FEDERAL RESERVE BANK OF RICHMOND

MONTHLY REVIEW

Determinants of Change In the Money Stock: 1960-1970

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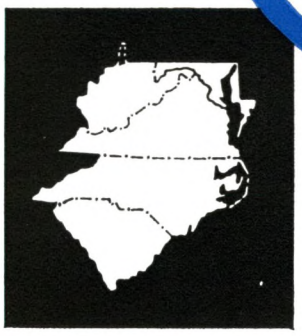

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DETERMINANTS OF CHANGE IN THE MONEY STOCK: 1960-1970

In studying the behavior of the money supply, analysts frequently employ the monetary base-money multiplier approach. In this framework the stock of money (M), usually defined as demand deposits and currency held by the nonbank public, is expressed as the product of the multiplier (m) and the base (B), i.e., M=mB. The monetary base is composed of so-called "high-powered" money—currency plus total bank reserves.[1] When channeled through the commercial banking system, this high-powered monetary input is capable, because of fractional reserve banking, of generating a monetary output equal to some multiple of itself. The multiplier may be thought of as a productivity ratio showing the monetary output per dollar of base input (m=M/B). A rise in the multiplier indicates a rise in the productivity of the base, whereas a fall in the multiplier indicates that each dollar of the base is less productive in generating money. Chart 1 shows the quarterly levels, since 1960, of the money supply, the monetary base, and the multiplier. The money supply is currently about 2.58 times larger than the base. The productivity of the base has declined somewhat since 1960 when the money stock was about 2.70 times the size of the base.

The chief distinction between the monetary base and the multiplier is that the former is largely determined by the actions of the monetary authority, whereas the latter is primarily determined by the actions of bankers and private individuals. The components of the monetary base are liabilities of the central bank and the Treasury. The Federal Reserve can alter the volume of these monetary liabilities by open market purchases and sales of U. S. Government securities. The money multiplier, on the other hand, is composed of several ratios whose magnitudes are determined by the decisions of commercial bankers and nonbank private individuals. These ratios include (1) the currency/private demand deposit ratio, k, (2) the time deposit/demand deposit ratio, t, (3) the total reserve/total deposit ratio, r, and (4) the Treasury deposit/private demand deposit ratio, g. The k and t ratios reflect the public's preferences for currency and time deposits relative to demand deposits, whereas the r ratio reflects bankers' decisions (subject to legal reserve requirements) on the proportion of reserves to hold against their deposit liabilities.[2] The g ratio reflects the Treasury's allocation of its deposit holdings between commercial banks and the Federal Reserve. The relation of these ratios to the money multiplier is summarized in the formula $m=(1+k) \div [r(1+t+g) + k]$. A derivation of this formula appears in Appendix B.

Much discussion has centered on the question of the relative importance of the base and the multiplier as sources of change in the money supply. The monetarist school argues that variation of the base is the dominant determinant of money stock change. Monetarists further hold that alterations of the money supply have been almost exclusively the result of Federal Reserve actions, since these actions are the main origin of changes in the base. Monetarists claim, moreover, that because of its stability the multiplier is relatively insignificant as a source of money stock change. Therefore, the Federal Reserve can easily neutralize changes in the money supply arising from changes in the multiplier, thus, controlling the money stock within close tolerance.

The nonmonetarist school of thought, on the other hand, maintains that sharp short-term changes in the money stock often reflect the influence of changing economic conditions that operate through the multiplier. The impact of these multiplier changes, it is argued, may be of sufficient magnitude to make it difficult for the central bank to control the money supply. Nonmonetarists point out that shifts in the multiplier do not need to be large to exert a powerful influence on the money supply. Even small

[1] A statistical series on the monetary base has been constructed by economists at the Federal Reserve Bank of St. Louis. To make the base comparable over time, St. Louis analysts add a *reserve adjustment* term to the reserve and currency components of the base. This reserve adjustment term takes into account reserves freed or absorbed by changes in legal reserve requirements and by shifts in the distribution of deposits among classes of banks and deposit categories having different reserve requirements.

[2] The total reserve/total deposit ratio is also determined by the distribution of total deposits among classes of banks and deposits having different reserve requirements. In the United States banking system, differential reserve requirements exist between (1) Federal Reserve member banks and nonmember banks, (2) reserve city and country member banks, and (3) deposits under and over $5.0 million. Thus, changes in the aggregate reserve ratio (r) can result from shifts in the distribution of deposits among various bank and deposit classifications as well as from changes in legal reserve requirements or from bankers' decisions to alter their reserve positions.

changes in the multiplier can have a large dollar impact. For example, an increase in the multiplier from 2.5 to 2.6, applied to a monetary base of $88.0 billion, will result in a change in the money supply from $220.0 to $228.8 billion, almost a $9.0 billion increase. In sum, nonmonetarists contend that because short-run shifts in the multiplier have such a magnified dollar impact on the money supply, the Federal Reserve may experience difficulty in controlling the latter via alterations of the base.

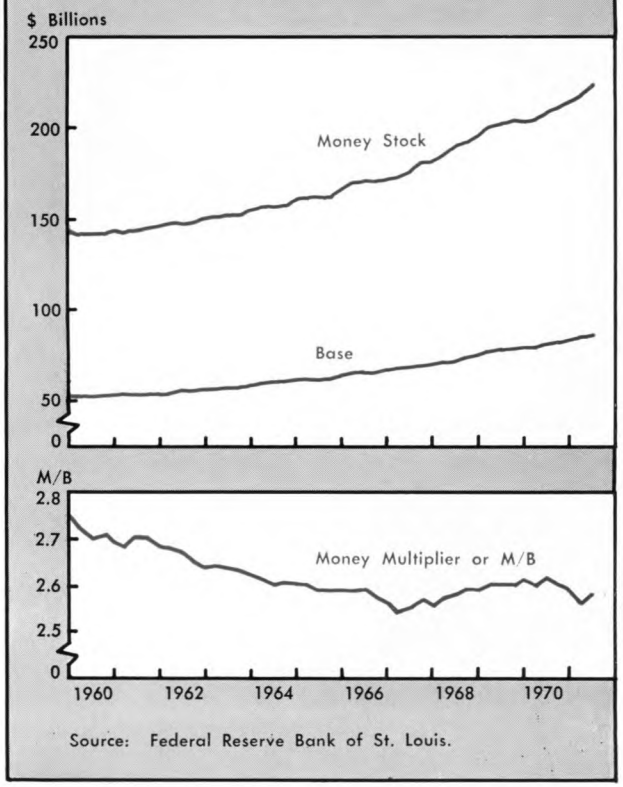
This article presents data showing the relative contributions of the multiplier and the base to changes in the stock of money over the decade of the 1960's. It also develops numerical estimates of the relative contribution of each of the constituent ratios of the multiplier to changes in the multiplier and the money stock. However, the reader should be forewarned of the limitations of the analysis presented in the following paragraphs. Although the monetary base and the money multiplier ratios will be treated as separate, mutually independent determinants of money stock change, these entities, in actuality, are not independent of each other. Changes in one of the determinants will induce changes in the others. Alterations in the monetary base wrought by the Federal Reserve will induce responses by banks and individuals that will alter the multiplier ratios. Consider, for example, the effects of an increase in the monetary base on the time deposit ratio. To achieve an increase in the base, the Federal Reserve may purchase Treasury bills on the open market. The increased demand for these securities raises their price and lowers their yield. The decline in Treasury bill yields is transmitted to other short-term assets—commercial paper, savings and loan shares, etc.—that compete with time deposits in individuals' portfolios. As the yields on these alternative short-term assets decline relative to the yield on time deposits, wealth-holders switch from the former assets to the latter, thereby raising the time deposit ratio. The reserve ratio, too, may rise if banks respond to the decline in short-term yields by holding a larger proportion of bank assets in the form of excess reserves.

Similarly, interrelationships also exist among the constituent ratios of the multiplier since they are mechanically linked to each other in an accounting or definitional sense. For example, the reserve ratio, r, a weighted average of the excess and legal required reserve ratios associated with demand, time, and government deposits, will fall when the proportion of time to demand deposits rises. A rise in the t ratio alters the composition of the weights in favor of the relatively low required reserve ratio for time deposits, thereby pulling down the weighted average. Because of such interdependencies, estimates of the proportion of money stock change attributable to each determinant will be subject to error. For example, suppose 10.0% of the money stock change is estimated to be attributable to changes in the time deposit ratio, and 30.0% to changes in the reserve ratio. These estimates may understate the contribution of the time deposit ratio to money stock change if part of the change in the reserve ratio was induced by changes in the time deposit ratio. Thus, the estimates presented below should be interpreted as rough approximations only.

Contributions of Variation in the Base and the Multiplier to Changes in the Money Stock In order to investigate the relative importance of the base and multiplier components as sources of money stock change, it is convenient to state relationships among these variables in terms of percentage rates of change. Then, the percentage change in the money

Chart 1

MONEY STOCK, MONETARY BASE, AND MONEY MULTIPLIER: 1960-1971



Source: Federal Reserve Bank of St. Louis.

Table I

CONTRIBUTION OF MONETARY BASE AND MONEY MULTIPLIER TO CHANGE OF MONEY SUPPLY

Year	Percentage Change of			Relative Contribution[1] of		
	Money Stock	Base	Multiplier	Total[2]	Base	Multiplier
1960	−1.17	0.38	−1.54	100	− 32.6	131.4
1961	1.65	2.16	−0.51	100	130.9	− 30.5
1962	2.13	3.40	−1.22	100	159.4	− 57.2
1963	2.91	4.00	−1.05	100	137.4	− 36.0
1964	3.92	4.87	−0.90	100	124.1	− 23.0
1965	4.19	4.92	−0.71	100	117.4	− 16.9
1966	4.42	4.99	−0.53	100	112.9	− 12.0
1967	3.94	4.76	−0.80	100	120.9	− 20.4
1968	7.12	6.13	0.94	100	86.0	13.1
1969	5.96	4.86	1.05	100	81.6	17.6
1970	4.06	4.50	−0.41	100	110.7	− 10.0
Mean Value of Yearly Figures	3.56	4.09	−0.52	100	104.4	− 4.0

[1] A negative relative contribution signifies that the determinant exerted an influence opposite to the direction of change of the money supply.

[2] Sum of relative contributions may not exactly equal 100 because of rounding and approximation error.

stock is approximately equal to the sum of the percentage changes in the base and the multiplier.[3]

Over the span from 1960 to 1970 the money stock, base, and multiplier exhibited average annual growth rates of 4.0%, 4.5%, and −0.5%, respectively. Note that the base and the multiplier moved in opposite directions. The growth rate of the money supply reflected both the upward pull of the base and the downward pull of the multiplier. Because of the latter, the money stock growth rate was only eight-ninths that of the base. But the 4.0% growth rate of the money supply clearly reflected the dominant numerical influence of the base. In terms of the M=mB identity, if the base had remained constant while the multiplier fell, the money stock would have declined by 0.5% per annum. If the multiplier had remained constant while the base rose, the money supply would have risen 4.5% per year.

Even over the period spanning the last four years of the decade, when the multiplier exhibited a positive growth rate, the base accounted for 91.0% of the growth of the money stock. The picture is roughly the same if monthly instead of yearly data are used and if initial and terminal dates of January 1960 and September 1971 are chosen over which to calculate growth rates. Over that 139 month interval, the growth contributions of the base and multiplier were 110.0% and −7.0%, respectively, of the total growth of the money supply. This evidence indicates that, over the long run, changes in the monetary base were definitely the dominant determinant of money stock change, and that changes in the multiplier played only a minor role.

Over shorter periods of time, however, variations in the multiplier have exerted greater influence on money stock changes than in the long run. This is indicated in Table I, which shows that on a yearly basis the multiplier sometimes accounted for fairly significant proportions of total changes in the money supply. The small *average* value of the relative contribution of the multiplier to money stock change is misleading because in each year the multiplier's contribution deviated markedly from its 11 year average. In fact, the *standard deviation* (a statistical measure of variation about the mean) of the relative contribution of the multiplier was practically the same as the standard deviation of the base's contribution. The measured magnitude and variability of the multiplier on a year-to-year basis adds support to the nonmonetarists' claim that instability of the multiplier may create difficulties for monetary control in the short run. The short-run importance of multiplier

[3] More precisely, the percentage change in the money stock measured over discrete intervals of time, such as a quarter or a year, is equal to the percentage change in the base *plus* the percentage change in the multiplier *plus* the product of the percentage changes in the base and the multiplier, respectively. This last factor, however, is usually small enough to disregard and is ignored in the discussion of the text.

movements as a source of money stock change would have been even more manifest if quarterly and monthly changes had been examined.

Sources of Change in the Multiplier In the preceding section, changes in the money supply were attributed to changes in the base and changes in the multiplier. This was a convenient first approximation. Because the money multiplier itself embodies several determinants of the money stock, however, a better understanding of changes in the money supply requires specification of the factors contributing to changes in the multiplier.

As previously mentioned, the money multiplier is composed of several ratios reflecting the portfolio composition decisions of bankers and nonbank individuals. It is changes in these ratios that cause changes in the multiplier. For example, assuming all other factors constant, a rise in the ratio of currency to deposits, k, will reduce the size of the multiplier. The multiplier relation between the money stock and monetary base falls because the rising k ratio reduces the proportion of the base that banks are able to acquire as reserves to support demand deposits equal to some multiple of reserves. Changes in the other ratios also act to alter the size of the multiplier. Increases in the time, t, and government, g, deposit ratios cause the multiplier to fall by reducing the share of total reserves available to support the money supply. Time and government deposits (not counted as part of the money supply) must be backed by legal reserves. Growth of these deposits relative to private demand deposits means that a larger portion of total reserves are absorbed to support nonmonetary liabilities. In short, the immobilization of a growing portion of the base, as backing behind nonmonetary deposits, lowers the money-creating leverage of the base. In contrast, a fall in the reserve, r, ratio acts to increase the multiplier because it permits a greater amount of money to be created per dollar of reserves.

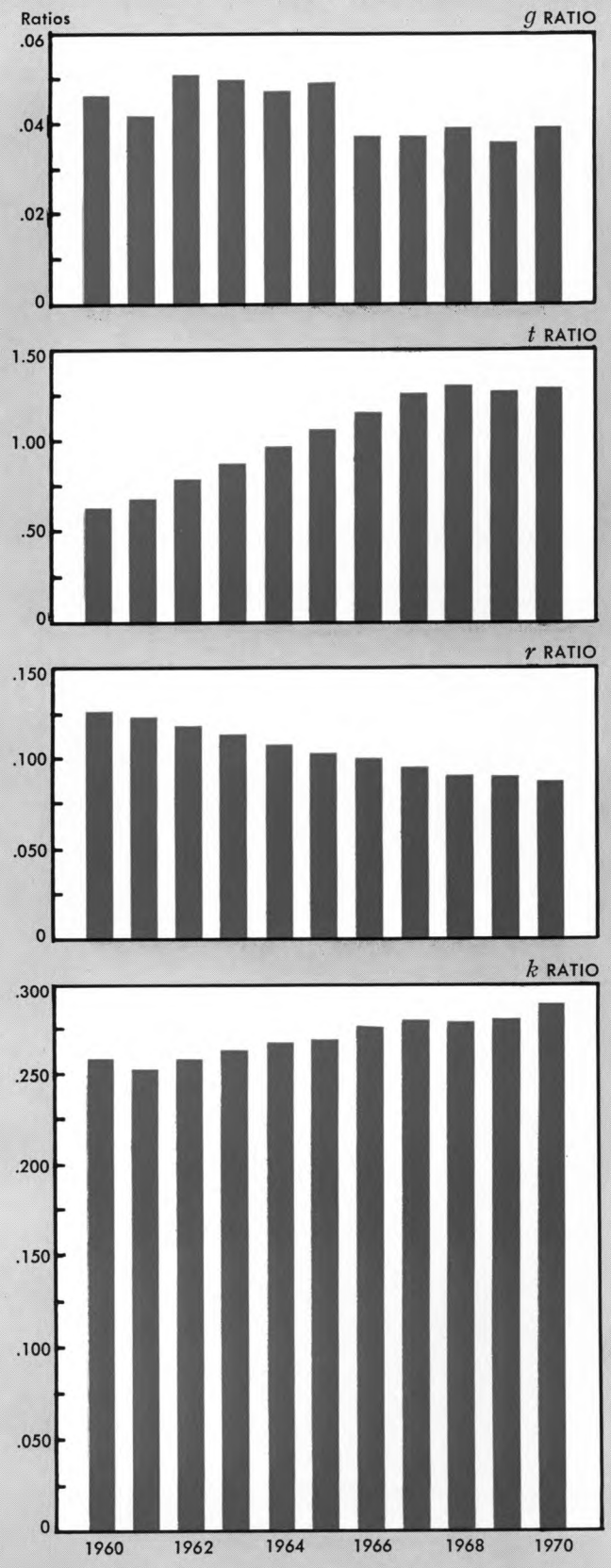
The yearly average values of the multiplier ratios are shown in Chart 2. The trends of both the time deposit and currency ratios have been upward, the former ratio exhibiting substantial year-to-year growth and the latter registering more moderate gains. The reserve ratio, on the other hand, has declined gradually but persistently. Only the government deposit ratio has shown no perceptible trend.

Table II shows the contribution of changes in each of the ratios to year-to-year percentage changes in

Chart 2

VALUES OF CONSTITUENT RATIOS OF THE MONEY MULTIPLIER: 1960-1970

(Annual Average Values)



Source: Federal Reserve Bank of St. Louis.

Table II

CONTRIBUTIONS OF MULTIPLIER RATIOS TO CHANGES IN THE MONEY MULTIPLIER

Year	Percentage Change in Multiplier	Attributable to Changes in:[1,2] Currency Ratio	Reserve Ratio	Time Deposit Ratio	Government Deposit Ratio	Total Contribution	Relative Contribution of Changes in:[3,4] Currency Ratio	Reserve Ratio	Time Deposit Ratio	Government Deposit Ratio
1960	−1.6	−0.60	0.00	−0.84	−0.16	100	37.5	0.0	52.5	10.0
1961	−0.5	0.63	0.83	−2.08	0.13	100	−125.0	−166.7	416.7	−25.0
1962	−1.2	−0.48	1.75	−2.26	−0.21	100	40.0	−145.7	188.6	17.1
1963	−1.0	−1.00	3.01	−3.10	0.05	100	95.5	−286.4	295.5	− 4.5
1964	−0.9	−1.16	2.31	−2.14	0.09	100	128.6	−257.1	238.1	− 9.5
1965	−0.7	−0.27	1.18	−1.59	−0.03	100	38.5	−169.2	226.9	3.8
1966	−0.5	−0.73	1.50	−1.47	0.20	100	146.7	−300.0	293.3	−40.0
1967	−0.8	−0.55	2.83	−3.08	0.00	100	69.2	−353.8	384.6	0.0
1968	0.9	0.09	−1.49	0.65	0.03	100	10.3	165.5	− 72.4	− 3.4
1969	1.0	−0.29	0.57	0.67	0.05	100	− 28.6	57.1	66.7	4.8
1970	−0.4	−0.89	0.74	−0.22	−0.03	100	223.1	−184.6	53.8	7.7
Mean Value of Yearly Figures	−0.52	−0.31	1.20	−1.41	0.01	100	57.8	−149.2	194.9	− 3.5

[1] Sum of contributions of changes in the multiplier ratios may not exactly equal to percentage change of multiplier because of rounding and approximation error.

[2] If changes of ratio and multiplier are of opposite sign, then that ratio change exerted an influence on the multiplier opposite to the direction of actual change of multiplier.

[3] Sum of contributions may not exactly equal to 100 because of rounding and approximation error.

[4] A negative relative contribution signifies that the particular ratio exerted an influence on the multiplier opposite to the direction of actual change of multiplier.

the multiplier. The method used to derive the estimates appearing in the table is described in the appendix to this article. Roughly, the separate influence exerted by the change in each ratio was calculated by (1) estimating the percentage change in the multiplier resulting from a small unit change in the ratio, the other ratios being assumed constant, and (2) multiplying this figure by the actual number of units that the ratio changed over the year. For example, if, in a given year, the multiplier tended to decrease by one-fourth of 1 percent for every one percentage point rise in the currency ratio, then a yearly rise of five percentage points in the currency ratio would, by itself, cause a 1¼% fall in the multiplier. The separate contribution of each determinant is calculated similarly, and the total of all the separate contributions equals the percentage change in the multiplier.

It is evident from the table that changes in the time deposit ratio had the greatest single impact on the multiplier, with reserve ratio changes a close second. Taken together, however, the *combined* influence of the time deposit and reserve ratio changes usually was not great. During the 1960's the reserve ratio was falling, while the time deposit ratio was rising. Thus, the two ratios exerted opposite influences on the multiplier. In most years the falling reserve ratio partially offset the influence of the rising time deposit ratio. The offset, however, was incomplete, and the influence of time deposit ratio dominated. Together with the rising currency ratio, then, the rising time deposit ratio contributed more than enough to offset the influence of reserve ratio changes that tended to raise the multiplier. In short, the main factors accounting for the negative growth rate of the multiplier were changes in the currency and time deposit ratios.

Conclusion The relative contributions of each of the money stock determinants to yearly changes in the money supply are summarized in Table III. The table indicates that although the base was the dominant determinant of money stock change, the reserve, time deposit, and currency ratios played significant roles. Generally, the positive relative contributions of the rising monetary base and the falling reserve ratio more than offset the negative relative contributions of the rising currency and time deposit ratios. Numerically, the main contributors to the positive growth rate of the money stock were changes in the base and the reserve ratio.

Jane Anderson and Thomas M. Humphrey

Table III

RELATIVE CONTRIBUTION OF EACH DETERMINANT TO TOTAL PERCENTAGE CHANGE IN MONEY STOCK

Year	Total Contribution[1]	Contributions[2] (percentage of total) of changes in: Base	Currency Ratio	Reserve Ratio	Time Deposit Ratio	Government Deposit Ratio
1960	100	− 32.6	49.3	0.0	68.9	13.1
1961	100	130.9	38.1	50.8	−127.1	7.6
1962	100	159.4	−22.9	83.3	−107.9	− 9.8
1963	100	137.4	−34.4	103.1	−106.4	1.6
1964	100	124.1	−29.6	59.1	− 54.7	2.2
1965	100	117.4	− 6.5	28.6	− 38.3	− 0.6
1966	100	112.9	−17.6	36.0	− 35.2	4.8
1967	100	120.9	−14.1	72.2	− 78.4	0.0
1968	100	86.0	1.3	21.7	− 9.5	− 4.4
1969	100	81.6	− 5.0	10.0	11.7	0.8
1970	100	110.7	−22.3	18.4	− 5.4	− 0.8
Mean Value of Yearly Figures	100	104.4	− 5.8	43.9	− 43.8	1.3

[1] Sum of contributions may not exactly equal to 100 because of rounding and approximation error.

[2] A negative relative contribution signifies that the particular ratio exerted an influence opposite to the direction of change of the money supply.

APPENDIX A

This appendix describes the techniques employed in devoloping the estimates shown in Tables II and III of the article. The formula used to specify the fraction of money stock change attributable to each of its determinants is derived from the relation between the money supply, base, and multiplier (1) $M = Bm$ where $m = (1+k) \div [r(1+t+g)+k]$.

By taking the logarithm of equation (1) and then calculating the total derivative of the resulting logarithmic expression, one obtains the following expression:

$$(2)\quad dM/M = dB/B + \underbrace{\frac{r(1+t+g) - 1}{m[r(1+t+g)+k]^2}}_{(3)} dk + \underbrace{\frac{-(1+k)(1+t+g)}{m[r(1+t+g)+k]^2}}_{(4)} dr + \underbrace{\frac{-r(1+k)}{m[r(1+t+g)+k]^2}}_{(5)} dt + \underbrace{\frac{-r(1+k)}{m[r(1+t+g)+k]^2}}_{(6)} dg.$$

This is the formula used to determine the proportion of the percentage change in the money stock attributable to each of its determinants.

The first term of the formula (dM/M) is the percentage change of the money stock. It is equal to the sum of terms (2) through (6), each of which represents the contribution of a separate determinant to the total percentage change in the money stock. Term (2) of the formula is the percentage change in the base and also the fraction of the percentage change in the money supply attributable to changes in the base. Terms (3), (4), (5), and (6) represent the separate contributions of changes in the currency ratio, reserve ratio, time deposit ratio, and government deposit ratio, respectively, to the percentage change of the money stock. Each of the terms on the right-hand side of the equation is divided by the term on the left-hand side to obtain the proportion of money stock change attributable to each determinant, as shown in Table III.

The sum of the last four terms of the equation equals the percentage change in the money multiplier. Each of these terms, expressed as a fraction of the total of all four of them, represents the relative contribution of a change in one of the component ratios of the multiplier to the total percentage change in the

multiplier. The ratio of each term (3) through (6) to the total of all four was employed in estimating the relative contribution of each determinant to the total change in the multiplier, as shown in Table II.

Actually, equation (2) is completely valid only for the computation of *instantaneous* rates of change. The data used in the text, however, were for *discrete intervals* of time. Thus, the instantaneous rates of change of equation (2) had to be approximated by *average* yearly rates of change and the factors k, r, t, and g had to be approximated by their average value over the year. The use of average data to approximate the relation shown in equation (2) introduces an error into the analysis. Thus, an error term should be added to equation (2). Generally, this approximation error is small enough to disregard.

APPENDIX B:
DERIVATION OF THE MONEY MULTIPLIER

The multiplier employed in this article differs from the multiplier expression appearing in the demand deposit expansion formula shown in most money and banking texts. In the textbook formula, demand deposits equal a multiplier times the volume of reserves, where the multiplier is simply the reciprocal of the reserve ratio. The expression for the money multiplier used in this article is derived as follows.

The money stock (M) is composed of private demand deposits (D) and currency (C):

(1) $M = D + C$.

The currency holdings of the aggregate of individuals is some fraction (k) of their demand deposit holdings:

(2) $C = kD$.

Substituting equation (2) into (1) yields:

(3) $M = (1+k)D$.

The monetary base (B) is defined as the sum of reserves (R) and currency (C):

(4) $B = R + C$.

The volume of reserves (R) held by the aggregate of banks is some fraction (r) of their deposit liabilities, including private demand deposits (D), federal government demand deposits (G), and time deposits (T):

(5) $R = r(D+T+G)$.

Time deposits (T) and government demand deposits (G) respectively, are equal to some fraction (t and g, respectively) of private demand deposits:

(6) $T = tD$

(7) $G = gD$.

Substitution of equations (2), (5), (6), and (7) into equation (4) yields:

(8) $B = [r(1+t+g) + k]D$.

Equation (8) may be written as:

(9) $D = B \div [r(1+t+g) + k]$.

Finally, substitution of equation (9) into equation (3) yields:

(10) $M = \{ [1+k] \div [r(1+t+g) + k] \} B$.

The expression enclosed by braces is the money multiplier, the ratio of M to B.

Bibliography

Ahrensdorf, J. and S. Kanesathasan. "Variations in the Money Multiplier and Their Implications for Central Banking," *International Monetary Fund Staff Papers*, 8 (1960-61), 126-49.

Cagan, Philip. *Determinants and Effects of Changes in the Stock of Money 1875-1960.* New York: National Bureau of Economic Research, 1965. pp. 8-21.

Friedman, Milton and Anna J. Schwartz. *A Monetary History of the United States.* Princeton: Princeton University Press, 1963. pp. 794-95.

Jordan, Jerry L. "Elements of Money Stock Determination," Federal Reserve Bank of St. Louis *Review* (October 1969), pp. 10-19.

Kelly, Alex K. "Sources of Change in the Canadian Money Stock, 1955-65," *Banca Nazionale del Lavoro Quarterly Review* (1969), pp. 395-407.

Weintraub, Robert. "The Time Deposit-Money Supply Controversy." *Targets and Indicators of Monetary Policy.* Ed. K. Brunner. San Francisco: Chandler Publishing Company, 1969. pp. 300-12.

PROFIT SIZE AND MEASUREMENT

The subject of profit is the focus of a bewildering array of opinions and a wide variety of interpretations. Popular views range all the way from a "fat cat" theory, which holds that profit arises from the rapacious exploitation of consumers and wage-earners, to a "seed corn" theory, which holds that profit is an indispensable source of capital expansion and economic growth. Economic theory, too, offers a diversity of explanations of profit. Does profit arise from monopolistic restrictions on output and access to the market? From unforeseen changes in demand and costs? From innovation? From the need to reward entrepreneurs for risk-bearing and decision-making? From frictions that delay the adjustment of firms, industries, and markets to equilibrium positions following the disruptions of dynamic change? Economists cannot agree. Each of these explanations has its adherents. Most likely, none of the explanations will ever be unanimously accepted as the most correct.

The abundance of profit theories is matched by the profusion of misconceptions about the magnitude of profit. The average American apparently thinks that accounting profit per dollar of sales of manufacturing corporations is about seven times its actual level. This was revealed recently when the Opinion Research Corporation asked a sample of 1,000 adults what they thought the average manufacturer makes in after-tax profit as a percent of each sales dollar. The median response was 28.0%, far larger than the 4.0% margins actually earned by manufacturers in 1970.[1] Moreover, two-thirds of those questioned displayed further ignorance of the size of profit margins when they agreed that firms could pay a ten cent per hour wage increase without raising prices.

With the purpose of dispelling some of the misconceptions about profit, this article discusses the size and behavior of corporate profits over the past 20 years and describes the chief empirical measures of profit.

Measures of Profit In economic analysis, relative magnitudes are usually more revealing than absolute magnitudes. Thus, although profit may be expressed as an aggregate dollar total, it is often more meaningful analytically when expressed as a ratio to, or percentage rate of return on, related economic variables. The most widely used profit rates are the ratio of corporate profit to: (1) net national product (NNP), (2) income originating in the corporate sector, (3) sales, and (4) stockholders' equity. The first two of these ratios are measures of profit's share in the aggregate income distribution. Note that the denominator of the profit/NNP ratio is more comprehensive than the denominator of the second ratio, which includes only that portion (roughly 60.0%) of the NNP produced by private corporations. The third, or profit/sales, ratio is the margin of profit on each dollar of sales. It also indicates the ratio of average price to cost per unit of output. For example, a profit/sales margin of 5.0% implies that unit cost is 95.0% of unit price. Finally, the ratio of profits to equity measures the rate of return on the book or historical value of owners' investment in the corporations.

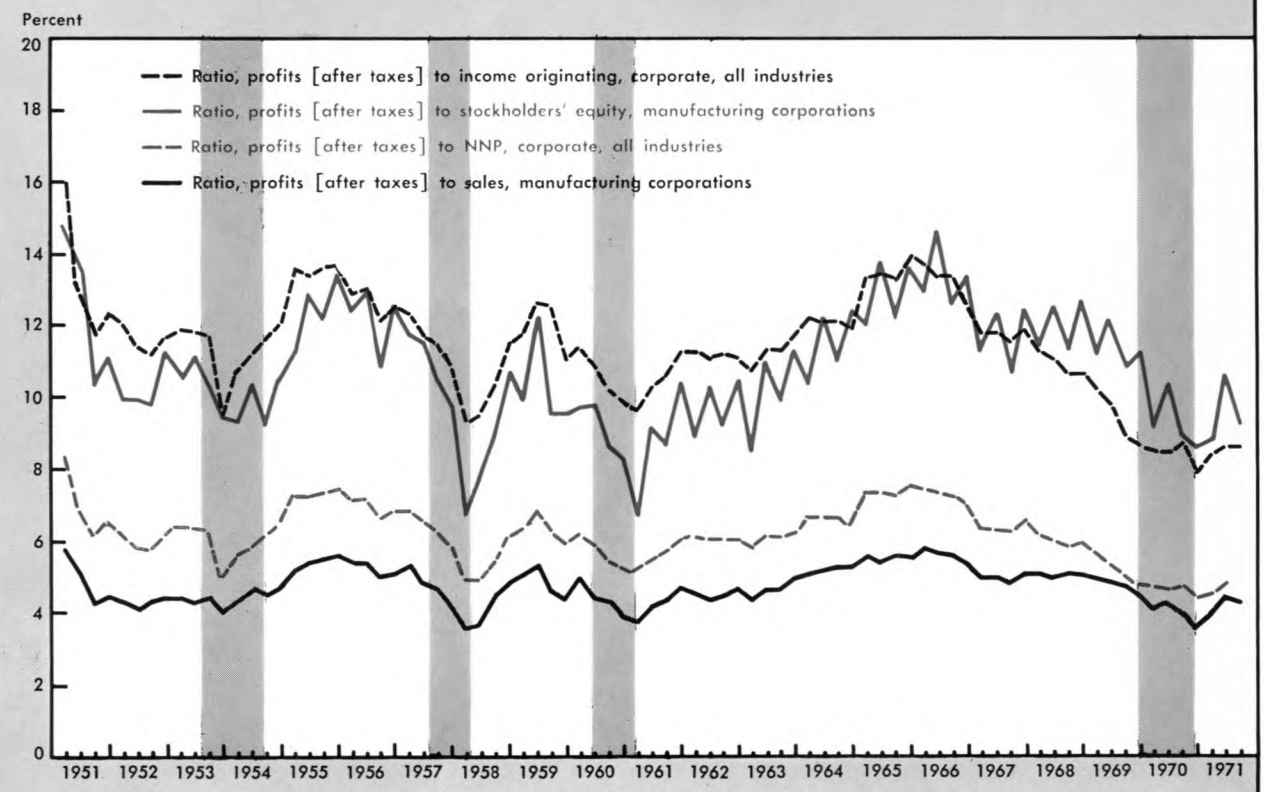
Chart 1 shows quarterly figures since 1951 for each of these profit ratios. The profit rates on sales and on equity refer to manufacturing only, whereas the other two profit rates are for the entire corporate sector. In all cases profits are measured after taxes. Notice that the profit rate on equity is about double or triple the profit rate on sales. The source of this disparity is the sales/equity or capital turnover ratio, which has a numerical value varying between two and three. Similarly, profit's share of NNP is approximately three-fifths the size of profit's share of income originating in corporations, reflecting the fact that only about 60.0% of the national product is produced in the corporate sector.

Behavior of Profit The information shown in Chart 1 reveals several noteworthy characteristics of the behavior of profit. First, profit rates are relatively low, contrary to the conviction held by many antibusiness critics and to the opinion of the man in the street. Over the entire 20-year period the share of profit in NNP and in income originating in corporations averaged only about 6.0% and 11.0% re-

[1] *Business Week*, December 18, 1971, p. 26.

Chart 1

VARIOUS PROFIT RATIOS: 1951-1971



Note: Shaded areas represent periods of business recessions as defined by the National Bureau of Economic Research.

Sources: U. S. Department of Commerce, **Business Conditions Digest**; Federal Trade Commission, **Quarterly Financial Report for Manufacturing Corporations.**

spectively. Even in the relatively high-profit years of 1951, 1965, and 1966 these two ratios did not exceed 8.5% and 16.0%. Similarly, manufacturing profit per dollar of sales averaged only about 4.8% over the whole period and rarely exceeded 5.5%.

Second, the four profit rate measures have shown no appreciable upward or downward long-run trend. Apparently, price increases over the long run have been sufficient to prevent rising unit labor costs from encroaching on profit's share and profit margins. More precisely, the trend percentage change in the price level has been approximately equal to the difference between the percentage rise in hourly wage rates (including fringe benefits) and man-hour productivity.

Third, in contrast to their long-run stability, the aggregate profit measures exhibit noticeable short-run movements, generally rising in the recovery stage of the business cycle and falling in the boom and recession stages. Of the four series, profit's share of income originating in the corporate sector exhibits the most pronounced cyclical variation. As GNP rebounds sharply in the recovery stage, business firms normally experience declines in both unit fixed and unit labor costs, the former because of the spreading of overhead expenses over rapidly expanding output and the latter because of the registering of above-average gains in labor productivity. This decline in unit production costs leaves a growing share of sales revenue for profit. Profit's share may be further augmented if firms enjoying some degree of monopoly power respond to the increase in aggregate demand by raising prices as well as output.

In the boom and recession stages, however, profit's

share falls as increasing costs absorb a growing proportion of revenues. Labor productivity growth slackens and wage increases accelerate causing unit labor costs to rise. Moreover, unit fixed costs stop falling in the boom, as firms approach their capacity output levels, and may rise in the recession, as businessmen cut back production. In short, during the boom and recession stages, rises in unit production costs tend to exceed price increases, thereby reducing profit's residual share of revenues per unit of output.

Fourth, profit rates suffered a drastic decline in the late 1960's. By 1970 profit rates had fallen to their lowest postwar levels. Accounting for the abnormally severe squeeze on profits were: (1) stagnant productivity growth; (2) wage increases substantially in excess of the limited productivity gains, with the consequent rise in unit labor costs surpassing the rise in selling prices; and (3) high unit fixed costs associated with depressed rates of capacity utilization (Chart 2).

In 1971, as the economy emerged from its fifth postwar recession, profit rates began to recover from their lows of the preceeding year. Economists are predicting a substantial rise in the *dollar volume* of profits in 1972 as a result of the expected 9.0% expansion of GNP. Only modest gains, however, are anticipated for profit margins and profit's share of GNP. In fact, these gains are not large enough to bring the profit's share of GNP up to its 20-year trend value.

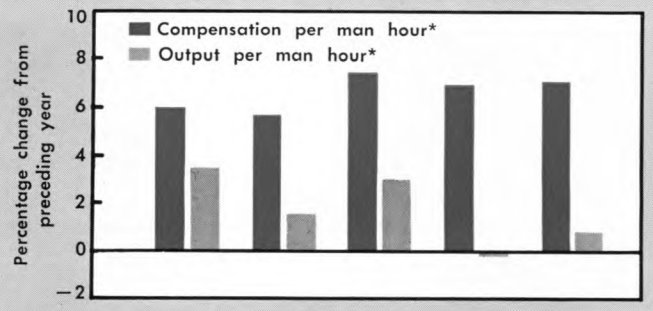
Overstated Profit Figures Some economists believe that reported statistics on corporate profit, such as those appearing in Chart 1, represent a considerable overstatement of true profit. In other words, as low as measured profit has been in recent years, actual economic profit was even lower. These analysts argue that certain corrections should be made to the official profit figures to eliminate the upward bias. Any downward adjustment would, of course, establish the profit ratios at levels below those shown in Chart 1. Profit overstatement springs from two sources: (1) understated depreciation charges and (2) implicit interest costs contained in the profit figures.

Inflation and Historical Cost Depreciation Historical cost amortization is one source of bias in the profit figures. Standard accounting practice spreads the original cost of capital equipment over its useful life by allocating to annual depreciation expense a portion of that original cost. In other words, the annual depreciation charge is expressed in terms of dollars of past, rather than current, purchasing

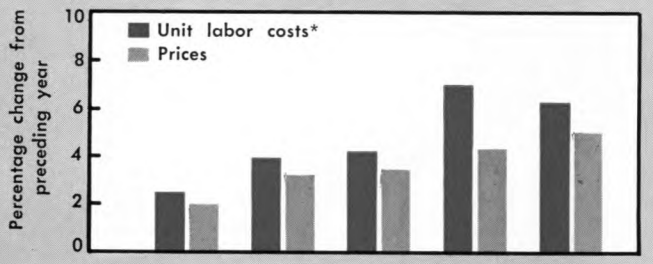
Chart 2

SOURCES OF THE PROFIT SQUEEZE: 1966-1970

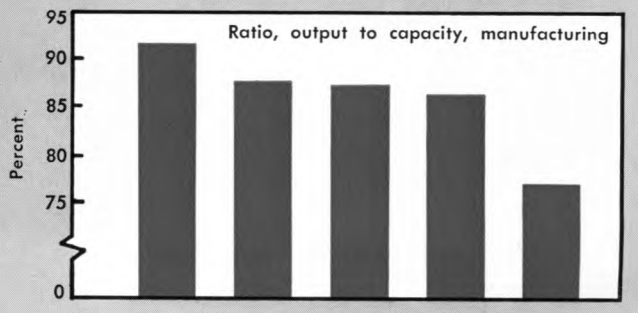
Rapidly rising wage rates combined with sluggish productivity growth to produce...



percentage rises in unit labor costs in excess of percentage rises in selling prices. These forces, together with...



falling rates of capacity utilization,



acted to squeeze profits' share.

*Private nonfarm economy.

Sources: Council of Economic Advisors, **Economic Report of the President**, January 1972; **Survey of Current Business**, January 1972; **Federal Reserve Bulletin**.

power. When inflation occurs, past dollars differ from current dollars. Each past dollar is now equivalent to more than one current dollar in purchasing power. Prevention of inadequate amortization charges during inflation requires that the historical cost of depreciation be translated into current dollars of equivalent purchasing power. But this usually is not done. Consequently, depreciation expense is understated, and profit is overstated.

Similarly, profit distortion may result during inflation if accountants charge to current expense the prior-period acquisition cost of inventory used up in current production. This source of upward bias in profit could be largely eliminated if accountants expressed inventory consumption cost in terms of the inflated price level of the current period, instead of the lower price levels of the past. But this remedy is not always applied either.

The magnitude of profit overstatement resulting from the failure to fully adjust depreciation and inventory consumption expenses for inflation has been estimated by several analysts, including George Terborgh,[2] former research director of the Machinery and Allied Products Institute, and Solomon Fabricant of the National Bureau of Economic Research.[3] Terborgh's estimates indicate that the cumulative overstatement of profit since 1951 has been slightly in excess of $90.0 billion, with about $32.0 billion of the overstatement occurring in the three-year period 1968-1970 and $25.0 billion in the two-year interval of 1969-1970 alone. These sums represent errors of 18.0%, 31.0%, and 39.0% respectively of the corrected profit figures for the indicated years. Apparently the degree of profit distortion tends to vary directly with the rate of inflation, which was 2.1%, 5.6%, and 5.9% respectively over the three periods.

The effect on the profit-share ratios of Terborgh's revision of the profit figures is indicated in the following table.

AVERAGE ANNUAL RATIO OF CORPORATE AFTER-TAX PROFIT TO INCOME ORIGINATING IN THE CORPORATE SECTOR, SELECTED PERIODS

	1951-1967	1968-1970
(1) Ratio as reported	.119	.091
(2) Ratio adjusted for price change	.103	.069
(3) Percentage overstatement of ratio {[(1) − (2)] ÷ (2)}	15.8%	31.3%

[2] George Terborgh, *Essays on Inflation*, (Washington, D. C.: Machinery and Allied Products Institute, 1971), pp. 52-56.
[3] Solomon Fabricant, "Inflation and the Lag in Accounting Practice" in *Accounting in Perspective: Contributions to Accounting Thought by Other Disciplines* (Cincinnati: South-Western Publishing Company, 1971), pp. 139-141.

The estimated percentage overstatement of the reported profit ratio is greater for the recent period of high rates of inflation than for the earlier period, which was marked by lower rates of inflation.

How would Terborgh's adjustments affect the other profit ratios? The adjusted profit/sales ratio would bear the same proportional relationship to the reported ratio as Terborgh's adjusted profit figures bore to the reported profit figures. The percentage adjustment to the profit rate on equity, however, would be expected to exceed the percentage adjustment to profits and to the profit/sales ratio. Unlike the latter ratio, which has only its numerator revised, the profit/equity ratio must have both numerator *and* denominator adjusted for inflation. The denominator of the profit/sales ratio needs no adjustment since it is already stated in current dollars. Stockholder's equity, however, is measured partly in terms of dollars of past periods. To eliminate the inflationary bias in the profit/equity ratio, both depreciation expense *and* equity must be translated into the current-dollar equivalents of the purchasing power of their historical or book values. If physical assets were to be measured at current rather than historical cost, stockholder equities would be larger than those shown on the balance sheets by the dollar difference between the current and historical stated net value (net of depreciation reserves) of the assets. The profit/equity ratio is, therefore, reduced more, proportionately, than are the ratios of profit to current flows such as product or sales.

Unfortunately, there are no reliable estimates for recent years of the aggregate profit/equity ratio adjusted for inflation. The closest substitutes are George Stigler's estimates of the adjusted profit rate on *total assets* of manufacturing corporations, 1948-1957. Stigler's estimates indicate that, in each year, the profit/asset ratio expressed in current dollars fell short of the ratio measured in terms of the book values of the assets.[4] On the average, the size of the corrected ratio was only about two-thirds the size of the unadjusted ratio.

Implicit Interest A second deduction from the official profit statistics that should be made in arriving at a figure for true or purely residual profit is the implicit interest on owners' capital. Implicit interest is the yield or interest return that stockholders could realize on their capital if they invested it elsewhere. Although not treated as a cost in con-

[4] George J. Stigler, *Capital and Rates of Return in Manufacturing Industries* (Princeton: Princeton University Press, 1963), Tables 2 and 5 of Errata Statement.

ventional accounting practice, implicit interest *is* actually the cost of attracting equity capital from its highest-paying alternative opportunity. In the long run, if these opportunity or transfer cost payments are not met out of reported profit, then stockholders will transfer their funds elsewhere. Deduction of implicit interest from reported profit is merely a way of stating that this portion of profit is not a true surplus but is a cost of attracting capital.

Instead of deducting implicit interest *return* from aggregate profit, it is easier to subtract the implicit interest *rate* from the profit rate on equity. For example, if the profit rate on equity is 9.0% and the implicit interest rate is 5.0%, then the net surplus profit rate would be 4.0%.

It is impossible, of course, to determine with absolute precision the implicit interest rate. Because of the heterogeneous nature of alternative investment opportunities and because of imperfections in the capital market, the same opportunity cost rate will not be applicable for all stockholders and firms. Moreover, even if the opportunity cost rate *could* be represented by a single market rate, it is difficult to determine whether the selected rate should exclude or include a premium for risk. One might argue for a riskless rate, such as the rate on government bonds, on the grounds that, for the entire population of corporations, the risk rewards of successful firms should cancel out against the losses of unsuccessful ones. Others might argue for a market rate that reflects some degree of risk, e.g., the yield on triple or double-A rated corporate bonds, on the grounds that in our dynamic economy, default risks are positive even for the aggregate of corporations and that some minimum risk premiums are necessary payments for the unpleasant task of uncertainty-bearing.

In the calculations below, the average interest rate on government bonds has been arbitrarily chosen to represent the implicit interest rate. The reader should be aware, however, that other analysts might, with equal justification, select other market yield rates to represent the implicit rate. The government bond rate serves as a proxy for the pure interest or riskless rate of return. Subtracting this rate from the estimated profit rate on equity, corrected for inflation, one obtains an estimate of the pure or surplus rate of profit. The inflation-corrected profit rate was estimated to be two-thirds of the reported profit rate, the same as in Stigler's study of the profit rate on assets, referred to previously. For want of more appropriate estimates, Stigler's figures are employed.

ESTIMATED PURE OR SURPLUS PROFIT RATE SELECTED PERIODS

	1951-1960	1961-1968	1969-1970
(1) Reported after-tax profit rate on equity, manufacturing.	10.68%	10.93%	10.40%
(2) Profit rate corrected for inflation [(1) x ⅔]	7.11%	7.28%	6.97%
(3) Less: Estimated Implicit Interest Rate	3.14%	4.27%	7.44%
(4) Pure rate of profit on equity	3.97%	3.01%	− 0.47%

The reader is warned not to put too much faith in the accuracy of these figures. As mentioned previously, it is doubtful whether the government bond rate appearing in line three of the table corresponds perfectly to the implicit interest rate. Furthermore, the two-thirds correction factor shown in line two was based on a study pertaining to 1948-1957, a period not entirely comparable to the period covered in this article. The applicability of this correction factor to 1969-1970 is especially dubious. It is quite likely that in these two years the inflation allowance should be larger and the inflation-corrected profit rate smaller than the rate shown in the table. In short, because of the crudeness of the estimated adjustments shown in lines two and three of the table, the pure profit figures appearing in line four are rough approximations only, still subject to error. Nevertheless, the figures are indicative of the direction of movement of the surplus profit rate over the past two decades. The figures suggest that in the late 1960's sharply declining accounting profits combined with a high opportunity cost rate of interest on equity to reduce noticeably the surplus profit rate below its 1951-1968 levels.

Conclusion Over the past 20 years reported profit rates generally have been lower than many people realize. Toward the close of the 1960's, moreover, some of these rates plunged precipitously and by 1970 had reached their lowest levels since World War II. Removal of historic cost error further shrinks the profit rates, and when the element of implicit interest cost is extracted, they become even more slender. The cushion of pure surplus or residual profit, upon which business enterprise is often said to rest, has never been very thick, and in recent years it may have vanished altogether.

Thomas M. Humphrey

PROFITS AND WAGES: 1965-1971

Chart 1: After-Tax Profits of All Nonfinancial Corporations

After-tax profits of all nonfinancial corporations increased slightly between 1965 and 1968 to nearly $42.0 billion, and then declined steadily during the general economic slowdown of 1969 and 1970 to well below $30.0 billion. Although the low point in profits of $27.8 billion in late 1970 was primarily a result of the automobile strike in the fall of 1970, substantial increases in labor costs, in the face of only moderate gains in sales revenues, accounted for the 1969-1970 decline. Recovery from this decline began in early 1971, paralleling a step-up in the pace of economic activity, and since that time total profits have risen markedly. Since profits are often regarded as a "leading indicator" of economic activity, the improved profits picture in 1971 tends to support forecasts of substantial economic gains for 1972.

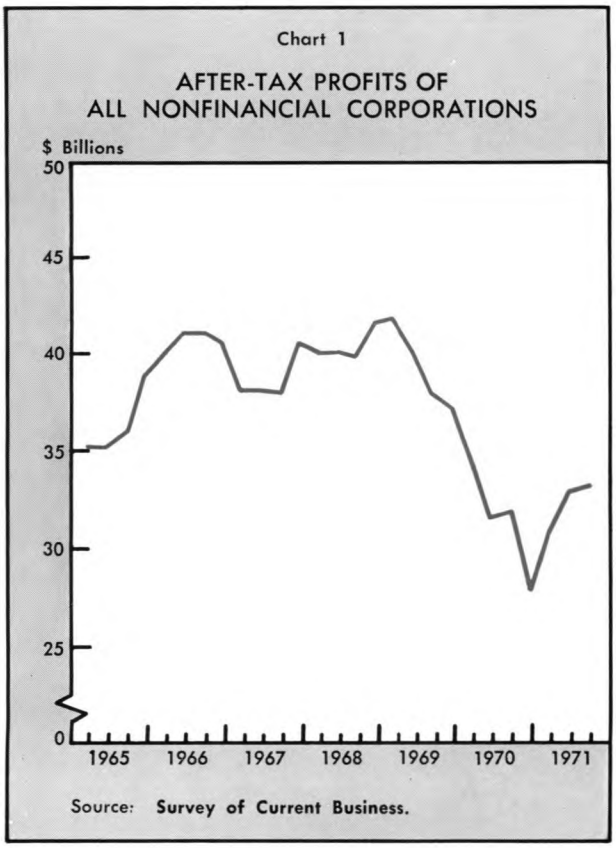


Chart 2: After-Tax Profits as a Percent of Stockholders' Equity—Manufacturing Corporations Only

Return on stockholders' equity reached its post World War II peak in 1966. Thereafter, it began a steady decline that lasted through 1970. The return on equity depends on both profits and stockholders' equity. During the latter 1960's stockholders' equity increased fairly steadily, while profits actually declined. Thus, there was a decrease in the return on stockholders' equity. Such declines in the return on equity tend to dampen investor enthusiasm and generally contribute to poor stock market performance, as was observed in 1969 and 1970. Since early 1971, however, the return on equity has tended to improve, as profits have increased.

Chart 3: Wages and Salaries Paid by Nonfinancial Corporations

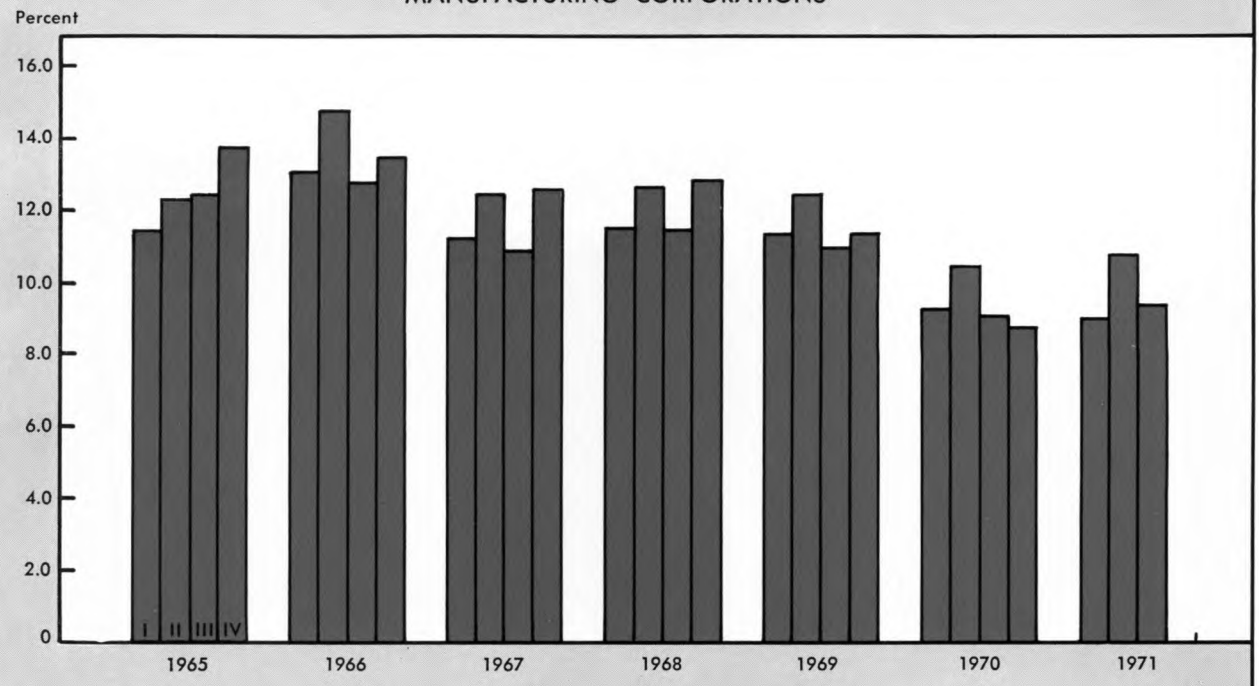
From 1965 until the general level of economic activity slowed in late 1969, total wages and salaries paid by nonfinancial corporations increased at about an 8.0% annual rate. With the slowing of economic activity in late 1969, the demand for goods and services tapered off and many firms reduced employment and consequently their total wage bill. These cutbacks accounted for the leveling off in total wages and salaries paid during 1970. Improved economic conditions and substantial wage increases in several major industries contributed to the rapid increase in wages and salaries paid in 1971.

Chart: 4 Wages and Salaries and Profits as a Percent of Sales

Wages and salaries as a percent of sales and profits as a percent of sales both fluctuated within a narrow range from 1965-1971. Although wages and salaries by themselves exhibited a dramatic increase during this period (Chart 3), sales increased sufficiently to prevent a major decline in profit margins. By 1971, sales increased faster than wage costs, allowing profit margins to improve. Although profit

Chart 2

AFTER-TAX PROFITS AS A PERCENT OF STOCKHOLDERS' EQUITY
MANUFACTURING CORPORATIONS



Source: Federal Trade Commission, **Quarterly Financial Report for Manufacturing Corporations.**

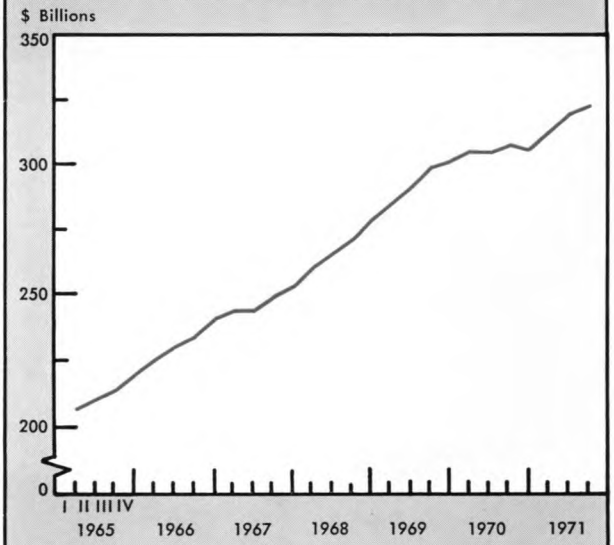
margins have historically declined in the second year of a business expansion, several factors suggest that this pattern may not hold in 1972. First, the improvement in profit margins in 1971 was relatively small. Second, gains in productivity, which serve to offset wage increases, are expected to be substantial in 1972. Finally, the new investment tax credit will reduce the effective tax rate for many corporations, which has a positive effect on after-tax profit margins.

Chart 5: Factors Affecting Profit Margins for Manufacturing Firms

It is well known that at least two economic measures have a high degree of statistical correlation with profit margins. As shown in Chart 5, these measures are a capacity utilization index and a per unit labor cost index. The capacity utilization index may be interpreted as an indicator of the impact of fixed costs on profit margins, while the index of labor costs per unit of output may be interpreted as an indicator of the impact of variable costs on profit margins. As the capacity utilization index fell during late 1969 and 1970, firms produced fewer units of

Chart 3

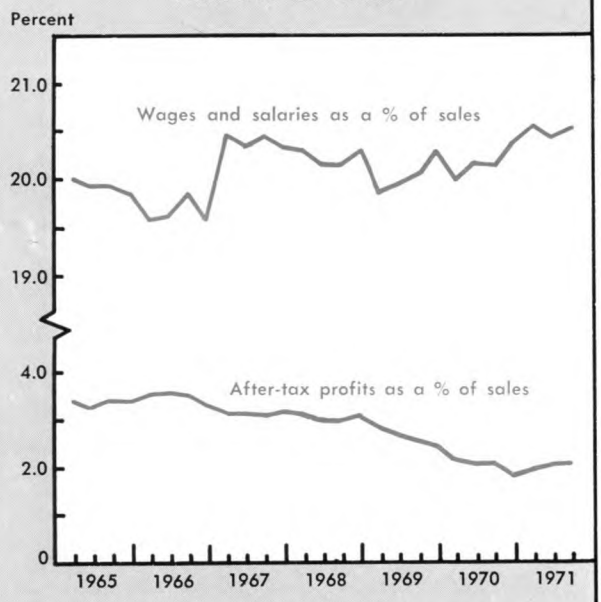
WAGES AND SALARIES—
ALL NONFINANCIAL CORPORATIONS



Source: **Survey of Current Business.**

Chart 4

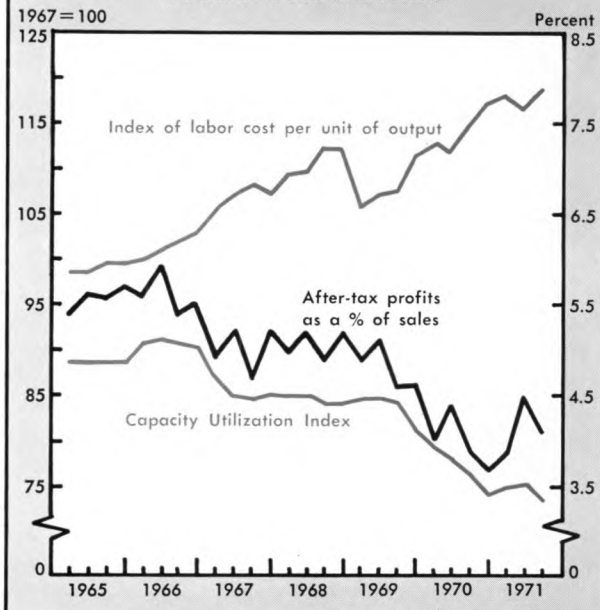
WAGES AND SALARIES AND PROFITS AS A PERCENT OF SALES



Sources: Board of Governors, Federal Reserve System; Survey of Current Business.

Chart 5

FACTORS AFFECTING PROFIT MARGINS FOR MANUFACTURING FIRMS



Sources: Survey of Current Business; Federal Trade Commission, Quarterly Financial Report for Manufacturing Corporations.

output over which to spread fixed costs. Thus, profits per dollar of revenue also declined. The index of labor costs per unit of output is a ratio of hourly wage rates and productivity or output per man hour. The increase in this index, beginning in 1969, reflects both rising wage rates and declining productivity. Combined, these two factors suggest that cost per unit was increasing substantially during 1969-1971, which had a downward effect on profit margins.

Philip H. Davidson

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