table 3, col. 2.
Col. 2: Table 2, col. 1 divided by table 3, col. 2.
Col. 3: Table 2, col. 3 divided by table 3, col. 1.

TABLE 11.—*Demand ratchet and output divided according to business cycle phase*

Year	Quarter	Demand ratchet	Constant 1954 dollars—Quarterly figures at annual rates				
			Demand ratchet denominator= $X_p(1.0375)^{t-p}$ or X_{t-1}	Output	Output during cyclical		
					Early upswing	Late upswing	Downturn
		(1)	(2)	(3)	(4)	(5)	(6)
1947	1			115.51			
	2	1.0410	115.51	120.25			
	3	1.0125	120.25	121.76			
	4	1.0177	121.76	123.91			
1948	1	1.0384	123.91	128.67			
	2	1.0128	128.67	130.32			
	3	1.0028	130.32	130.69			
	4	1.0181	130.69	133.05			
1949	1	.9705	133.05	129.13			129.13
	2	.9413	134.30	126.43			126.43
	3	.9478	135.56	128.49			128.49
	4	.9122	136.83	124.83			124.83
1950	1	.9554	138.11	131.96	131.96		
	2	1.0135	139.40	141.29	141.29		
	3	1.0605	140.71	149.84	149.84		
	4	1.0236	143.36	153.38	153.38		
1951	1	.9925	153.38	152.24		152.24	
	2	1.0004	154.82	154.89		154.89	
	3	.9967	156.27	155.76		155.76	
	4	.9871	157.73	155.70		155.70	
1952	1	.9847	159.21	156.79		156.79	
	2	.9650	160.71	155.10		155.10	
	3	.9629	162.21	156.20		156.20	
	4	1.0089	163.73	165.20		165.20	
1953	1	1.0337	165.27	170.84		170.84	
	2	1.0130	170.84	173.07		173.07	
	3	.9871	173.07	170.84			170.84
	4	.9388	174.69	164.01			164.01
1954	1	.9170	176.33	161.71			161.71
	2	.9101	177.98	161.98			161.98
	3	.9013	179.65	161.92			161.92
	4	.9227	181.34	167.33	167.33		
1955	1	.9556	183.04	174.93	174.93		
	2	.9844	184.75	181.88	181.88		
	3	1.0060	186.48	187.60	187.60		
	4	1.0216	188.23	192.31	192.31		
1956	1	.9913	190.00	190.65		190.65	
	2	.9810	194.11	190.43		190.43	
	3	.9720	195.93	190.45		190.45	
	4	.9800	197.77	193.82		193.82	
1957	1	.9702	199.62	193.69		193.69	
	2	.9542	201.52	192.31		192.31	
	3	.9499	203.38	193.21		193.21	
	4	.9083	205.29	186.47			186.47
1958	1	.8391	207.22	173.88			173.88
	2	.8261	209.16	172.79			172.79
	3	.8577	211.12	181.10	181.10		
	4	.8956	213.10	190.87	190.87		
1959	1	.9181	215.10	197.49	197.49		
	2	.9587	217.12	208.15	208.15		

Source:
Cols. 1 and 2: Described in app. A, pt. 3.
Col. 3: Table 2, col. 2.
Cols. 4, 5, and 6: See text just preceding equation (11).

TABLE 12.—*Average hourly earnings of manufacturing and estimated corporate wage rate*

Year	Average annual wage rate $\overline{R}_t$ (1)	Average hourly earnings of manufacturing R_{m_t} (2)	Corporate wage rate divided by manufacturing wage rate $\frac{\overline{R}_t}{R_{m_t}}$ (3)
1947	1.4436	1.24	1.164
1948	1.5681	1.35	1.162
1949	1.6324	1.40	1.166
1950	1.7041	1.47	1.159
1951	1.8481	1.59	1.162
1952	1.9538	1.67	1.170
1953	2.0774	1.77	1.174
1954	2.1663	1.81	1.197
1955	2.2432	1.88	1.193
1956	2.3702	1.98	1.197
1957	2.5093	2.07	1.212
1958	2.6173	2.13	1.229

Source:
Col. 1: Table 3, col. 1.
Col. 2: "Employment in Earnings," Bureau of Labor Statistics, September 1959, table C-1, p. 27.

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