FEDERAL RESERVE BANK OF NEW YORK

MONTHLY REVIEW

JUNE 1969

Contents

The Business Situation 111

The Money and Bond Markets in May..... 114

How Much Does Money Matter?..... 119

Volume 51 **No. 6**

The Business Situation

Economic activity continues to move higher but possibly at a somewhat slower pace than earlier in the year. Growth in production and income was more moderate during April, and total employment eased off slightly, resulting in some relaxation of the extreme tightness that prevailed in the labor markets during the winter months. And, for the third consecutive month, new housing starts were below the exceptionally high rate recorded earlier in the year. On the other hand, new orders received by durables manufacturers surged to a record in April and auto sales in May recovered a bit from the slow pace set during the winter months. Thus, while the recent business statistics appear to have been balanced on the softer side, it is too early to conclude that the rate of economic growth is slowing sufficiently to ease the upward thrust of prices. The April rise in consumer prices was again huge, and preliminary data for May indicate a further large overall gain in wholesale commodity prices even though the industrial component rose only moderately.

OUTPUT, INVENTORIES, AND CONSTRUCTION ACTIVITY

Industrial activity expanded further in April though by a considerably smaller margin than in the previous two months. The Federal Reserve Board's index of industrial production reached 171.5 percent of the 1957-59 average, up 0.3 percent from the March level. Output grew at about twice that rate in the two preceding months. However, the April slowing of overall output was chiefly due to sharply curtailed activity in the automobile industry which was hit by strikes during the month. Auto assemblies fell by more than 9 percent to a seasonally adjusted annual rate of 7.7 million units, substantially below the 8.4 million production level originally scheduled for the month. Output of business and defense equipment and of materials rose strongly in April, and there were sizable advances in the steel, coal, and petroleum industries. Production of household furniture and consumer nondurables also increased, but the sharp drop in auto assemblies resulted in a modest decline—the first since last November—in the aggregate output of goods for consumer markets.

Despite the continuation of strikes in the auto industry, auto assemblies in May were at an annual rate of 7.6 million units, down only slightly from the April figure, and the tentative June schedule points to a pace of 8.8 million units. Dealer inventories of new cars have recently declined from their record March levels, partly as a result of the strikes and partly because the pace of new car sales has become a bit livelier. In May, dealer sales of domestic-model cars were at a seasonally adjusted annual rate of 8.5 million units, up 4.3 percent from April.

Another development pointing to near-term strength in industrial production was a very sharp $1.3 billion April increase in the volume of new orders placed with durable goods manufacturers. This increase, which may have reflected some anticipation of the repeal of the 7 percent investment tax credit requested by President Nixon on April 21, brought the month's new orders to a record $31.0 billion. A large part of the gain was in orders placed for transportation equipment, but an expanded orders volume was also reported by the other major sectors of durables manufacturing. Shipments rose very little in April, and as a result the backlog of unfilled durables orders also rose sharply to $86.4 billion, a $1.3 billion gain for the month.

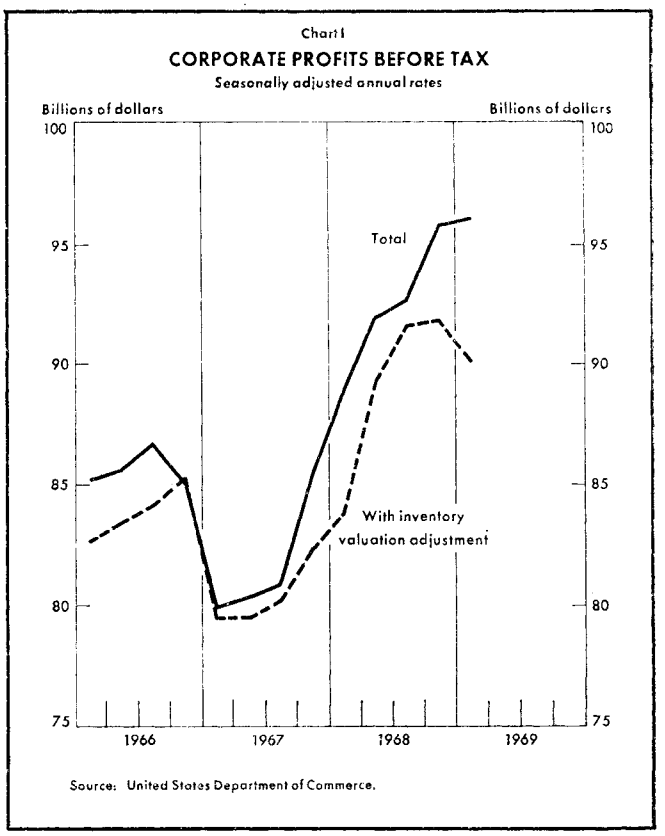
Durables manufacturers and wholesalers accumulated inventories in March at a fairly substantial pace, while stocks of nondurables manufacturers and retailers were virtually unchanged. With the availability of full data for March, the estimate of the inventory accumulation component of first-quarter gross national product (GNP) was revised to an annual rate of $6.9 billion, up by $0.5 billion from the preliminary estimate but still well below the fourth-quarter pace of $10.6 billion.[1]

Despite the continued fairly strong rise in the book

[1] The Department of Commerce has revised its preliminary estimate of GNP during the first quarter of 1969 from $903.4 billion, discussed in the May issue of this *Review*, to $903.3 billion. Inventory investment and spending by state and local governments were adjusted upward, while consumption outlays were revised downward.

value of business inventories in recent months, there is little evidence to suggest any significant imbalance currently between inventories and the levels of business sales. The inventory-sales ratio for manufacturers moved higher in March and rose slightly further in April, but remained at about the 1968 average and well below the level of last December. At the same time, the ratio for wholesalers declined in March to the lowest level since last September, as strong increases in stocks were outweighed by even sharper sales advances. The inventory-sales ratio for retail trade firms moved up substantially in March when retail sales declined, but the strong sales recovery in April probably reversed that movement.

The rate of construction starts on new housing units moved lower in April for the third consecutive month. However, the decline—which may have been due in some degree to scattered strike activity—was substantially milder than in February or March. New private housing units were begun in April at a seasonally adjusted annual rate of 1.54 million units, down about 2 percent from the March pace and 18 percent from January's unusually high rate. On the other hand, there was a small gain in April in the number of residential building permits issued. The costliness and short supply of mortgage credit appear to have had a significant impact on the single-family sector of the housing market. The effective interest rate on conventional mortgages to purchase new single-family homes again rose sharply in April, reaching a nationwide average of 7.6 percent, nearly a percentage point higher than in the same month of 1968. Probably as a reflection of this, the starts rate for single-unit homes has fallen from an annual rate of 1.1 million units in January to 0.8 million units in April, a decline of 26 percent. Multi-unit building has fared better, probably in good measure because rates on such loans are generally unrestricted by state usury laws and because of the ability of institutional lenders to acquire an equity interest in apartment buildings on which they extend mortgages. Multi-unit housing in April was started at the rate of 0.8 million units, little changed from January's high level. A recent survey by the National Association of Home Builders found that builders expect multi-unit starts to register a modest rise in 1969 over 1968, but also expect that increase to be more than offset by a decline in single-unit starts.



PROFITS AND PRODUCTION COSTS

Growth in corporate profits slowed markedly during early 1969 (see Chart 1). Pretax profits in the first quarter rose by only $0.3 billion to a seasonally adjusted annual rate of $96.0 billion, according to the preliminary figures of the Department of Commerce. The increase was the smallest in two years, with most of the gain attributable to nonmanufacturing corporations such as financial institutions and utilities. In the manufacturing sector, profits declined, largely because of lower earnings in the automobile industry. Moreover, when aggregate first-quarter book profits are adjusted for the effects of sharply rising prices on the valuation of inventories, the resulting pretax profits figure showed a drop of $1.7 billion, the first decline since early 1967.

Pressure on profit margins during the first three months of 1969 stemmed from steeply rising prices of materials and labor and from a slowdown in productivity. Unit labor costs in the private nonfarm economy rose in the first quarter by almost 2 percent to 122.4 percent of the 1957-59 average. Compensation per man-hour continued to increase, while output per man-hour declined. The drop in productivity, the first since 1967, reflected the fact that man-hours increased strongly in the first quarter but growth in real output was relatively modest. In the manufacturing sector, the gain in unit labor costs was not so steep as in the private economy as a whole. Productivity in manu-

facturing continued to grow, but the advance was less than half as large as the gain in compensation.

PERSONAL INCOME AND CONSUMER DEMAND

Personal income rose $2.8 billion in April to a seasonally adjusted annual rate of $730.5 billion. The gain was considerably smaller than those in recent months and reflected the distinctly smaller increase in wage and salary disbursements that accompanied the April slowdown in employment. Sluggish growth in payrolls was widespread among most of the major industry divisions, but was most marked in the manufacturing sector where wages and salaries rose by only $0.1 billion compared with an average gain of $1.2 billion during the first three months of the year. In the distributive and service industries, payroll growth was curtailed almost as sharply.

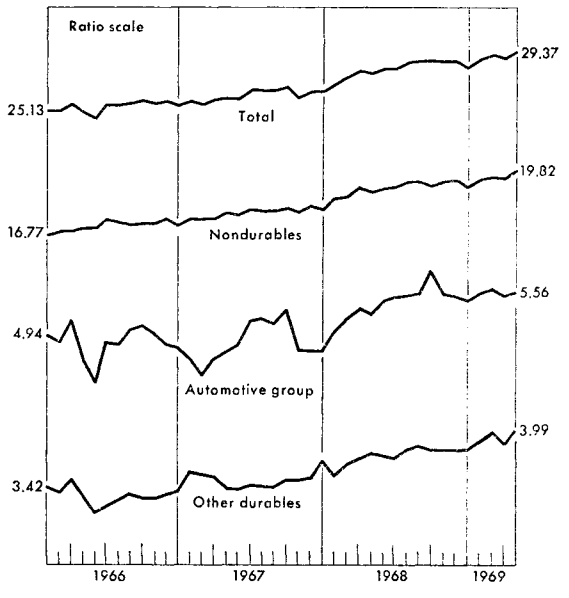
According to preliminary statistics, total retail sales in April rose by 1½ percent to a new all-time high of $29.4 billion—in a month when taxpayers were faced with large final payments on their 1968 income taxes. Nondurables led the advance, but steadier automobile sales and increases in other durable goods also contributed. Dealer sales of domestic-model cars ran at a seasonally adjusted annual rate of 8.1 million units in April, only fractionally lower than the March pace which was down 6 percent from that in February. The retail sales increase estimated for April followed a 1 percent decline during March and brought volume to an all-time high, but only $0.5 billion above the pace in September 1968. Following a temporary surge immediately after imposition of the surtax in mid-1968, retail sales have shown little change on balance in the past seven months (see Chart II). Indeed, the 1¾ percent gain in retail sales since September is smaller than the rise in retail prices over the same period.

The preliminary first-quarter estimate of total consumer expenditures on the GNP basis has been reduced by $1.0 billion because of a large downward revision in the initial estimate of March retail volume. The revision was centered in nondurables outlays. At the same time, the preliminary estimate for disposable income in the first three months of 1969 was revised upward, with the result that the personal saving ratio is now estimated at 6.1 percent in the first quarter, down 0.7 percentage point instead of the previously reported reduction of a full percentage point.

Chart II

RETAIL SALES

Billions of dollars; seasonally adjusted



Note: Latest data plotted are based on preliminary reports.

Source: United States Department of Commerce, Bureau of the Census.

PRICE DEVELOPMENTS

In April, consumer prices continued their rapid climb, increasing at a 7.6 percent annual rate. The consumer price index reached 126.4 percent of the 1957-59 average. The April rise was primarily due to higher prices for food and for services. However, mortgage interest and other household costs were sharply higher, and medical care also continued to rise steeply. In addition, the prices for apparel and recreation gained strongly.

Wholesale prices rose fairly modestly in April, but apparently again increased sharply in May. The wholesale price index rose at a 2.1 percent per annum rate in April when there was some easing of lumber and plywood prices and of farm products prices. In May, however, preliminary statistics indicate that total wholesale prices rose at a 7.5 percent annual rate, reaching 112.6 percent of the 1957-59 average. Farm products prices climbed in May at a phenomenal 49 percent per annum rate, and processed foods and feeds by 17 percent per annum. In contrast, industrial commodities in May rose by a modest 1.1 percent per annum, as increases in metals and machinery were partly offset by further decreases in lumber prices. Total wholesale prices thus far in 1969 have risen on balance at a far faster rate than in 1968, and the latest month's increase in farm and food prices is the most severe in eleven years.

The Money and Bond Markets in May

Pressures in the money and bond markets intensified during May amid international financial uncertainties and continued domestic monetary restraint. Following the resignation of President de Gaulle of France on April 28, new rumors of an impending revaluation of the German mark, coupled with a possible devaluation of the French franc, set in motion massive speculative movements of international funds into Germany. Partly as a result, rates on Euro-dollar borrowings by domestic banks rose quickly to record levels and continued to climb during most of the month. At the same time, the effective rate on Federal funds moved upward, reaching a new high of 9⅜ percent on the final day of the period. Other money market instruments also responded to the increasing tautness in the market; the costs of borrowing through commercial paper and bankers' acceptances rose in several steps during May. Moreover, as commercial banks experienced higher costs on funds raised in the Federal funds and Euro-dollar markets, they in turn raised interest rates on call loans to dealers in United States Government securities. After mid-month the situation in the foreign exchange markets quieted somewhat, but increasing discussion of the possibility of a rise in the commercial bank prime lending rate contributed to continuing unsettlement in the domestic financial markets.

Corporate bond prices moved higher during the early part of May in response to renewed interest from some major pension funds and favorable reaction on the part of investors to recent new issues. The improved tone did not, however, extend to the tax-exempt sector where both inventories and the calendar of new issues remained heavy. Attention in the Government securities market during the first week was focused on the results of the Treasury's refunding operation for which subscription books were open to holders of "rights" from May 5 through May 7. Results of the refunding show that private holders of the eligible issues subscribed for $2.1 billion of the new 6⅜ percent fifteen-month note and $2.2 billion of the 6½ percent seven-year note at an overall attrition rate of 27.6 percent. In the weeks following the Treasury's refunding, all segments of the bond markets deteriorated except for a brief rally prior to President Nixon's May 14 nationwide address, which was based on market optimism that the speech might contain news of some dramatic improvement in the Vietnam situation.

BANK RESERVES AND THE MONEY MARKET

Reflecting the heightened pressure on bank reserves during May, member bank borrowings at the discount window rose substantially from the preceding month, as did the rate range in which most Federal funds trading occurred. In the week ended on May 7, daily average borrowings from the Federal Reserve Banks climbed to $1.6 billion, the highest weekly level since the end of 1952, and for the month as a whole averaged $1.4 billion, some $300 million greater than in April. With excess reserves little changed from the previous month, average net borrowed reserves also increased by approximately $300 million in May, reaching record high levels in the final two statement weeks of the month.

With the exception of one day, the effective rate on Federal funds was in a 7¾ to 9⅜ percent range throughout May, in contrast to the 6¾ to 8 percent range that prevailed in April following the increase in the Federal Reserve discount rate to 6 percent. A consistent intra-weekly pattern prevailed during the month as the major money market banks bid aggressively for funds at the start of each week to make certain of meeting their reserve requirements early in the statement period, thus driving the Federal funds rate up. Later in each week the rate fell somewhat, as these banks reduced their demand and excess reserves reached the market (see Chart I). In part the behavior of these money center banks resulted from a substantial deterioration in their basic reserve position which was considerably more than seasonal (see Chart II). The increased deficit was particularly striking at the eight major New York City banks which increased their loans and investments by a sizable amount over the first three weeks of the period despite a runoff in all types of deposits. There was a progressive deterioration of the reserve position of the New York City banks until the final week in May.

As pressures on the reserve and liquidity positions of

the major money center banks mounted, their net interbank purchases of Federal funds rose steadily although their borrowings at the discount window moved irregularly. Despite some easing at the end of each statement week, the money market was quite firm throughout the month of May, and the effective rate on Federal funds moved steadily higher with the opening of each period. The effective rate on May 1 was 8¼ percent; on May 8, 8⅜ percent; on May 15, 8½ percent; on May 22, 9 percent; and on May 29, 9⅜ percent. During the last two days of the month, some Federal funds traded at a record rate of 9¾ percent.

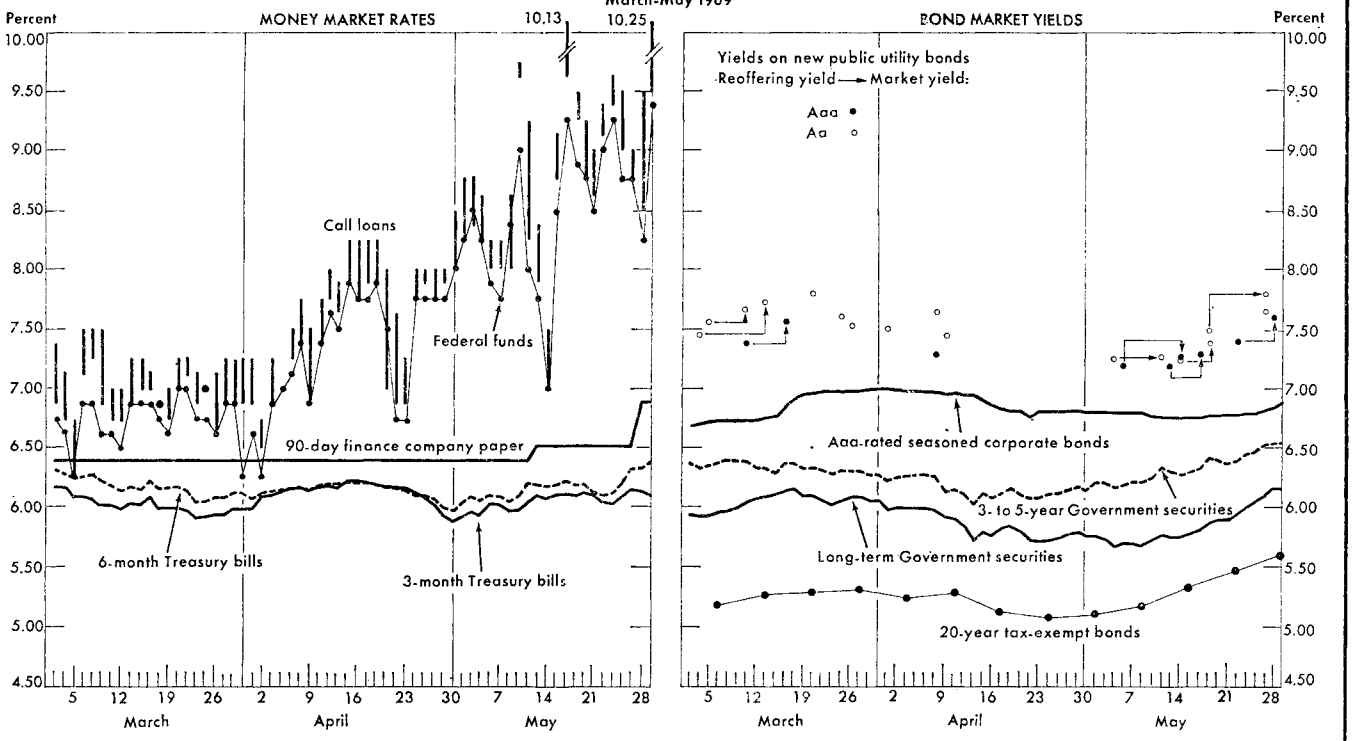
Due to the tendency of market factors to absorb reserves during the month as currency outside banks rose sharply and a decline in float provided an additional drain, the System injected $724 million of reserves on average in May through open market operations (see Table I). Because of the intraweekly pattern, noted earlier, of tautness in the money market at the beginning of statement weeks followed by some easing toward the close, System operations consisted largely of repurchase agreements against Treasury and Federal agency securities and bankers' acceptances, which were arranged early in the week and allowed to mature without replacement toward the close.

Daily average deposits subject to reserve requirements (the bank credit proxy) declined in May at a seasonally adjusted annual rate of about 1 percent, after a 5 percent rise in April. Although there was some increase in net demand deposits on a seasonally adjusted basis, this was more than offset by a further decline in time deposits.

Chart I

SELECTED INTEREST RATES

March-May 1969



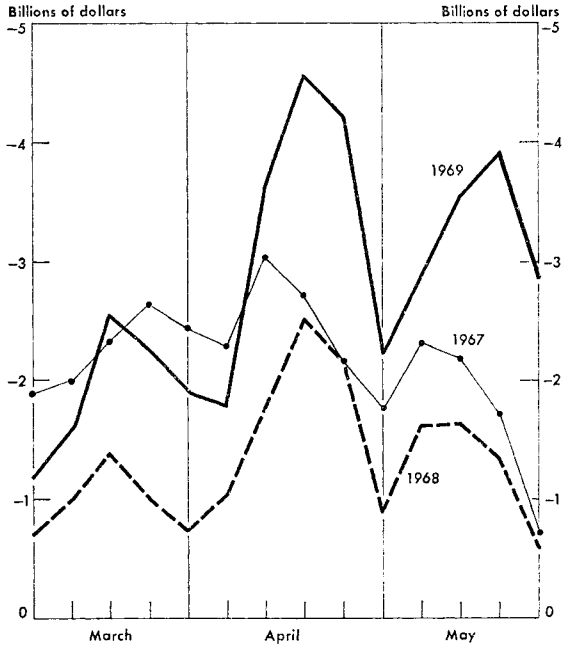
Note: Data are shown for business days only.

MONEY MARKET RATES QUOTED: Daily range of rates posted by major New York City banks on call loans (in Federal funds) secured by United States Government securities (a point indicates the absence of any range); offering rates for directly placed finance company paper; the effective rate on Federal funds (the rate most representative of the transactions executed); closing bid rates (quoted in terms of rate of discount) on newest outstanding three- and six-month Treasury bills.

BOND MARKET YIELDS QUOTED: Yields on new Aaa- and Aa-rated public utility bonds (arrows point from underwriting syndicate reoffering yield on a given issue to market yield on the same issue immediately after it has been released from syndicate restrictions); daily averages of yields on seasoned Aaa-rated corporate bonds; daily averages of yields on long-term Government securities (bonds due or callable in ten years or more) and on Government securities due in three to five years, computed on the basis of closing bid prices; Thursday averages of yields on twenty seasoned twenty-year tax-exempt bonds (carrying Moody's ratings of Aaa, Aa, A, and Baa).

Sources: Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System, Moody's Investors Service, and The Weekly Bond Buyer.

Chart II
BASIC RESERVE POSITIONS OF MAJOR MONEY MARKET BANKS



Note: All figures shown represent deficit positions. Calculation of the basic reserve position is illustrated in Table II.

Liquidation of large certificates of deposit continued but at a much slower pace than in the early months of the year. Commercial bank liabilities to foreign branches rose by some $300 million during the four statement weeks ended in May, after a drop of $200 million during April. Moreover, domestic banks also continued to raise additional Euro-dollar funds by sales of assets to their foreign branches. The seasonally adjusted money supply registered no further gain in May, following a large increase in April which partly reflected special factors of a technical nature.

THE GOVERNMENT SECURITIES MARKET

Yields on Government securities rose on balance during May although generally good demand, pressing on a limited market supply, restricted the increase in short-term bill rates to a narrow range (see Chart I). Part of the demand for bills arose from foreign sources in the wake of the speculative activity surrounding the German mark.

Despite the increased demand for bills and their relatively short market supply, upward pressures were exerted on bill rates by the high costs of dealer financing and the Treasury's decision to roll over rather than retire the bills that were added to six issues in the March "strip" auction. Moreover, dealers were somewhat disappointed by the volume of demand for bills arising from the Treasury's May refunding. At the final weekly auction on May 26, average issuing rates for the new three- and six-month bills were set at 6.124 and 6.218 percent, respectively, 7 and 18 basis points above the average rates established at the last weekly auction in April. At the regular monthly auction on May 27, average issuing rates on the nine- and twelve-month bills were set at 6.307 and 6.270 percent, respectively, 33 and 34 basis points higher than comparable rates at the auction a month earlier (see Table III). The auction rate on the twelve-month bill was the highest since last December.

In the market for longer term Government securities, attention was centered on the Treasury's May refunding during the early part of the month. The Treasury offered holders of notes and bonds maturing in May and June of this year the right to exchange their holdings into either a fifteen-month 6⅜ percent note yielding 6.42 percent or a seven-year 6½ percent note priced at par. The terms were considered generous by most market participants, and the overall attrition by private holders of only 27.6 percent was near the lower end of the range of market expectations. By the end of the month the longer note had fallen to a bid quotation of $1^{9}/_{32}$ below par while the shorter note was bid about $^{8}/_{32}$ below its issue price.

Prices of outstanding intermediate-term Treasury notes declined about half a point during the first week of May in initial reaction to the terms of the Treasury refunding and moved somewhat lower over the remainder of the month. Prices of long-term bonds, in contrast, rose early in the period in response to some indications of moderating domestic economic activity and favorable press discussions concerning the Paris peace talks. In the latter part of the period, prices generally declined due to disappointment over the President's Vietnam speech, concern over the high costs of financing dealer positions, and the worsening state of the corporate and municipal bond markets. Over the month as a whole, prices on most intermediate-term issues were 1 to $1^{12}/_{32}$ points lower, while those on longer term issues declined by $2^{22}/_{32}$ to $4^{18}/_{32}$ points.

OTHER SECURITIES MARKETS

Yields on new and seasoned corporate bonds declined somewhat in the first week of May, largely in response to favorable investor reception of the preceding week's new

Table I

FACTORS TENDING TO INCREASE OR DECREASE MEMBER BANK RESERVES, MAY 1969

In millions of dollars; (+) denotes increase, (—) decrease in excess reserves

Factors	Changes in daily averages—week ended on				Net changes
	May 7	May 14	May 21	May 28	
"Market" factors					
Member bank required reserves	— 152	+ 170	— 94	+ 37	— 39
Operating transactions (subtotal)	— 248	— 94	— 195	— 305	— 842
Federal Reserve float	— 31	— 108	+ 288	— 351	— 202
Treasury operations*	+ 16	— 42	+ 141	+ 128	+ 243
Gold and foreign account	— 40	+ 32	— 4	+ 8	— 4
Currency outside banks	— 93	— 264	— 454	+ 151	— 660
Other Federal Reserve accounts (net)†	— 100	+ 288	— 167	— 242	— 221
Total "market" factors	— 400	+ 76	— 289	— 268	— 881
Direct Federal Reserve credit transactions					
Open market operations (subtotal)	+ 309	+ 139	— 38	+ 314	+ 724
Outright holdings:					
Government securities	+ 41	+ 66	+ 217	+ 339	+ 663
Bankers' acceptances	+ 1	— 1	— 1	— 4	— 5
Repurchase agreements:					
Government securities	+ 304	+ 52	— 256	— 32	+ 68
Bankers' acceptances	— 12	+ 4	— 7	— 10	— 25
Federal agency obligations	— 25	+ 18	+ 9	+ 21	+ 23
Member bank borrowings	+ 486	— 433	+ 188	— 55	+ 186
Other loans, discounts, and advances	—	—	—	—	—
Total	+ 794	— 293	+ 151	+ 257	+ 909
Excess reserves	+ 394	— 217	— 138	— 11	+ 28

	Daily average levels				
Member bank:					
Total reserves, including vault cash	28,175	27,788	27,744	27,696	27,851‡
Required reserves	27,731	27,561	27,655	27,618	27,641‡
Excess reserves	444	227	89	78	210‡
Borrowings	1,603	1,170	1,358	1,363	1,359‡
Free, or net borrowed (—), reserves	—1,159	— 943	—1,269	—1,225	—1,149‡
Nonborrowed reserves	26,572	26,618	26,386	26,393	26,492‡
Net carry-over, excess or deficit (—)§	6	217	160	80	116

	Changes in Wednesday levels				
System account holdings of Government securities maturing in:					
Less than one year	— 410	—1,110	+12,785	— 227	+11,038
More than one year	—	—	—10,804	+ 83	—10,721
Total	— 410	—1,110	+ 1,981	— 144	+ 317

Note: Because of rounding, figures do not necessarily add to totals.
* Includes changes in Treasury currency and cash.
† Includes assets denominated in foreign currencies.
‡ Average for four weeks ended on May 28.
§ Not reflected in data above.

Table II

RESERVE POSITIONS OF MAJOR RESERVE CITY BANKS MAY 1969

In millions of dollars

Factors affecting basic reserve positions	Daily averages—week ended on				Averages of four weeks ended on May 28
	May 7	May 14	May 21	May 28	
Eight banks in New York City					
Reserve excess or deficiency(—)*	104	69	— 49	— 3	30
Less borrowings from Reserve Banks	146	121	164	59	123
Less net interbank Federal funds purchases or sales(—)	695	1,292	1,660	706	1,088
Gross purchases	*1,872*	*2,118*	*2,593*	*1,940*	*2,131*
Gross sales	*1,177*	*826*	*933*	*1,235*	*1,043*
Equals net basic reserve surplus or deficit(—)	— 738	—1,345	—1,873	— 768	—1,181
Net loans to Government securities dealers	737	611	352	317	504
Net carry-over, excess or deficit(—)†	— 22	57	48	— 2	20
Thirty-eight banks outside New York City					
Reserve excess or deficiency(—)*	106	1	— 31	— 27	12
Less borrowings from Reserve Banks	462	260	378	251	338
Less net interbank Federal funds purchases or sales(—)	1,810	1,996	1,623	1,819	1,812
Gross purchases	*3,335*	*3,616*	*3,564*	*3,697*	*3,553*
Gross sales	*1,525*	*1,620*	*1,941*	*1,878*	*1,741*
Equals net basic reserve surplus or deficit(—)	—2,166	—2,255	—2,032	—2,098	—2,138
Net loans to Government securities dealers	36	99	— 38	— 59	10
Net carry-over, excess or deficit(—)†	— 2	62	39	24	30

Note: Because of rounding, figures do not necessarily add to totals.
* Reserves held after all adjustments applicable to the reporting period less required reserves and carry-over reserve deficiencies.
† Not reflected in data above.

Table III

AVERAGE ISSUING RATES* AT REGULAR TREASURY BILL AUCTIONS

In percent

Maturities	Weekly auction dates—May 1969			
	May 5	May 12	May 19	May 26
Three-month	5.978	6.084	6.148	6.124
Six-month	6.063	6.191	6.231	6.218
	Monthly auction dates—March-May 1969			
	March 26	April 24	May 27	
Nine-month	6.058	5.977	6.307	
One-year	6.132	5.931	6.270	

* Interest rates on bills are quoted in terms of a 360-day year, with the discounts from par as the return on the face amount of the bills payable at maturity. Bond yield equivalents, related to the amount actually invested, would be slightly higher.

issues and to renewed demand from major pension funds. Reflecting underwriters' optimism, the first long-term Aaa-rated issue marketed since early March, a $40 million telephone issue, was priced on May 6 to yield 7.20 percent. This yield was 18 basis points lower than the similarly rated telephone issue of March 11. Investor response was not very enthusiastic, however, due in part to the fact that a closely competitive utility issue, marketed the previous day, was offered at 7.25 percent.

The trend of corporate bond prices was steadily downward during succeeding weeks in May except for a brief improvement prior to President Nixon's speech on May 14. Despite the fact that White House press sources had stated in advance that nothing basically new would be presented, market participants were apparently hopeful that some word concerning a quick end to the Vietnam fighting would be included. When these hopes did not materialize, the corporate bond market resumed its decline, as participants continued to respond to the heavy demand for funds, the lack of substantial progress at the Paris peace talks, and the fact that inflation in the economy had not shown any abatement according to the latest price statistics. Several corporate syndicates were terminated during the final three weeks of May, and some scheduled new issues were either reduced in size or postponed because of market conditions. Indicative of the deterioration which occurred, on May 27 a telephone company sold a $65 million issue of debentures at a cost of 7.7 percent, the highest cost for a Bell System unit since 1921. In addition, scheduled new issues for the month ahead are estimated at some $100 million more than at the end of April.

Prices on tax-exempt securities moved lower throughout the entire month, though the decline accelerated after the first week of the period as measured by *The Weekly Bond Buyer's* index of twenty municipal bond yields. At the end of May this index was at a 36-year high of 5.60 percent, an increase of 50 basis points over the month. The calendar of new municipal securities was sizable throughout the period. Moreover, commercial bank demand for new securities remained at reduced levels and some further bank sales of outstanding tax exempts were reported. Highlighting the activity in this market was the sale of $182 million of housing authority bonds on May 21 at a record net interest cost of 5.517 percent. Yields to investors ranged as high as 5.55 percent but, despite this record return for tax-exempt securities guaranteed by the Federal Government, the reception was less than enthusiastic. In this environment, syndicate terminations and price cutting began to recur during the month and an $88 million issue scheduled for marketing was withdrawn by the state of New York because of the probability that it could not be sold at or below the 5 percent interest ceiling set on it. The calendar of scheduled new issues at the close of May had declined by some $200 million over the month, possibly reflecting an unwillingness on the part of potential borrowers to announce firm dates given the unsettled market conditions.

How Much Does Money Matter? A Look at Some Recent Evidence

By RICHARD G. DAVIS
Adviser, Research and Statistics Function
Federal Reserve Bank of New York

Editor's Note: *The following is a paper presented at a Money and Banking Workshop held on May 9, 1969 at the Federal Reserve Bank of Minneapolis. It is being reprinted in this* Review *for the benefit of our readers who are interested in the current controversy surrounding the role of the money supply. The views expressed are the author's and do not necessarily reflect those of the Federal Reserve Bank of New York or of the Federal Reserve System.*

The air has been filled of late with signs of upheaval in long-established patterns of thinking regarding monetary and fiscal policy and, more generally, regarding the role of money in the economy. The basic framework used for years by most of us in analyzing these matters has come under serious challenge. Signs of intellectual disarray are evident all over, among public officials, in the business press, and among academics. Indeed, the current sense of confusion may well exceed anything witnessed since the early 1930's. Obviously the questions of "how much does money matter?" and "in what way does money matter?" are central issues underlying many specific problems of policy making, forecasting, and business-cycle analysis that are currently up for reexamination.

The change in atmosphere has been a very recent phenomenon. Only two or three years ago, there was rather general agreement that a wide variety of factors could produce fluctuations in business activity. Monetary developments were but one item in the list and, in the minds of many, by no means the most important. Money was assumed to operate through its effects on financial interest rates and through changes in the degree of credit rationing impinging on certain types of borrowers operating in imperfect capital markets.

The view that "only money matters" or, perhaps more accurately, that "mainly money matters" was the province of an obscure sect with headquarters in Chicago. For the most part, economists regarded this group—when they regarded it at all—as a mildly amusing, not quite respectable collection of eccentrics. The number of serious attempts to grapple with the Friedman view on the role of money until recently has been remarkably small. A 1960 paper by John Culbertson,[1] some work by Kareken and Solow on Friedman's approach to measuring lags,[2] and the papers surrounding the controversy over the Friedman-Meiselman work[3] comprise a nearly exhaustive list of the pre-1968 literature. The fact is that the view held by Friedman and a few others on the predominant

[1] See his "Friedman on the Lag Effect of Monetary Policy", *Journal of Political Economy* (December 1960), pages 617-21. See also Friedman's reply, "The Lag Effect of Monetary Policy" in the October 1961 issue of the same *Journal* (pages 447-66) as well as Culbertson's rejoinder in the same issue (pages 467-77).

[2] John Kareken and Robert Solow, "Lags in Monetary Policy", in *Stabilization Policies* (Commission on Money and Credit, 1963), pages 14-96.

[3] Milton Friedman and David Meiselman, "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States", in *Stabilization Policies* (Commission on Money and Credit, 1963), pages 165-268. See also Donald Hester, "Keynes and the Quantity Theory: A Comment on the Friedman-Meiselman CMC Paper", and the Friedman-Meiselman reply in the *Review of Economics and Statistics* (November 1964). In addition, see Albert Ando and Franco Modigliani, "Velocity and the Investment Multiplier"; Michael dePrano and Thomas Mayer, "Autonomous Expenditures and Money"; and replies by Friedman and Meiselman plus rejoinders by Ando-Modigliani and dePrano-Mayer, all in the *American Economic Review* (September 1965), pages 693-792.

importance of money was just not given serious attention by most economists.

This whole situation has been changing of late with a rather startling abruptness. Indeed as far as the general public is concerned, much of the change in atmosphere has occurred within the last six to nine months. There can be no doubt that the principal explanation for this development has been the surprisingly exuberant behavior of the economy since the tax surcharge was enacted last June. Most forecasters who, like myself, have used the usual techniques of short-term projecting, hopefully with at least average skill, have consistently and fairly substantially underestimated the strength of the economy in the past nine months. Now of course these forecasting mistakes may not have been due to any overestimate of the potency of fiscal policy or an underestimate of the importance of the monetary growth rate. Many other explanations are possible. Nevertheless, it has been distinctly unsettling to see the projected slowdown recede further and further into the future, month after month and quarter after quarter. It is the sort of experience to make one reexamine one's "maintained hypotheses"—and perhaps such a reexamination is really in order.

The failure of conventional forecasting techniques in the wake of fiscal restraint would not, of course, necessarily send one running to the money supply for an explanation were there not a large body of research on the importance of money already waiting in the wings. This research needed only the right historical moment to bring it forth into the limelight. The post-surcharge experience has provided such a moment. Looking at the evidence in behalf of a dominant role for money presented in most of this research, however, it is not too difficult to understand why it achieved relatively little acceptance for the monetary view—on its own merits, so to speak, and without the psychological benefit of the post-surcharge trauma.

EVIDENCE FOR THE MONETARY POSITION

By far the largest mass of evidence consisted of the Friedman-Schwartz measurement and comparison of specific cycles in the monetary growth rate with reference cycles using the standard National Bureau techniques.[4] The consistency with which cycles in the monetary growth rate were found to lead reference cycles was so nearly perfect that it seemed scarcely possible that it could be due to chance alone. The existence of these timing leads was interpreted by Friedman and Schwartz to mean a dominant causal role for money, while their length and variability was taken as meaning a corresponding length and variability in the lags with which the money supply exerts its influence on business activity.

It is probably fair to say that relatively few not already in the fold were converted by these arguments. The main problem is that the evidential value of the monetary leads in trying to demonstrate a dominant causal role for money, as well as a long and variable lag in its timing, is gravely compromised by the possibility of a reverse influence of business on money. This point was made back in 1960 by Culbertson in the article mentioned earlier. At the time he wrote, little work had been done on the supply side of the money problem. Hence the existence of important reverse effects of business on money could really only be put forward as a plausible hypothesis. This situation was changed in 1965 with the publication of Phillip Cagan's book, *The Determinants and Effects of Changes in the Stock of Money*. While Cagan's book appears to be very much in the Friedman tradition, it seems to me that its results in fact tend to undercut that tradition. Cagan's work suggests rather clearly that the characteristic cyclical timing relationships between monetary rates of change and the business cycle are very importantly determined by the influence of business on money. The case is made even stronger if one takes explicit account—as Cagan does not—of the impact of the Federal Reserve's attempts at countercyclical policy. Federal Reserve behavior alone may be sufficient to explain the characteristic lead of cycles in the monetary growth rate ahead of business-cycle turning points during the postwar period without the need to posit any influence of money on business whatever. If Cagan's work is correct, then the massive evidence gathered by Friedman and Schwartz for leads in the turning points of monetary cycles seems distinctly questionable as evidence for a dominant causal role for money.

The second sort of evidence in behalf of the "mainly money matters" position, as of last June, was the so-called "reduced-form" equations turned up in the famous Friedman-Meiselman paper. As will be recalled, Friedman and Meiselman regressed first the money supply against consumption and then what they called "autonomous" spending against consumption. They regarded their results as "strikingly one-sided"[5] in support of the money

[4] Their major results are summarized in Milton Friedman and Anna Schwartz, "Money and Business Cycles", *Review of Economics and Statistics* (February 1963 Supplement), pages 32-64.

[5] Friedman and Meiselman, *op. cit.*, page 166.

multiplier over their version of the Keynesian multiplier.

Again, however, it seems unlikely that many outside the fold were converted by the Friedman-Meiselman evidence. As the mass of correlation coefficients computed by the various combatants began to pile up, it became increasingly obvious that the controversy would never be able to produce a clear and decisive verdict. Results turned out to depend very much on the definition of "autonomous" spending and on the years for which the computations were made. Using definitions of autonomous spending much more akin to those of the usual textbook versions of Keynes than the one adopted by Friedman and Meiselman, little difference between the money multiplier and the autonomous spending multiplier could be discerned. Moreover, interpretation of all the results was complicated by the extreme simplicity of the "models" chosen to be tested, as well as by the inability of correlation techniques to distinguish an influence of money on business from an influence of business on money. To me, at least, the whole thing was a washout, proving nothing and making the Friedman position seem not one jot more plausible than it had seemed before.

Thus those economists, journalists, and public officials who began to take a hard look at the evidence for the monetarist position in the wake of the apparent failure of the tax surcharge found a rather mixed bag. On the one hand, Friedman and his colleagues had established beyond question a very substantial gross association between the money supply and business activity. On the other hand, the monetarists had failed to convince the majority of their professional colleagues that their claims for the importance of money had been adequately demonstrated. The reasons for their failure lay mainly in relatively esoteric matters of statistical methodology and economic theory. Such problems have obviously made much less impression on the lay public than has the simple fact of the gross association between money and business itself.

THE ST. LOUIS EQUATION

Under these circumstances, a new study of the importance of the money supply, and its importance relative to fiscal policy, was certain to be welcome. The paper by Leonall Andersen and Jerry Jordan published last November[6] in the St. Louis Federal Reserve Bank's *Review* has understandably created a good deal of interest. Their approach consists of regressing current changes in gross national product (GNP) on current and lagged changes in the money supply and in fiscal variables. Certainly their procedure is very simple but not, for that reason, necessarily invalid. My own feeling is that, right or wrong, the St. Louis article is a distinctly worthwhile contribution to the literature on the importance of money. It deserves to be taken seriously and, by the same token, it deserves careful scrutiny. I propose to use the remainder of this paper to examine the claims made by Andersen and Jordan.

Table I

THE FISCAL MULTIPLIERS IN THE BOARD-MIT AND ST. LOUIS MODELS

Elapsed time	Board-MIT		St. Louis	
	Spending	Taxes	Spending	Taxes
After 1 quarter	2.0	1.1	0.4	0.2
After 2 quarters	2.5	2.2	0.9	0.2
After 4 quarters	3.4	3.2	0.1	0.2
After 12 quarters	3.2	4.7	0.1	0.2

Note: Figures for the Board-MIT model are estimates made from the simulation presented in Charts 8 and 9 on pages 28 and 29 of the January 1968 *Federal Reserve Bulletin*. The tax simulations in the Board-MIT model are actually in terms of percentage point changes in tax rates, but it is noted on page 23 of the *Bulletin* that the .02 percentage point change used for the simulations was equivalent to about $4 billion during the period for which the simulations were conducted.

The first thing I want to note about the St. Louis equation is that it portrays a world in several respects sharply at variance with the expectations of most of us.

1. The fiscal multipliers in the St. Louis world are virtually zero. The fiscal multipliers for spending and taxes taken directly from the St. Louis equation are shown in Table I. At no point do these multipliers rise above unity, and after four quarters they have returned essentially to zero. Multipliers taken from the recent Federal Reserve Board staff-Massachusetts Institute of Technology structural econometric model are shown in the same Table I. These multipliers, by contrast, correspond roughly to expectations, rising to over 3 after a year.

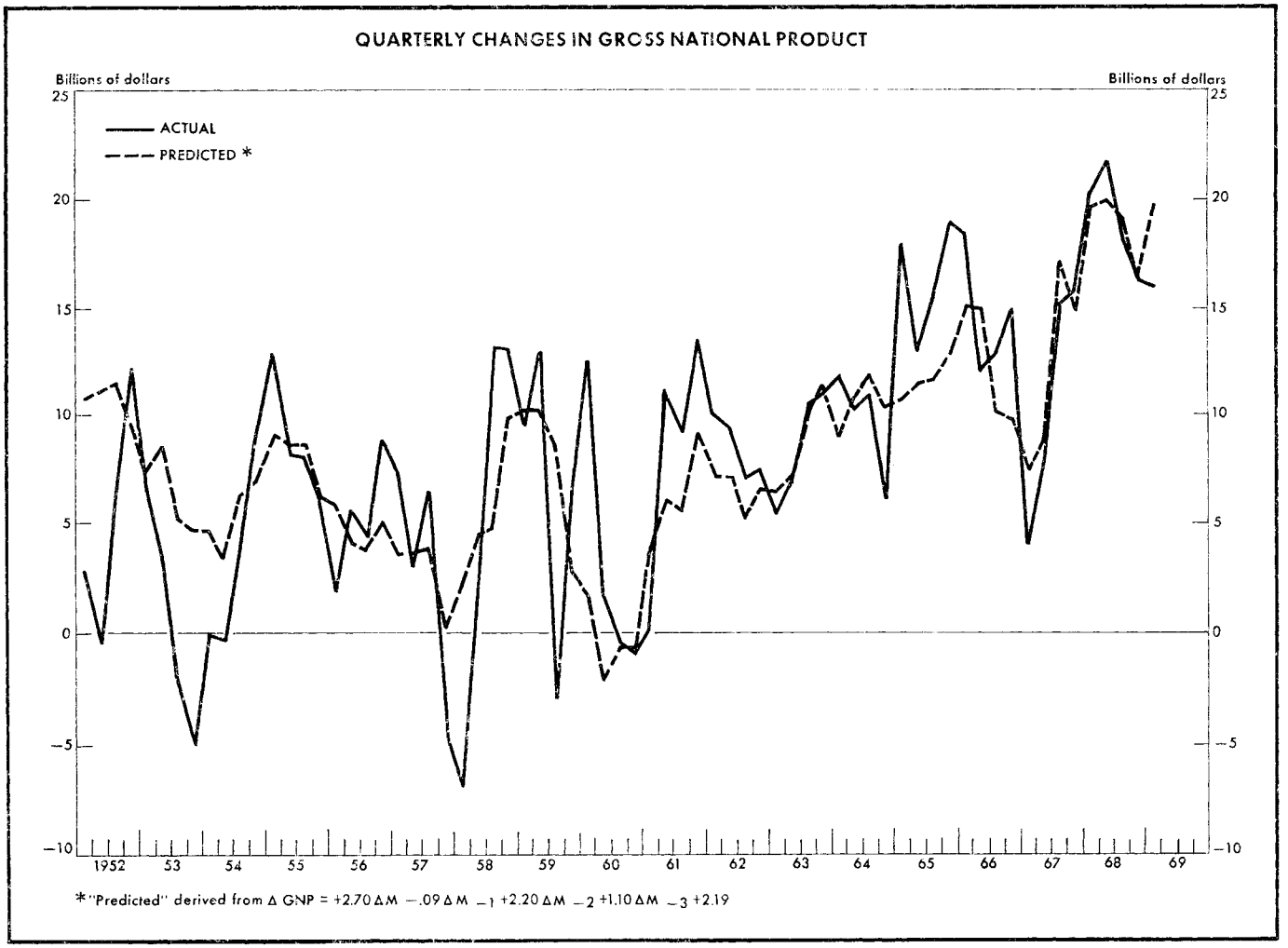
2. Current and lagged changes in M_1 (private holdings of demand deposits and currency) explain a remarkably high proportion of the variance of quarterly changes in GNP. For the 1952-68 period used by St. Louis, about 50 percent of the variance of changes in GNP is "explained" by changes in money. This leaves the remaining 50 percent to be accounted for by every other possible determinant of the course of business activity!

[6] "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization", Federal Reserve Bank of St. Louis *Review* (November 1968), pages 11-24.

Just how well money does is illustrated in the chart. The equation used here differs from the St. Louis equation only in omitting the fiscal variables and in having an unconstrained lag structure. When it is kept in mind that the chart shows *changes* in GNP, I think the closeness is visually reasonably impressive. The only prolonged period of really serious errors is from the beginning of 1952 to about mid-1954. On the other hand, the equation's accuracy since mid-1967 has been extremely high.

3. The size of the money multiplier is much higher than might have been expected. As Table II shows, a once-and-for-all increase in the money supply of $1 billion in quarter 1 will have raised the level of GNP by $6.6 billion by quarter 4, according to the St. Louis equation. This result can be compared with the money multiplier implicit in the Board-MIT model. The money supply is of course an endogenous variable in this model, and so really has no "multiplier" as such. However, the arithmetic multiplier can be computed by dividing the GNP multiplier of nonborrowed reserves by the money multiplier of nonborrowed reserves. (This procedure includes reverse effects of business on money, to be sure, but so does the St. Louis equation. More later on this.) After four quarters, the money multiplier in the Board-MIT model is only about 0.4. Even after twelve quarters, it is still only about 2.2, or only one third the size of the multiplier implicit in the St. Louis equation.

4. To me, the most surprising thing about the world of the St. Louis equation is not so much the force, but rather the speed with which money begins to act on the economy.



This can also be seen in the results presented in Table II. If the level of the money supply undergoes a $1 billion once-and-for-all increase in a given quarter, it will already raise GNP by $1.6 billion in that very same quarter. In the next quarter, the level of GNP will have risen to $3.5 billion above what it would otherwise have been. And, as noted, it will have risen to $6.6 billion higher in the fourth quarter. In the Board-MIT model, by contrast, a once-and-for-all increase in M_1 of $1 billion in a given quarter would have almost no effect whatever on GNP in that quarter, and only very little effect by one quarter later. Even after four quarters, the level of GNP is only about $400 million higher than it would otherwise have been.

I think it is clear from this summary that what is at stake in the case of the St. Louis equation is not merely a "shade of difference", but a strikingly contrasting view of the world—at least relative to what is normally taken as the orthodox view roughly replicated and confirmed both in methods and in result by the Board-MIT model. The validity and meaningfulness of the St. Louis equation is thus a question of some importance. There seem to be two basic issues that need to be examined: First, how good are the purely statistical properties of the sort of relationship presented by Andersen and Jordan? Second, how much of the relationship they find is due to a reverse influence of business on money, the problem that has plagued all previous attempts to buttress the so-called "strong monetarist position"?

Before turning to these questions, I should note that I have concentrated all my attention in what follows on the question of the importance of money. I will have virtually nothing to say on the seeming unimportance of the fiscal variables. This latter problem is of course also of great interest, but there has simply not been time to give adequate attention to both issues.

Table II

THE MONEY MULTIPLIER IN THE BOARD-MIT AND ST. LOUIS MODELS

Elapsed time	Board-MIT			St. Louis multiplier
	ΔM_1	Δ GNP	Multiplier	
	(1)	(2)	(3)	(4)
After 1 quarter	+ 2.5	+ 0.5	0.2	1.6
After 2 quarters	+ 3.5	+ 1.3	0.4	3.5
After 4 quarters	+ 4.3	+ 2.0	0.4	6.6
After 12 quarters	+ 5.0	+ 11.0	2.2	6.6

Note: Changes in M_1 and GNP were estimated from charts presented on page 27 of the January 1968 *Federal Reserve Bulletin*. These charts show results for the Board-MIT model in which the effects of a $1.0 billion increase in nonborrowed reserves are simulated. The implied "money multiplier" shown in column 3 is computed by dividing the change in GNP (column 2) by the change in money (column 1). Actually only effects for demand deposits are shown—currency effects are thus assumed to be comparatively small.

The money multiplier shows the change in the level of GNP after the time period specified associated with a once-and-for-all increase in the level of the money supply of $1.0 billion. Estimates of the money multiplier for the St. Louis equation are obtained simply by summing coefficients over the appropriate number of quarters.

OTHER ST. LOUIS-TYPE EQUATIONS

Table III presents a number of St. Louis-type equations covering different time periods and using different techniques for estimating the lag structure. The first line of figures contains the original St. Louis results for their 1952 to 1968-II period. The second line reproduces these results with two differences: (1) the fiscal variables were not included and (2) a second degree polynomial was used for the Almon lag rather than St. Louis' fourth degree. (This latter adjustment was made solely to accommodate programming limitations.) A comparison of these two equations reveals that neither omission of the fiscal variables nor reduction of the degree of the polynomial has any substantial effect on the results for the monetary variables.

Concentrating on this second set of equations in Table III using the second degree polynomial, the following observations seem pertinent. First, the coefficients for the two subperiods are quite clearly different, but they are not drastically different. The overall money multiplier after four quarters is 3.6 for the earlier period and 5.3 for the later period. Both are strikingly larger than the 0.4 one-year multiplier of the Board-MIT model. The St. Louis equation does pass the Chow test for the two subperiods at the 5 percent level.

Second, the explanatory power of the monetary variables is quite low in the first half of the period ($R^2 = .18$)[7] and quite high ($R^2 = .62$) in the second half of the period. What is the reason for this difference? One possible answer is a strong common time trend in changes in M_1 and in GNP present in the 1960's but not in the earlier period. Such a trend beginning around the early 1960's is readily visible in the chart referred to earlier. (The R^2 of time alone on changes in GNP is .38 in the later period, virtually zero for the earlier period and .36 for the entire 1952 to 1968-II period.)

Now of course the mere existence of a common time trend in the 1960's does not necessarily mean that the close relationship between money and GNP is spurious.

[7] R^2 is the square of the multiple correlation coefficient.

Table III

CHANGES IN GNP REGRESSED ON CURRENT AND LAGGED CHANGES IN M_1

Quarterly changes

Period	R^2 SE of est	Sum of coefficients	t	t-1	t-2	t-3
	The St. Louis equation† Almon lag with fourth degree polynomial					
1. 1952-68*	.56 4.2	6.6	1.6 (2.2)	1.9 (3.6)	1.8 (3.4)	1.3 (1.9)
	Equations using Almon lag with second degree polynomial‡					
2. 1952-68*	.48 4.6	5.6	1.6 (3.0)	1.7 (7.6)	1.4 (4.3)	0.9 (3.0)
3. 1952-60	.18 5.1	3.6	1.7 (1.7)	1.1 (2.6)	0.6 (1.1)	0.2 (0.5)
4. 1961-68*	.62 3.2	5.3	0.8 (1.6)	1.6 (6.4)	1.7 (5.4)	1.2 (4.5)
	Equations using unconstrained lag coefficients‡					
5. 1952-68*	.50 4.6	5.9	2.7 (3.3)	—0.1 (—0.1)	2.2 (2.0)	1.1 (1.3)
6. 1952-60	.18 5.3	3.7	1.9 (1.1)	0.6 (0.3)	1.2 (0.5)	— .05 (—)
7. 1961-68*	.68 3.0	5.7	2.0 (2.8)	—0.3 (—0.3)	2.6 (2.8)	1.4 (2.0)

Note: Values of "t" statistics are indicated in parentheses.
* Through the second quarter of 1968.
† Fiscal variables included but not shown.
‡ No fiscal variables included.

One could argue that we have had relatively steady rises in quarterly GNP increments because we have had relatively steady rises in quarterly money increments. Some equations including time as an explicit variable suggest that there may have been a reasonably strong association between GNP and current and lagged changes in M_1 during the 1960's even after time is allowed for. Nevertheless, the fact remains that the degree of association between GNP and current and lagged money supply would have looked very different to Andersen and Jordan had they done their work in 1961 instead of 1968. Given an R^2 as low as prevailed in the 1952-60 period, it may be doubted that they would have felt it worthwhile to pursue the matter further.

Finally, I would like to point out the bottom three equations shown on Table III. These are simply unconstrained multiple regressions of changes in GNP on current and lagged changes in M_1. Comparison with the other lines in the table shows the extent to which imposition of Almon lags changes the results. The lag pattern present in the unconstrained equations is, of course, infected with multi-collinearity. Nevertheless, it is interesting to note that the one-period lag coefficient for the entire 1952-68 period, which is the *largest* for the Almon lags, actually becomes the *lowest* in the unconstrained equation.

PROBLEM OF TWO-WAY CAUSATION

I now want to turn to the problem of two-way causation. That there is a high "gross" association between money and business, however measured, has long been apparent from the work of Friedman-Schwartz and Friedman-Meiselman, as noted earlier. The St. Louis results generally confirm this finding—at least for the 1960's. As I noted, however, the possibility of important influences running from business to money seem to weaken substantially the evidential value of the work done by Friedman and his collaborators in trying to establish a dominant *causal* role for money. The question now is, does the St. Louis study suffer from the same fatal defect?

In a critique of the St. Louis work published in the April issue of the St. Louis Bank's *Review,* Frank deLeeuw, one of the principal architects of the Board-MIT model, and John Kalchbrenner take note of the two-way causation problem.[8] They note that the "reduced-form" approach used by St. Louis requires that the variables on the right-hand side be truly exogenous. If they are not, biased coefficient estimates may result. Conceivably, such bias could account for the surprisingly powerful and quick-acting effects of money seemingly indicated by the coefficients of the St. Louis equation. DeLeeuw and Kalchbrenner believe that Andersen and Jordan recognized the vulnerability of the money supply as an exogenous variable and that it was for this reason that they constructed an alternative version of their equation. In this alternative version, current and lagged changes in M_1 are replaced with current and lagged changes in the monetary base *(adjusted for changes in reserve requirements).*[9] This alternative version of the St. Louis equation is reproduced on the top line of Table IV. The explanatory power is similar to that of the money supply equation. The size of the multiplier, however, is naturally much larger since it represents the combined effect of the base-to-money multiplier and the money-to-GNP multiplier.

[8] Frank deLeeuw and John Kalchbrenner, "Comment", St. Louis Reserve Bank *Review* (April 1969), pages 6-11.

[9] The monetary base consists of total member bank reserves plus currency in circulation outside banks.

The second line of figures on Table IV contains a re-estimate of the parameters of line 1, this time with no fiscal variables included and with the second degree polynomial rather than the St. Louis fourth degree polynomial.

The problem with the St. Louis equations using the monetary base is that, while the latter may be more exogenous than the money supply, its own "exogeneity" is still far from beyond question. In other words, a good case can be made for the view that the two-way causation problem is still present in the monetary base. First, the monetary base includes borrowed reserves. While the Federal Reserve sets the conditions for borrowing and the discount rate, actual borrowings take place at the initiative of the member banks themselves. Certainly current business conditions, interest rates, and the state of loan demand influence the demand for borrowed reserves. Second, the base includes currency. The volume of currency the public wishes to hold is an endogenous variable. The banks supply the public with currency on demand, and, during the period of the 1950's and 1960's, the Federal Reserve has more or less automatically replenished the reserves lost by the banking system through currency drains. Hence a strong case can also be made that the currency component of the base is endogenous too. In a rejoinder to deLeeuw and Kalchbrenner, Andersen and Jordan dispute the contention that borrowed reserves and currency should be subtracted from the base to obtain a more "exogenous" variable.[10] While I remain unconvinced by their rejoinder, I will not say anything more about this "exogeneity" issue since I want to pursue a somewhat different tack.[11]

The remaining equations in Table IV show the results of stripping away, successively, borrowed reserves and currency from the total monetary base. As can be seen from the table, R^2 falls and the standard error rises noticeably when the sole independent variables are the current and lagged *nonborrowed* monetary base. (Compare lines 2 and 3.) Furthermore, breaking the entire period into the two subperiods used earlier, we find no significant relationship whatever between the nonborrowed monetary base and GNP in the earlier period ended in 1960. Indeed, the overall multiplier is actually negative.

Table IV

CHANGES IN GNP REGRESSED ON VARIOUS MEASURES OF CURRENT AND LAGGED CHANGES IN THE MONETARY BASE OR NONBORROWED RESERVES

Quarterly changes

Period	R^2 / SE of est	Sum of coefficients	t	t-1	t-2	t-3
	The St. Louis equation—total monetary base Almon lag with fourth degree polynomial†					
1. 1952-68*	.53 / 4.4	16.0	1.0 (0.5)	5.5 (3.4)	6.5 (4.1)	3.1 (1.5)
	Total monetary base Almon lag with second degree polynomial‡					
2. 1952-68*	.45 / 4.8	14.8	3.5 (1.8)	4.4 (7.1)	4.1 (3.5)	2.7 (2.5)
	Nonborrowed monetary base Almon lag with second degree polynomial‡					
3. 1952-68*	.32 / 5.3	10.8	−0.1 (−0.1)	3.2 (5.2)	4.4 (4.7)	3.3 (4.0)
4. 1952-60	.07 / 5.5	— 3.4	−4.1 (−1.6)	−1.0 (−0.6)	0.7 (0.4)	1.1 (0.8)
5. 1960-68*	.33 / 4.2	9.2	−1.0 (−0.5)	2.8 (3.0)	4.2 (3.5)	3.2 (3.3)
	DeLeeuw-Kalchbrenner—nonborrowed monetary base Almon lag with fourth degree polynomial†					
6. 1952-68*	.45 / 4.5	10.4	n.a.	n.a.	n.a.	n.a.
	DeLeeuw-Kalchbrenner—nonborrowed reserves Almon lag with fourth degree polynomial†					
7. 1952-68*	.42 / 4.7	2.4	n.a.	n.a.	n.a.	n.a.

Note: Values of "t" statistics are indicated in parentheses.
* Through the second quarter of 1968.
† Fiscal variables included but not shown.
‡ No fiscal variables included.

[10] St. Louis Reserve Bank *Review* (April 1969), pages 12-16.

[11] Andersen and Jordan find a negative correlation between changes in borrowed reserves and changes in nonborrowed reserves (*op. cit.*, page 15). From this they conclude that the Federal Reserve System automatically offsets the effects on total reserves of endogenous changes in borrowed reserves and that total reserves, rather than the nonborrowed component, should therefore be treated as exogenous. However, a negative correlation would also be found if the System used either nonborrowed reserves or borrowed reserves (or some other related money market variable such as free reserves or the Federal funds rate) as an operational target. Thus a deliberate increase in nonborrowed reserves would tend to make banks pay off borrowings. Similarly, a deliberate increase in the level of borrowed reserves would have to be engineered by a subtraction of nonborrowed reserves. In neither of these cases would total reserves or the total monetary base be the appropriate exogenous variable. Similarly, Andersen and Jordan conclude that automatic System accommodation of currency drains implies a nonborrowed reserves target; that the System has not in fact followed a nonborrowed reserves target; and, therefore, that currency cannot be endogenous (*op. cit.*, page 13). This chain of reasoning is invalid, if only because many targets other than a nonborrowed reserve target involve automatic System accommodation of currency drains, including free reserve and other money market targets.

The first deLeeuw and Kalchbrenner equation shown in Table IV also uses the nonborrowed monetary base, but differs from mine in that it includes fiscal variables. The inclusion of the latter accounts for an R^2 higher than the one in my equation. Otherwise, the results are similar to mine. (Compare lines 3 and 6.)

The second deLeeuw-Kalchbrenner equation reported in Table IV eliminates both borrowed reserves and currency from the monetary base, thus leaving nonborrowed member bank reserves. As these authors note, the effect of leaving out currency is to reduce the multiplier drastically. Indeed, the multiplier of 2.4 obtained for this equation is not very different from the 2.0 multiplier of nonborrowed reserves onto GNP obtained from the Board-MIT model (see Table II). As a result, deLeeuw and Kalchbrenner conclude that the coefficients of the St. Louis equation are in fact heavily distorted by simultaneous equations bias. Once this is removed, they argue, the results closely resemble the sort of world most of us have always believed in.

I certainly agree with deLeeuw and Kalchbrenner that, while the total monetary base is statistically superior to the money supply as an exogenous variable, it probably is not exogenous enough. Moreover, I agree that the similarity of the results for nonborrowed reserves to the Board-MIT structural model is interesting. Nevertheless, I can't help feeling that this is not quite the end of the story. Even if one were wholly satisfied that nonborrowed member bank reserves are the proper exogenous monetary variable, it must nevertheless be kept in mind that what is at stake is not a member-bank-nonborrowed-reserves theory of the economy, but rather a money supply theory of the economy. There is a substantial gap between member bank nonborrowed reserves and the money supply. The problem with the computations presented in Table IV is that they short-circuit a two-stage chain of relationships consisting of the relationship between the nonborrowed base or nonborrowed reserves and money, on the one hand, and the relationship between money and GNP, on the other. Let us suppose that the money supply *does* exert a powerful and quick-acting influence on GNP. Let us suppose also that the influence of GNP on the money supply is minimal. One might nevertheless get a rather weak and slow-acting influence of the nonborrowed base or of nonborrowed reserves on GNP simply because the relationship between the base, or reserves, and money was relatively weak. Moreover, the lag between the base, or reserves, and GNP would represent the sum of the lags in the two links of the chain. In other words, it is possible that, even though the regressions proposed by deLeeuw and Kalchbrenner and myself may be more statistically "pure" in terms of the "reduced-form" rationale of the St. Louis equations, these regressions may nevertheless fail to do justice to the real power, stability, and promptness of the causal influence of money on business.

This possibility puts us in a new dilemma. On the one hand, we can't accept the St. Louis equations at face value because neither money nor the total reserve base may be sufficiently exogenous. On the other hand, the equations using the nonborrowed base or reserves may understate the causal influence of money for the reasons just given. To separate out the influence of money on business from the influence of business on money, one would seem to need a complete structural model. But this is precisely what the "reduced-form" approach, originated by Friedman and Meiselman and carried on by Andersen and Jordan, seeks to avoid!

REDUCED-FORM EQUATIONS FOR MONEY

One possible way out of this mess is to examine reduced-form equations for money itself. If the relationship between the nonborrowed monetary base and money is not very tight, this will explain some of the relative looseness of the relationship between the nonborrowed base and GNP. Moreover, by adding current and lagged GNP to the instrument variables of policy, it may be pos-

Table V

CHANGES IN M_1 REGRESSED ON CURRENT AND LAGGED CHANGES IN THE NONBORROWED MONETARY BASE ($\triangle$ B)

Quarterly changes

Period	R^2	$\triangle$ B	$\triangle$ B_{-1}	$\triangle$ B_{-2}	$\triangle$ B_{-3}
	Unconstrained lag structure				
1952-68*	.54	.67 (2.6)	.80 (2.8)	.55 (1.9)	.27 (1.0)
1952-60	.37	.23 (0.6)	.85 (2.3)	.56 (1.5)	.90 (2.6)
1961-68*	.58	1.37 (3.4)	.64 (1.4)	.83 (1.8)	— .43 (—1.0)
	Almon lag—second degree polynomial				
1952-68*	.53	.73 (3.6)	.67 (8.4)	.56 (4.6)	.33 (3.1)
1952-60	.34	.29 (0.9)	.74 (3.8)	.84 (4.1)	.59 (3.7)
1961-68*	.54	1.31 (4.4)	.76 (5.1)	.36 (1.9)	.11 (0.7)

Note: Values of "t" statistics are indicated in parentheses.
* Through the second quarter of 1968.

sible to get some qualitative idea of how much of the gross relationship between money and GNP reflects a direct causal influence of money on GNP and how much of it reflects a reverse influence of GNP on money.

Some reduced-form equations for quarterly changes in M_1 using current and lagged values of the nonborrowed monetary base are presented in Table V. Current and lagged changes in the nonborrowed monetary base (which, it should be recalled, has been adjusted for changes in reserve requirements) explain about 54 percent of the variance of quarterly changes in M_1. What is more to the point for present purposes is that the nonborrowed base *fails* to explain fully 46 percent of the variance. Hence there is considerable looseness in the relationship between the nonborrowed base and M_1. Again, such a looseness is especially evident in the first half of the period. Moreover, the coefficients in Table V suggest that the influence of the base on M_1 does operate with a distributed lag that would contribute to the total lag of the influence of the base on GNP. Thus the results of Table V lend some support to the contention that the regressions of GNP on the nonborrowed monetary base *under*state (implicitly) the closeness of the association between money and GNP and the size of the money multiplier operating on GNP within any given period of elapsed time.[12]

If something in the neighborhood of one half the variance of quarterly changes in M_1 is left unexplained by the nonborrowed base, what accounts for the *remainder* of this variance? One factor would be the other instrument variables of policy, i.e., changes in the discount rate and in the Regulation Q ceiling. In addition, there could be various factors operating from within the banking sector of the economy, such as shifts in bank demand schedules for excess and borrowed reserves. Finally, there would be all the remaining factors summed up in the expression "the influence of business on money". Only part of the influence of business on money would be represented as an influence of, specifically, *GNP* on money. Other parts would perhaps be represented by movements in the composition of GNP, interest rates, and the various categories of credit demands.

How large a part of the unexplained variance does reflect an influence of GNP, as such, on money is the question that Table VI attempts to answer. The first equation presented for each time period covered in the table attempts to show the influence of the nonborrowed base and other policy instrument variables on changes in M_1. Actually, the only difference between these equations and those in Table V is the addition of changes in the discount rate—which does not, in fact, make much difference. As noted earlier, changes in reserve requirements are accounted for in the measure of the base. The remaining instrument variable of policy, changes in the Q ceiling, is simply not included. Some experiments on time periods when no change in the Q ceiling occurred showed essentially the same results. Hence it seemed better to omit it and save the degrees of freedom.

On balance, the results presented in Table VI do not seem to show any very strong feedback from GNP to money—which, it should be emphasized again is *not* the same thing as a feedback from "business" to money. To be sure, current and lagged changes in GNP "explain" about 32 percent of the variance of changes in M_1 over the whole 1952 to 1968-II period and a bit over 20 percent in each of the two subperiods. However, most of this impact appears to occur in the current quarter, when the direction of causation is of course ambiguous. The lagged changes in GNP contribute almost nothing.

Similarly, the addition of current and lagged GNP variables contributes almost nothing to explaining changes in M_1, once current and lagged monetary "policy" variables have already been included. For the period as a whole, the adjusted R^2 of .53 for the policy variables rises only .05 to .58 when current and lagged changes in GNP are added. In contrast, the addition of the *policy* variables to the GNP variables raises R^2 substantially, from .27 to .58. As to the subperiods, GNP does make a noticeable contribution in the earlier period. In the 1960's, however, current and lagged GNP variables give an adjusted R^2 of only .08 by themselves. When the policy variables are added, this rises to fully .67. This is an interesting result in view of the especially close relationship between changes in GNP and current and lagged changes in M_1 during the 1960's, as noted earlier.

The impression that the influence of "policy" variables on the money supply dominates any feedback from GNP to the money supply has to be modified, but only somewhat, if nonborrowed member bank reserves are used in place of the nonborrowed monetary base. The reason is, of course, that nonborrowed reserves make no allowance for the currency component of the money supply and therefore explain less of the variance of changes in M_1

[12] Essentially the same conclusions apply if member bank nonborrowed reserves are used instead of the nonborrowed reserve base. However, R^2's are of course lower since nonborrowed reserves make no attempt to explain, or to allow for, changes in the currency component of M_1. Using an unconstrained lag structure, nonborrowed reserves gives an R^2 of .34 for the full period with a total multiplier of 3.2. For the 1952-60 subperiod, the R^2 is .30, while it is .39 for the 1961 to 1968-II subperiod.

Table VI

CHANGES IN M_1 REGRESSED ON CURRENT AND LAGGED CHANGES IN GNP, THE NONBORROWED MONETARY BASE, AND THE DISCOUNT RATE

Quarterly changes

Period	△ GNP	△ GNP-1	△ GNP-2	△ GNP-3	△ B	△ B_{-1}	△ B_{-2}	△ B_{-3}	△ R_d	R^2	$\overline{R^2}$†
1952-68*					.78 (3.0)	.85 (3.0)	.47 (1.6)	.17 (0.6)	.73 (2.1)	.57	.53
	.08 (3.9)	.01 (0.3)	— (—)	— (—)						.32	.27
	.03 (1.7)	.01 (0.3)	— (—)	— .04 (−2.3)	.95 (3.7)	.79 (2.8)	.38 (1.4)	.02 (0.1)	.56 (1.4)	.64	.58
1952-60					.46 (1.1)	.93 (2.5)	.61 (1.6)	.88 (2.6)	.49 (1.1)	.39	.29
	.05 (1.9)	— .01 (−0.4)	.01 (0.2)	— .04 (−1.7)						.23	.13
	.05 (2.2)	.01 (0.5)	.03 (1.1)	— .02 (−0.9)	.70 (1.7)	.91 (2.5)	.64 (1.7)	.73 (2.3)	— .12 (−0.2)	.55	.39
1961-68*					1.39 (3.8)	.86 (2.0)	.46 (1.0)	— .59 (−1.5)	1.54 (2.5)	.66	.59
	.09 (2.0)	.01 (0.3)	— .03 (−0.6)	.02 (0.4)						.21	.08
	.06 (1.7)	.03 (0.9)	— .05 (−1.4)	— .03 (−1.1)	1.61 (4.3)	.90 (1.8)	.21 (0.5)	— .64 (−1.6)	.86 (1.3)	.77	.67

Note: Values of "t" statistics are indicated in parentheses.
* Through the second quarter of 1968.
† Adjusted R^2.

than does the nonborrowed base. For the entire 1952 to 1968-II period, changes in nonborrowed member bank reserves (adjusted for reserve requirements) and in the discount rate have an adjusted R^2 with respect to changes in M_1 of .39. Addition of current and lagged changes in GNP raises this to .50. For the 1952-60 subperiod, the "policy" variables, so defined, give an adjusted R^2 of .20 alone, with R^2 rising to .21 when the GNP variables are added. For the 1961 to 1968-II subperiod, the "policy" variables give an adjusted R^2 of .38, which rises to .50 when GNP is included. While these results using nonborrowed reserves are less clearly one-sided than those using the nonborrowed monetary base, the conclusion that the feedback from changes in GNP to changes in M_1 may be relatively modest still seems warranted.

SUMMARY OF MAJOR STATISTICAL ISSUES

At this point a brief general summary of the major statistical issues for and against the St. Louis equation may be useful. (1) The equation shows very little explanatory power when fitted to the 1952-60 data. It seems to fit the data well only in the 1960's. Coincidentally or not, there was a significant trend in the first differences of money and GNP in the 1960's that was not present in the 1950's. In rejoinder, St. Louis might note that the period 1952-60 happens to be about the worst possible subperiod from the entire 1952 to 1968-II period. The R^2 for this subperiod, as noted earlier, is .18. For the still shorter subperiods, 1952-57 and 1955-60, it is about .32 in each case. Personally, this rejoinder does not seem very impressive to me. Consequently, I would regard the poor performance of the St. Louis equation in the 1952-60 subperiod as a distinct embarrassment.

(2) In the St. Louis equation's favor is the fact that the coefficients are reasonably stable over time, even though the two halves of the 1952-68 period show such different R^2's.

(3) If the nonborrowed monetary base or nonborrowed member bank reserves are used as the exogenous variable, rather than the money supply or the total monetary base, explanatory power drops rather substantially. So do the sizes of the multipliers. Indeed, there is no significant relationship at all between the nonborrowed base, current and lagged, and GNP in the 1952-60 subperiod. In defense of the St. Louis equation, however, one may argue that the total base is in fact a more appropriate "exogenous" variable than the nonborrowed base. Again, I myself am not at all satisfied with the St. Louis rejoinder on this point cited earlier. Nevertheless, I freely

confess that the problem of identifying a suitable exogenous monetary variable does not seem to have an entirely obvious solution.

(4) I would prefer a somewhat different defense of the St. Louis equation. This would be along the lines that the relatively poor relationship between the nonborrowed base (or reserves) and GNP does not deal directly with the question of the relationship between money itself and GNP. To deal with this question, it is worthwhile to attempt to determine how much of the relationship between changes in money and changes in GNP is a feedback relationship from GNP to money.

(5) The available evidence suggests that current and lagged changes in the nonborrowed base (or nonborrowed reserves) and other monetary policy variables leave a substantial amount of the variance in monetary changes unexplained. This therefore leaves a large potential role for all the influences wrapped up under the general rubric of "business conditions".

(6) The specific variable GNP, however, seems to contribute rather little extra to explaining the variance in monetary changes beyond what is explained by the policy variables. Hence, only a relatively modest part of the gross relationship between money and GNP exhibited in the St. Louis equation may reflect a feedback effect from GNP to money. Much of the powerful influence of "business" on money found by Cagan must be reflected by variables other than GNP (such as interest rates)—or perhaps the cyclical behavior of the monetary growth rate is simply a very different sort of variable than quarterly dollar changes in M_1.

On balance it would seem fair to say that the St. Louis equation has not been devastated by the critical scrutiny to which it has been subjected. On the other hand, I think it is equally obvious that some distinctly troublesome questions exist regarding the equation. The equation's merits do not seem to me sufficient to compel by themselves our acceptance of the world it portrays. This being the case, it seems appropriate in closing to put aside regression results and consider briefly some of the underlying economic issues.

TRANSMISSION MECHANISM

The St. Louis equation says that a $1 billion increase in the money supply this quarter will raise GNP in this same quarter by $1.6 billion and that, by the next quarter, money will have raised GNP by $3.5 billion. This is somewhat over half its ultimate influence. If the money supply were increased by means of Government handouts of newly printed dollar bills, this sort of quick, sharp reaction would certainly seem reasonable. The actual process of money creation is of course quite different, however. It works primarily through central bank open market operations and through asset purchases by commercial banks. It involves no direct effects on private income or wealth of any great magnitude.

Most people now seem to agree that monetary impulses must work their effects on GNP primarily through a chain of substitution relationships. This chain most often begins when the Trading Desk at the New York Reserve Bank makes a bid over the phone to a group of Government securities dealers who are persuaded by the terms of the offer to exchange part of their portfolio of Governments for demand deposits. Relative interest rates change and portfolio balance is disturbed. Thus further substitutions are made. Deposits are exchanged for private securities, and the rates on these securities are bid down. Ultimately, wealth holders must be persuaded that they should substitute into physical assets (whether producers' goods or consumers' durables). It is at this stage that GNP begins to be affected.

The crucial point is that, if there are no important income or wealth effects stemming from the process of money creation, then this final substitution into goods can only take place as a result of the shifts in relative interest rates that are set in motion by the monetary process. If wealth holders' net worth is unchanged, and if their income is unchanged, they will be induced to try to shift into more extensive holdings of real assets only if their demand for such assets is sensitive to the changes in relative yields. If there are no income and wealth effects whatever, the impact of monetary changes on the real economy can be no swifter or more powerful than is permitted by the interest-rate responsiveness of the demand for real capital.

As far as I can tell, incidentally, these conclusions depend in no way on the length of the chain of transactions between the original money-creating transaction and the first transaction involving nonfinancial assets. Some argue that the initial money-creating transaction may lead immediately to an increased demand for goods and that, in such cases, the interest rate elasticity of the demand for goods is irrelevant. This seems quite wrong to me. Suppose an individual is induced to exchange with the Federal Reserve some of his Government securities for deposits because the Fed's bid in the market makes such an exchange attractive to him. At this point in time, his income and wealth are unchanged, but the rate on Governments is lower. If his equilibrium portfolio composition now involves, say, fewer Governments and more of both cash and goods, it can only be because his desired holdings of both cash and of goods are sensitive to the changed yield

on Governments. Given an unchanged utility function, there is simply no other possible explanation.

To the extent that the monetary process depends upon portfolio composition effects induced by changes in relative interest rates, the monetary impulses in the St. Louis equation seem to me to influence GNP with an implausible rapidity. We are, after all, not wholly devoid of information on the response of business fixed investment, inventories, and consumer durables to changes in interest rates. Indeed, we have a large body of econometric and interview-type studies accumulated over the years on these matters. Certainly these studies are open to a variety of interpretations, and they are by no means unanimous in their findings. Nevertheless, I think there can be little question that their tenor is overwhelmingly against the sort of large short-period multipliers found in the St. Louis equation. The Board-MIT model incorporates a fairly representative sample of such econometric research, and its multipliers are much closer to what this research had in the past led us to expect.

On the other hand, it is possible that the conventional studies of the interest-elasticity of demand of the different categories of capital goods, as well as the traditional interview approach to this subject, are leaving out major elements of the transmission mechanism. The omission of these elements may explain the divergence of the St. Louis world from the world seemingly implied by the more traditional sort of research. I can think of at least three possible factors that may not be adequately accounted for in the more traditional studies.

First, the money creation process itself—and the subsequent shifting of financial portfolios—does involve bidding up the prices of a variety of financial assets, Government and private. Obviously a rise in the market price of outstanding private financial instruments has no effect on real private wealth. However, there may be a sort of "pseudo-wealth", or "distribution" effect stemming from such price rises. This could occur if private financial assets were valued by their holders at market value while the issuers valued their liabilities at maturity value or at some conventional par. How important such distributional effects may be we do not know. Certainly I would not expect that the effects of rising market prices for debt instruments related to the monetary expansion process would be of much significance. For one thing, holders of these instruments often do not value their holdings at market prices. To this extent, net worth positions as perceived by their owners would not be changed by changing market prices. When one considers rises in the price of equities, however, the possibility of a significant secondary wealth effect on the demand for goods and services seems much more real.

A second possible source of transmission from monetary changes to the real sector that may not have been given sufficient attention in the traditional empirical research is availability effects. We know that the capital market is structured so that some potential borrowers simply cannot obtain all the funds they want by raising their bid in the market. To the extent that a money supply increase is associated with a direct increase in the funds made available to these borrowers, it could have a direct, swift-acting, and powerful effect on real spending. That there exists availability effects of this kind is beyond question; that they are important enough to account for the very high short-run multipliers in the St. Louis equation is less clear.

A third possible deficiency of the conventional research may be its treatment, or lack of treatment, of the implicit rates of return on real capital. Friedman and others have argued for years that existing research on the importance of interest rates in the demand for capital goods was wholly inadequate because it failed to include own-rates of return on real capital, including rates of return on consumer durable goods. It is of course possible that a more adequate treatment of implicit real rates would turn up a much sharper and more rapid response to interest rates than has been found in past studies. At the moment, however, this is totally unexplored territory.

CONCLUDING COMMENT

In conclusion, I can summarize my overall reaction to the St. Louis equation about as follows. Andersen and Jordan have produced a monetarist equation that holds up rather better than I would have thought likely. In particular, it does not seem easy to dispose of the association between changes in money and changes in GNP by showing that it is primarily or largely a matter of "reverse causation". On the other hand, the reduced-form approach they use, which at first looks so seductively easy, turns out on closer inspection to be itself fraught with difficulties. In this particular case, it leads to an equation that produces a much quicker monetary response than seems consistent with a large part of existing research on the nature of the monetary transmission mechanism. At the moment, I find it very difficult to believe in the St. Louis equation: I just don't quite see how things could work that way. On the other hand, I am ready to concede at least the possibility that proper allowance for various secondary wealth effects, credit availability effects, and a broader treatment of interest rates *might,* in principle, be able to make the St. Louis world seem plausible.

I think the onus is now clearly on the monetarists to

spell out in detail precisely how they think the transmission process works. Moreover, this description must be translated into an econometric model with a reasonable degree of structural detail. Certainly the rest of us would like to see just exactly how such a model would differ from the Board-MIT model, for example. We need to see precisely how money is supposed to produce the results it appears to produce in the Andersen-Jordan equation. I suspect that only after such a project is carried out, and carried out successfully, will most economists really be prepared to believe that money matters as much and as fast as it seems to in St. Louis.