# FEDERAL RESERVE BANK OF NEW YORK

# MONTHLY REVIEW

**DECEMBER 1971**

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**Volume 53** **No. 12**

# The Business Situation

The progress of the economic recovery from last year's recession continues to be mixed. A year after the cyclical trough, tentatively placed in November 1970, production and employment remain sluggish by comparison with the gains experienced in earlier recovery periods. Indeed, the unemployment rate again inched up to 6.0 percent in November, as a rise in employment was swamped by a large increase in the civilian labor force. There have been some indications in recent months, however, that the momentum of the recovery may be quickening. The level of gross national product (GNP) in the third quarter has been revised upward by $1.8 billion from the preliminary estimate.[1] Retail sales rose strongly over recent months. Moreover, these gains were widely based and not confined to automotive demand, which had risen markedly in part as a result of the proposed elimination of the automobile excise tax. After allowance for the rundown of inventory stocks accumulated in anticipation of a midsummer steel strike, manufacturers' demand for inventories appears to have strengthened. Residential construction activity remains high and, according to recent surveys, plant and equipment spending is slated to accelerate somewhat over this year's lethargic pace.

The impact of the ninety-day price freeze, which ended on November 13, is most clearly apparent in the data on wholesale prices. Indeed, wholesale industrial prices actually declined slightly over the three months that ended in November. The response of consumer prices was less dramatic, although technical factors complicate an assessment of the precise impact of the freeze on consumer prices. Looking to the future, price developments will depend in part on the manner in which the wage and price norms that were announced in November are applied. The newly established Pay Board and Price Commission have announced goals of holding overall increases in wages and benefits to 5.5 percent and in prices to 2.5 percent annually. The achievement of these goals in 1972 would represent significant progress in the fight against inflation.

## INDUSTRIAL PRODUCTION, ORDERS, AND INVENTORIES

The Federal Reserve Board's index of industrial production inched up a scant 0.2 percent in October on a seasonally adjusted basis. The increase in the overall index was held down by a sharp drop in the output of coal that resulted from the coal miners' strike. Indeed, excluding the impact of that strike, the rise in industrial output was relatively strong, as gains in production in other industries were broadly based. Output of steel, copper, industrial and commercial equipment, and consumer goods increased. On the other hand, output of defense equipment and some nondurable materials declined. By October, total industrial production had risen 3.6 percent above the November 1970 low but was still 0.8 percent below the 1971 high reached in June and 5.0 percent below the record peak attained in September 1969.

The flow of new orders received by durable goods manufacturers rose modestly in October on a seasonally adjusted basis. In fact, the series has been essentially flat all year. Although, in the past, movements in new orders have often foreshadowed changes in economic activity, recent developments may have affected the usefulness of this series as a forecasting tool. For example, confronted with the price freeze and the uncertainties surrounding Phase Two policies which were being formulated during

[1] The revised third-quarter estimate indicates that GNP increased by $17.7 billion to a seasonally adjusted annual rate of $1,060.8 billion. The rate of increase in the implicit GNP price deflator was revised downward slightly to an annual rate of 3.0 percent. The revised estimates indicate greater growth in real GNP—3.9 percent rather than 2.8 percent as originally reported. Among the major contributors to the upward revision in current-dollar GNP were residential construction and net exports. On the other hand, the initially reported small rise in business inventories was revised down by $0.5 billion to a $1.1 billion increase from the second quarter. The preliminary estimates of corporate profits, released along with the GNP revisions, reveal that after-tax corporate profits slipped $0.2 billion during the third quarter to $45.8 billion at a seasonally adjusted annual rate.

October, buyers and sellers may have been reluctant to make firm commitments. Nevertheless, new orders in the critical producers' capital goods sector rose in October to a record $6.9 billion, according to preliminary figures.

Recent movements in manufacturers' inventories have been dominated by the rundown in steel stocks built up by users in anticipation of a midsummer steel strike. Thus, manufacturers' inventories of materials and supplies—measured on a seasonally adjusted book-value basis—declined by nearly $0.5 billion between August and October, with much of this decline reflecting the liquidation of excess steel stocks. Apart from materials and supplies, however, inventory demand of manufacturers has strengthened. These firms' inventories of finished goods and goods in process increased by $1.0 billion between August and October. According to the results of a recent Government survey, moreover, manufacturers plan to expand their inventories further over the balance of the year. Increased inventory accumulation could well augment stronger final demand in spurring economic activity in coming months. This would be a major propellant for faster economic growth, since the sluggishness of inventory spending has been one of the most important factors in the slower than usual pace of the recovery.

The strengthening in demand for inventories appears to have extended to wholesale and retail trade establishments as well. The book value of wholesale and retail trade inventories rose by a substantial $0.6 billion in September (the latest month for which data are available). During the third quarter, total trade inventories increased at a seasonally adjusted rate of $1.9 billion, up about $0.4 billion from the previous quarter. At the same time, inventories at retail automotive outlets declined slightly. For the most part the accumulations were about in line with sales, and inventory-sales ratios remained at comfortable levels.

## PLANNED INVESTMENT SPENDING

According to several surveys taken after President Nixon outlined the new economic program on August 15, businesses plan to step up their fixed investment outlays in 1972. In a survey taken jointly by the Department of Commerce and the Securities and Exchange Commission in October and November, plant and equipment expenditures during the first half of 1972 were projected to rise 9.1 percent above what they had been in the comparable period of 1971. This estimated increase is consistent with the results of private surveys covering the entire year. The McGraw-Hill survey reported a 7 percent planned rise in plant and equipment expenditures during the upcoming year, slightly exceeding the 5 percent increase in capital goods' prices anticipated by the respondents to the survey. In comparison, the results of the earlier Lionel D. Edie and Co. survey indicated that businesses plan to spend 9 percent more on fixed investment goods while expecting capital goods' prices to rise 4.5 percent.

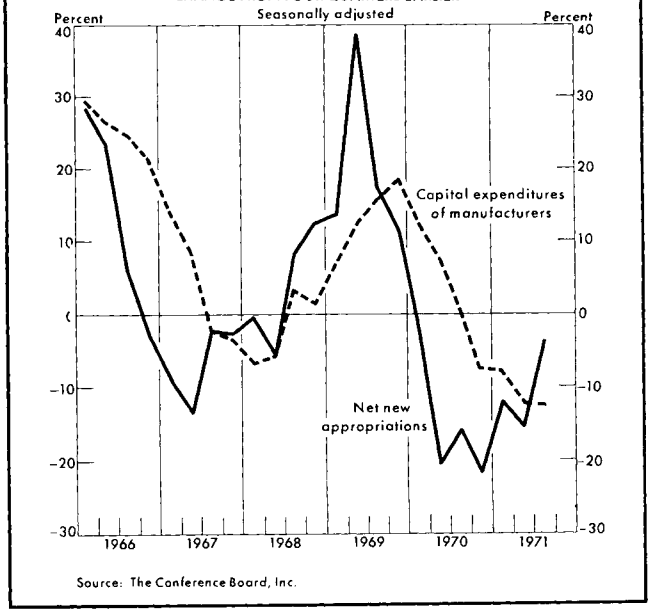
Although there are differences among the survey results in some details, the surveys are in broad agreement over the projected course of manufacturers' expenditures for plant and equipment. Whereas this spending component has been distinctly sluggish in 1970 and 1971, all three surveys foresee a substantial rise during the next few months. Of course, how much of this planned spending actually materializes will depend on how closely unfolding economic developments match current business projections. One early sign that a pickup in manufacturers' capital spending may be in the offing is the third-quarter turnabout in capital appropriations made by manufacturers (see Chart I). After falling in the previous quarter, net new appropriations increased some 14 percent in the third quarter according to a Conference Board survey. While the volatility of this series argues against attaching too much significance to short-run movements, the increase is consistent with the outlook for manufacturers' plant and equipment spending provided in the other surveys.

Chart I

MANUFACTURERS' EXPENDITURES AND APPROPRIATIONS FOR NEW PLANT AND EQUIPMENT

CHANGE FROM FOUR QUARTERS EARLIER

Seasonally adjusted




Source: The Conference Board, Inc.

### RESIDENTIAL CONSTRUCTION

Residential construction activity has continued to be a source of considerable economic strength. After dipping in September, housing starts in October again edged above the 2 million mark on a seasonally adjusted annual rate basis—a shade below the record third-quarter average of 2.1 million units. At the same time, newly issued building permits jumped nearly 17 percent in October to a seasonally adjusted annual rate of 2.2 million units, an all-time record. Since newly issued permits again exceeded the number of housing starts, the backlog of units yet to be begun rose in October, continuing its almost steady growth of the past year or so.

The course of residential home building during coming months will depend to some extent on developments in the mortgage market. Since in most instances mortgage commitments must be secured before construction financing can be arranged, the commitments series serves as an advance indicator of construction activity (see Chart II). In the third quarter, outstanding commitments of savings and loan associations and mutual savings banks had risen to record levels on a nonseasonally adjusted basis. Moreover, according to most indicators, conditions in the mortgage market have eased since then. It is true that the average interest cost of conventional mortgages edged higher in September before leveling off in October. However, these data are based on mortgage closings and thus reflect market conditions as much as several months earlier when the commitments were made. The more sensitive secondary market yields of Federal Housing Administration-insured loans declined in both September and October. A major factor underlying this easing in the mortgage market appears to have been the relatively large declines in interest rates on corporate bonds and United States Government securities. For example, the interest rate spread of conventional mortgages over Government securities with a maturity of ten years or more increased almost 60 basis points between June and October, while the spread between secondary FHA mortgages and long-term Government securities rose 34 basis points. Earlier in the year, when interest rates on these instruments were high relative to those on mortgages, savings and loan associations and mutual savings banks had used portions of their sizable savings inflows to acquire bonds and, in particular, to rebuild their liquidity positions. Recently, however, they have begun to channel proportionately more of their inflows to the mortgage market.

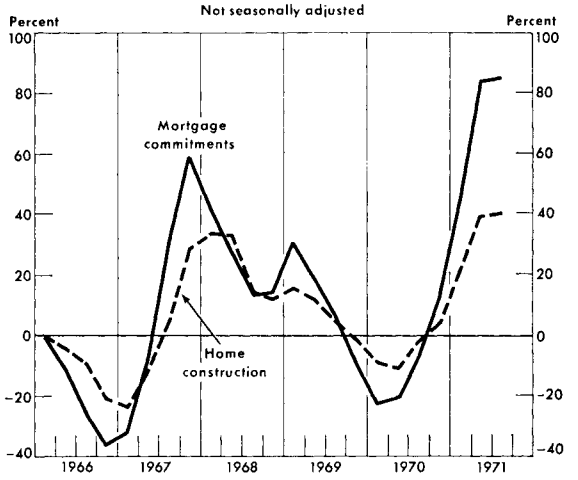
The expanded presence of the Federal Government in the private housing sector has contributed importantly to the 1971 housing boom. During the current year, the number of private housing starts receiving either a direct or indirect Federal subsidy is estimated at about ½ million units. It is unlikely that the number of subsidized starts will decline next year, especially in view of the Government's strong commitment to upgrade and enlarge the stock of residential housing.

Chart II

MORTGAGE COMMITMENTS AND RESIDENTIAL CONSTRUCTION EXPENDITURES

CHANGE FROM FOUR QUARTERS EARLIER

Not seasonally adjusted




Sources: Federal Home Loan Bank Board; Savings Bank Association of New York State; United States Department of Commerce, Bureau of the Census.

### INCOME, CONSUMPTION, AND EMPLOYMENT

Compared with the $5.1 billion monthly average increase in personal income so far this year, the $0.8 billion rise in October was minuscule. The increase was more than accounted for by a $1.3 billion increment in wage and salary disbursements—this too being well below the average growth of previous months. With wages frozen and payroll employment practically unchanged in October, the increase in wage and salary disbursements probably stemmed largely from the longer workweek and increased overtime during the month.

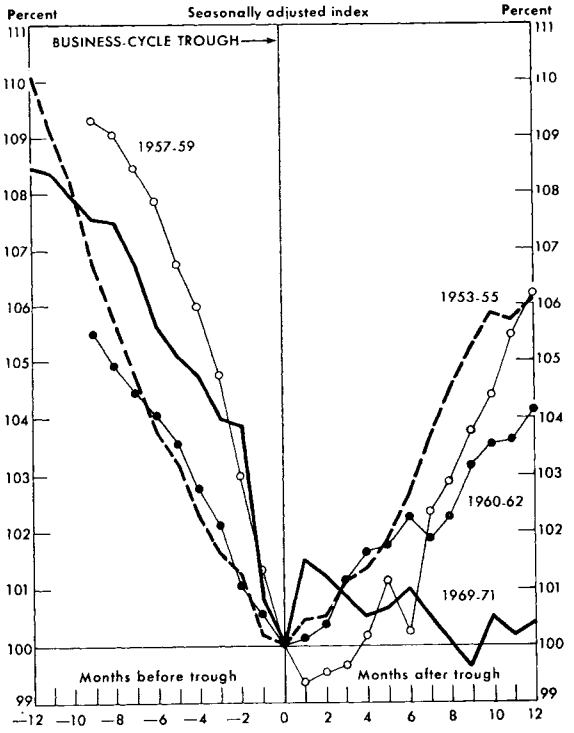
Recent retail sales data support the view that consumers have become somewhat less hesitant. During the five months that ended in October, nonautomotive retail sales increased at a seasonally adjusted annual rate of 8.3 percent. In comparison, over the first five months of the year, nonautomotive sales had grown at an annual rate of only 3.5 percent. In view of the slowing in the rate of increase of consumer goods prices, the recent accelerated

growth in nonautomotive retail sales is all the more significant. After surging dramatically in August and September, the automotive component of retail sales fell slightly in October, according to preliminary estimates. This decline may reflect seasonal adjustment difficulties associated with the price freeze, inasmuch as unit sales of new domestically produced passenger cars were reported to have risen almost 8 percent in October. During the three months ended in November, these sales were running at a seasonally adjusted annual rate of 9.8 million units, an increase of nearly 17 percent over average sales in the earlier months of 1971. Another indication of growing confidence on the part of consumers can be seen in their willingness to increase their indebtedness. The average monthly increase in consumer credit over the five-month period ended in October was nearly double that of the first five months of the year.

To some extent, the apparent shoring-up of consumers' confidence may be anchored in labor market conditions, which have begun to show some—admittedly scattered—improvements during recent months. After being virtually unchanged during the first six months of 1971, civilian employment posted a substantial gain of 520,000 on average in the third quarter, matched by an almost equal gain in the first two months of the current quarter. At the same time, however, this employment growth has been largely counterbalanced by an unusually big rise in the civilian labor force, leaving the unemployment rate hovering at 6.0 percent.

Some tentative improvements in labor market conditions can also be seen in the recent payroll survey data. After remaining virtually flat during the first eight months of the year, nonagricultural payroll employment increased about 390,000 on a seasonally adjusted basis between August and November. The extent of the advance was held down by the coal miners' and East and Gulf Coast dock workers' strikes, which were still in progress at the time of the November survey. In the manufacturing sector, the number of workers employed rose by 130,000 from August to November. Part of this gain was accounted for by the return of some steelworkers who had been laid off in August after the threatened steel strike was averted. Taking a longer perspective, the relatively slow pace of the recovery from last year's recession is clearly evident in manufacturing employment. During the year after the tentatively identified recession trough of November 1970, employment in manufacturing increased by only 0.4 percent (see Chart III). In contrast, such employment had posted gains ranging from 4.1 percent to 6.2 percent in the three earlier post-Korean war recoveries.

Chart III
MANUFACTURING EMPLOYMENT IN FOUR CONTRACTIONS AND RECOVERIES




Note: The business-cycle troughs, as identified by the National Bureau of Economic Research, are August 1954, April 1958, February 1961, and November 1970 (tentative).

Source: United States Department of Labor, Bureau of Labor Statistics.

## PRICE DEVELOPMENTS

The special circumstances surrounding the ninety-day price freeze that ended on November 13 have made recent movements in the consumer price index difficult to assess. For example, prices of some commodities and services were exempt from the freeze. Moreover, some items covered in the consumer price index are priced less frequently than monthly so that numerous price changes are reflected in the index with a lag. Even the practice of seasonal adjustment may produce misleading results when the customary seasonal variations are not fully permitted. With this in mind, the latest available data indicate that consumer prices rose at a seasonally adjusted annual rate of 1.6 percent in October, the smallest advance since April 1967. On an unadjusted basis the index rose at a 2 percent annual rate in October, the same as in the preceding month. The rate of increase in prices of nonfood commodities (not seasonally adjusted) was a large 5.1 percent

in October, the same as in the preceding month, and primarily reflected higher prices for apparel and new cars, including imports.

The price freeze apparently had a much greater effect on wholesale prices than on consumer prices. After rising sharply over the first eight months of 1971, wholesale prices actually declined slightly between August and November. While prices of agricultural products which were not subject to the freeze fluctuated widely, industrial wholesale prices generally edged lower. These prices fell at a seasonally adjusted annual rate of 1.3 percent between August and November, following their large increase at an annual rate of 5.0 percent earlier in the year. On an unadjusted basis, industrial wholesale prices fell at an annual rate of 0.7 percent between August and November.

# The Money and Bond Markets in November

Interest rate movements were mixed in November. Most money market rates continued the declines that had ensued upon President Nixon's announcement on August 15 of new economic policies to restrain inflation while stimulating the economy. The Federal Reserve Banks reduced the discount rate by ¼ percentage point to 4¾ percent to bring it into closer alignment with other short-term rates. The reduction by seven of the banks was approved by the Board of Governors of the Federal Reserve System November 10, and by November 18 the other five had followed suit. The effective rate on Federal funds dropped steadily on a weekly average basis to a level about ¾ percentage point below the level that had prevailed during the first half of August, just before the President's new economic initiatives. Declining rates on commercial paper triggered several reductions in the prime business loan rates of the few banks that have tied their prime rates to market rates. At the end of November, prime rates ranged from ¼ to ¾ percentage point below the 6 percent level of August. After posting declines early in November, a few short-term rates reversed direction and closed higher for the month although well below recent peaks. For example, the three-month Treasury bill rate was still a full percentage point below its late-July levels.

In contrast to most short-term rates, bond yields generally rose during November but still closed well below the pre-August 15 levels. Dealers in all sectors of the capital markets were burdened with unusually large inventories as the month began. After some active selling early in the month, dealers' holdings swelled further as a large flow of new issues encountered resistance amid mounting investor concern over the outcome of the Phase Two program to combat inflation. Yields on high-quality utility bonds increased slightly over the month but were still down about 60 basis points from the middle of August. Yields backed up somewhat more in the tax-exempt sector but, because of earlier declines, closed about 67 basis points lower than the mid-August levels, according to *The Weekly Bond Buyer's* twenty-bond index. Yields on Treasury securities also rose during November, but at the month end still showed net declines from mid-August averaging about 25 basis points on long-term bonds and more than 100 basis points on intermediate-term issues.

## THE MONEY MARKET

Although most short-term interest rates continued to edge downward in November, the pace of the decline in some cases was slower than in October, and there were some reversals late in the month. Major banks' offering rates on large certificates of deposit (CDs) were unchanged to ¼ percentage point lower in November. Bankers' acceptance rates were reduced by a net ⅛ percentage point. Three-month Euro-dollar rates, which had dropped from 10 percent in mid-August, slipped below 6 percent early in November. They rebounded to 7 percent in the Thanksgiving holiday week, but retreated to 6½ percent by the end of the month.

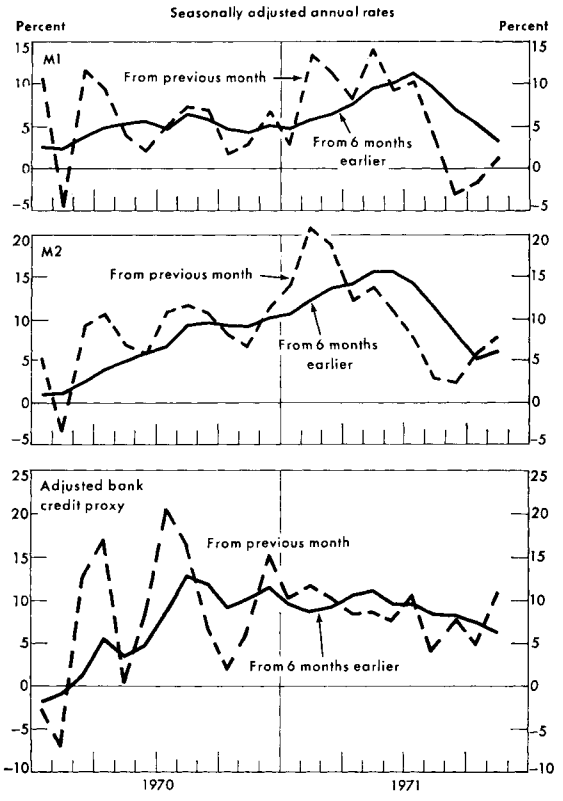
Rates on most maturities of commercial paper declined on balance over the month. For example, rates on dealer-placed 90- to 119-day paper fell from 5⅛ percent to 4¾ percent. Several banks are now tying their prime rate to commercial paper rates according to various formulas. One of these banks in New York City reduced its prime rate four times over the month from 5¾ percent to 5¼ percent, while another bank accomplished the same net reduction in two steps. Most major banks that are still administering the prime rate reduced it on November 4 from 5¾ percent to 5½ percent.

The effective rate on Federal funds continued to drop steadily on a weekly average basis, declining from 5.11 percent in the statement week ended October 27 to 4.86 percent in the week ended November 24. The money market suddenly tightened in that week, however, and the effective rate on Federal funds rose from 4¾ percent before the weekend to 5⅛ percent on the Wednesday settlement date. That day member bank borrowings from the Federal Reserve Banks surged to nearly $2.4 billion. For the statement week as a whole, such borrowings averaged $539 million, compared with an average of $209

Chart I

CHANGES IN MONETARY AND CREDIT AGGREGATES

Seasonally adjusted annual rates




Note: Data for November 1971 are preliminary estimates.

M1 = Currency plus adjusted demand deposits held by the public.

M2 = M1 plus commercial bank savings and time deposits held by the public, less negotiable certificates of deposit issued in denominations of $100,000 or more.

Adjusted bank credit proxy = Total member bank deposits subject to reserve requirements plus nondeposit sources of funds, such as Euro-dollar borrowings and the proceeds of commercial paper issued by bank holding companies or other affiliates.

Source: Board of Governors of the Federal Reserve System.

million during the three previous weeks (see Table I).

The tautness in the money market in the November 24 week, which occurred despite large injections of reserves by the Federal Reserve, came as a surprise. It turned out that reserve availability had been $400 million less on average during the week than had been thought. The error, which was not discovered until after the end of the statement period, resulted from a miscalculation of member bank holdings of vault cash. Thus, net borrowed reserves during the week averaged $344 million, whereas it had been assumed that there were free reserves averaging $56 million.

The tight reserve positions were reversed in the following statement week, and the Federal funds rate declined day by day to an effective rate of 3¾ percent on December 1. The banks had to maintain their heavy November 24 level of borrowings through the Thursday holiday. As a result, the member banks held an exceptionally large $558 million of excess reserves for the week, even though total borrowings from the Federal Reserve were reduced to $64 million by the closing day of the statement week.

The annual revisions in the money supply, based on new benchmark data from the call reports of nonmember banks for December 1970 and June 1971 and revised seasonal factors, have been announced. Minor adjustments were made in the data back through 1964.[1] The revisions in the 1971 figures did not alter the basic pattern that had been indicated by the unrevised figures of rapid growth in the money supply in the six months ended in July and slow growth or decline in each of the months since then (see Chart I). The seasonally adjusted annual rate of growth of $M_1$ over the six months ended in July was revised downward slightly to 11.2 percent from 11.8 percent, while the rate of decline for the succeeding three months was revised to 0.5 percent from 1.4 percent. This brought the annual growth rate of $M_1$ over the six months ended in October to a moderate 5.3 percent. According to preliminary data, growth of $M_1$ resumed in November, albeit at a modest rate of about 1 percent annually.

$M_2$ grew at an annual rate of about 7½ percent in November, reflecting continued strength in time deposits other than large CDs. Revisions in the $M_2$ series also were generally small. $M_2$ showed a pattern of very rapid growth in the first part of the year followed by smaller advances thereafter. In the case of $M_2$, however, the deceleration began earlier than it did for $M_1$. The slowdown was more gradual, and the series has turned around and risen moderately in the last two months as time deposits have picked up renewed strength.

The growth rate of the adjusted bank credit proxy, revised to take account of new seasonal factors, diverged considerably from the rates of increase of $M_1$ and $M_2$ in November as it had in several months earlier this year. In November, the growth of the proxy accelerated to a seasonally adjusted annual rate of about 11 percent in spite of weak demand deposit growth and a decline in large CDs. A sharp advance in seasonally adjusted Govern-

[1] Revised data are reported in the *Federal Reserve Bulletin* (November 1971), pages 880-93.

**Table I**

**FACTORS TENDING TO INCREASE OR DECREASE MEMBER BANK RESERVES, NOVEMBER 1971**

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

| Factors | Changes in daily averages—week ended | | | | Net changes |
|---|---|---|---|---|---|
| | Nov. 3 | Nov. 10 | Nov. 17 | Nov. 24 | |
| **"Market" factors** | | | | | |
| Member bank required reserves | — 192 | — 5 | — 413 | + 419 | — 191 |
| Operating transactions (subtotal) | + 630 | — 252 | + 122 | —1,044 | — 544 |
| Federal Reserve float | + 171 | — 157 | + 177 | — 24 | + 167 |
| Treasury operations* | + 357 | + 202 | + 46 | — 341 | + 264 |
| Gold and foreign account | + 22 | + 15 | — 4 | — | + 33 |
| Currency outside banks | + 167 | — 261 | — 260 | — 697 | —1,051 |
| Other Federal Reserve liabilities and capital | — 89 | — 51 | + 163 | + 19 | + 42 |
| Total "market" factors | + 438 | — 257 | — 291 | — 625 | — 735 |
| **Direct Federal Reserve credit transactions** | | | | | |
| Open market operations (subtotal) | + 57 | — 68 | + 539 | + 590 | +1,118 |
| Outright holdings: | | | | | |
| Treasury securities | + 19 | — 156 | + 211 | + 453 | + 527 |
| Bankers' acceptances | + 1 | + 1 | + 5 | — 6 | + 1 |
| Federal agency obligations | — | + 35 | + 48 | — | + 83 |
| Repurchase agreements: | | | | | |
| Treasury securities | + 29 | + 40 | + 234 | + 93 | + 396 |
| Bankers' acceptances | — | + 14 | + 13 | + 24 | + 51 |
| Federal agency obligations | + 8 | — 2 | + 28 | + 26 | + 60 |
| Member bank borrowings | — 197 | — 94 | + 167 | + 250 | + 126 |
| Other Federal Reserve assets† | + 47 | + 33 | — 179 | — 265 | — 364 |
| Total | — 93 | — 129 | + 527 | + 574 | + 878 |
| **Excess reserves** | + 345 | — 386 | + 236 | — 51 | + 144 |

| | Daily average levels | | | | Monthly averages |
|---|---|---|---|---|---|
| **Member bank:** | | | | | |
| Total reserves, including vault cash | 30,961 | 30,580 | 31,229 | 30,759 | 30,882‡ |
| Required reserves | 30,565 | 30,570 | 30,983 | 30,564 | 30,671‡ |
| Excess reserves | 396 | 10 | 246 | 195 | 212‡ |
| Borrowings | 216 | 122 | 289 | 539 | 292‡ |
| Free, or net borrowed (—), reserves | 180 | — 112 | — 43 | — 344 | — 80‡ |
| Nonborrowed reserves | 30,745 | 30,458 | 30,940 | 30,220 | 30,591‡ |
| Net carry-over, excess or deficit (—)§ | 40 | 222 | 54 | 76 | 98‡ |

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 November 24.

§ Not reflected in data above.

ment deposits at commercial banks, along with an increase in liabilities to foreign branches of United States banks, contributed to the strength of the proxy advance.

## THE GOVERNMENT SECURITIES MARKET

The October rally in the Treasury securities market extended into the first few days of November. The ebullience faded, however, as dealers emerged from the refunding[2] with inventories of coupon issues at a record-high level. In the face of declining prices, the auction by the Treasury on November 9 of $2.75 billion of a fifteen-month note received a less enthusiastic response than had been expected at the time of its announcement. The average issuing yield was about 4.91 percent, with bids accepted for yields as high as 4.96 percent. The cut in the discount rate by seven Federal Reserve Banks, announced November 10, did little to buoy the market, inasmuch as the action had been widely anticipated. The comments the next day by Chairman Burns of the Board of Governors that the Federal Reserve System "intends to see that adequate bank reserves are provided to finance a vigorous, but sustainable, expansion" helped to lend some strength to the market, encouraging modest price increases in the following days. The advances were short-lived, and by the Thanksgiving holiday week prices were again moving downward. Large additions to the supply of Federal agency issues and Treasury bills weighed upon the market. The market was also affected by considerable uncertainty regarding some aspects of the Administration's Phase Two program to restrain inflation.

Treasury bill rates generally declined through midmonth. The issuing rates moved steadily lower in the first three regular weekly auctions held during November (see Table II). Orders from foreign central banks continued to provide support for bill prices. The Treasury announced, on November 18, that it would auction $2.5 billion of tax anticipation bills (TABs) on November 24 to mature April 21, 1972. With the weekly auction of three- and six-month Treasury bills already scheduled for November 22 and the monthly auction of nine- and twelve-month bills scheduled for November 23, the addition of a further bill auction in a holiday-shortened week crowded the calendar.

This heavy load of offerings, combined with some feeling that international monetary negotiations might lead to reductions in foreign bill holdings, resulted in sharply higher yields during the week. Interest rates in the weekly bill auction jumped up by 11 basis points to 4.236 percent on the three-month bills and by almost 16 basis

[2] For details of the refunding, see this *Review* (November 1971), page 264.

points on the six-month bill. The next day, the one-year bills were auctioned at an average issuing rate of 4.563 percent, 7 basis points above the rate set in the October auction. The April TABs were sold at an average rate of 4.558 percent, about 8 basis points higher than the bid rate on outstanding Treasury bills maturing April 20, 1972. This spread occurred despite the granting of a 50 percent Treasury Tax and Loan Account credit on the new issues. The rate on these outstanding bills had advanced about 20 basis points during the statement week. Treasury bill rates fell in the final days of November but remained above the pre-Thanksgiving week levels. In the weekly bill auction on November 29, the average issuing rate on three-month bills advanced 9 basis points from the rate set the week before.

With the new offerings of marketable debt in November, the Treasury raised $2.35 billion of cash, net of repayments of maturing marketable issues, and issued a further $312 million of nonmarketable debt. During the first five months of the fiscal year that began on July 1, 1971, the Treasury raised $9.03 billion in net new cash through marketable issues and a further $5.89 billion through nonmarketable debt. This heavy use of nonmarketable debt contrasts sharply with the pattern of finance during the corresponding period last year, when $13.40 billion of cash was raised, $11.94 billion of it through marketable debt. Most of this fiscal year's increase in nonmarketable debt has consisted of special certificates of indebtedness sold to foreign central banks that have absorbed dollars in the foreign exchange markets. Savings bonds outstanding have also increased at a faster pace, advancing by a net $1.06 billion during the first five months of fiscal 1972 as compared with $408 million in the corresponding year-earlier period.

The volume of new issues by Federal credit agencies jumped in mid-November following three weeks in which there had been no offerings at all. Between November 16 and November 23 a total of almost $2.17 billion of issues by the Export-Import Bank, the Federal National Mortgage Association, the Banks for Cooperatives, and the Federal Intermediate Credit Banks reached the market. Of this, $1.43 billion was used to retire outstanding debt, while the remaining $742 million represented new cash. Net new cash raised so far in the second half of the year has been substantially above the average of the last few years, in contrast to the first half of 1971 when more debt was retired than was issued. Earlier this year, large savings inflows to savings and loan associations enabled the repayment of loans from the Federal Home Loan Banks. The FHLBs, in turn, retired a substantial portion of the debt that they had issued in early 1970. In October the FHLBs again became net borrowers. Other agencies have stepped up their net issues as well.

**Table II**

**AVERAGE ISSUING RATES* AT REGULAR TREASURY BILL AUCTIONS**

In percent

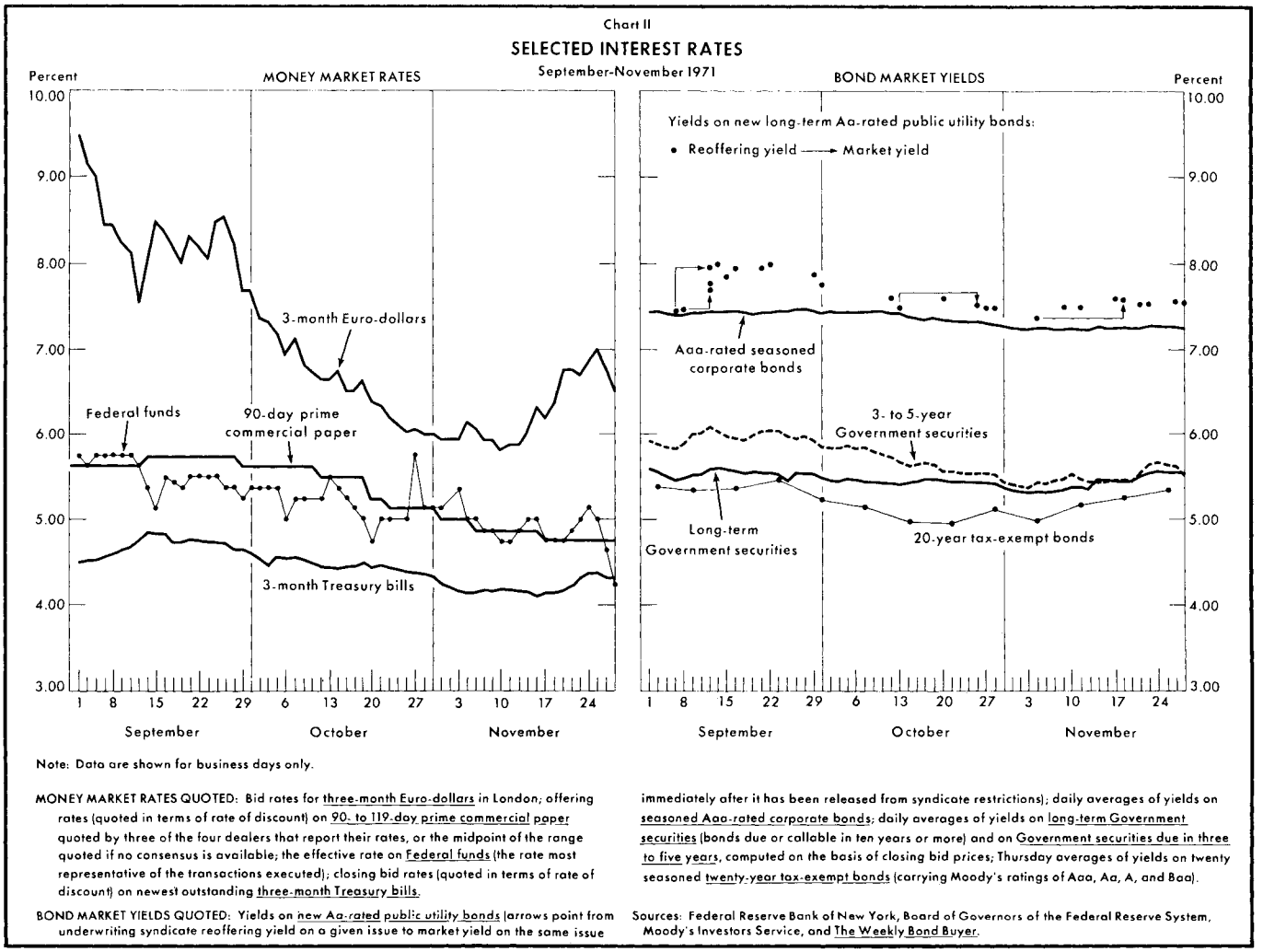
| Maturities | Weekly auction dates—November 1971 | | | | |
|---|---|---|---|---|---|
| | Nov. 1 | Nov. 8 | Nov. 15 | Nov. 22 | Nov. 29 |
| Three-month | 4.233 | 4.174 | 4.122 | 4.236 | 4.324 |
| Six-month | 4.346 | 4.340 | 4.255 | 4.411 | 4.431 |
| | Monthly auction dates—September-November 1971 | | | | |
| | Sept. 22 | | Oct. 26 | | Nov. 23 |
| Nine-month | 5.242 | | 4.495 | | 4.581 |
| One-year | 5.279 | | 4.490 | | 4.563 |

* 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.

## OTHER SECURITIES MARKETS

The corporate bond market rally that had begun in late September continued into the first week of November, enabling dealers to sell a part of their sizable inventories. However, the rally quickly faded in the next weeks. Soon, only securities offered at somewhat higher yields than had been experienced in the previous few weeks managed to sell quickly. Several factors appeared to have contributed to this reversal. Concern continued to be expressed as to the degree of success that could be expected from Phase Two of the President's new economic program as it went into effect in mid-November. The uneasiness, which had led to a falling stock market the month before, began spilling over into the bond market. Furthermore, investors became quite conscious of the large size of dealer inventories, and the calendar of new issues continued to be heavy until the Thanksgiving holiday week.

The early enthusiasm exhibited in the market led underwriters to price a utility bond rated Aa and marketed November 4 to yield 7⅜ percent, ⅛ percentage point below a similar late-October issue. In the face of the poor reception given to that and other aggressively priced issues, two Aa utilities marketed November 9 and 11 were priced to yield 7.50 percent, the same rate that had prevailed in late October. Both issues sold well. Even so,




Note: Data are shown for business days only.

MONEY MARKET RATES QUOTED: Bid rates for three-month Euro-dollars in London; offering rates (quoted in terms of rate of discount) on 90- to 119-day prime commercial paper quoted by three of the four dealers that report their rates, or the midpoint of the range quoted if no consensus is available; 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-month Treasury bills.

BOND MARKET YIELDS QUOTED: Yields on new 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.

further weakening of the market led dealers to offer an even more generous 7.60 percent on another Aa utility bond offered November 17. This issue was well received, and underwriters reoffered two similar issues to yield 7.54 percent early in the following week. While one sold well, the larger of the two encountered some resistance. At the end of November, another Aa utility bond was offered to yield 7.55 percent and sold slowly. Similar price declines were exhibited by other bonds. A Bell Telephone subsidiary bond offering on November 15 sold slowly even though it yielded 7.45 percent, 10 basis points above the yield offered in late October on a bond sold by another Bell Telephone subsidiary.

The tax-exempt sector suffered from considerable congestion, as a heavy calendar of new issues further burdened already swollen dealer inventories. The Blue List of advertised inventories had reached the highest level of the year at the end of October, standing at $970 million. After a slight decline early in November, it climbed again to $1,126 million on November 18, an all-time high. The congestion was exacerbated by waning institutional demand. Commercial banks, which had been major buyers of tax-exempt securities in October, bought smaller quantities in November. *The Weekly Bond Buyer's* twenty-bond municipal index rose 25 basis points to 5.36 percent from late October to November 24 (see Chart II).

# The Lag in the Effect of Monetary Policy: A Survey of Recent Literature

*By* MICHAEL J. HAMBURGER*

During the last ten years the views of economists—both monetarists and nonmonetarists—on the lag in the effect of monetary policy on the economy have changed considerably. This article examines some of the recent evidence which has served as the basis for these changes.

Prior to 1960, quantitative estimates of the lag in the effect of monetary policy were rare. While there had always been disagreement on the effectiveness of monetary policy, a substantial number of economists seemed to accept the proposition that there was sufficient impact in the reasonably short run for monetary policy to be used as a device for economic stabilization. Although this view did not go unquestioned—see, for example, Mayer [26] and Smith [29][1]—the main challenge to the conventional thinking came from Milton Friedman. He argued that monetary policy acts with so long and variable a lag that attempts to pursue a contracyclical monetary policy might aggravate, rather than ameliorate, economic fluctuations. In summarizing work done in collaboration with Anna Schwartz, he wrote [16]: "We have found that, on the average of 18 cycles, peaks in the rate of change in the stock of money tend to precede peaks in general business by about 16 months and troughs in the rate of change in the stock of money precede troughs in general business by about 12 months. . . . For individual cycles, the recorded lead has varied between 6 and 29 months at peaks and between 4 and 22 months at troughs."

Many economists were simply not prepared to believe Friedman's estimates of either the length or the variability of the lag. As Culbertson [11] put it, "if we assume that government stabilization policies . . . act with so long and variable a lag, how do we set about explaining the surprising moderateness of the economic fluctuations that we have suffered in the past decade?" Culbertson's own conclusion was that "the broad record of experience support[s] the view that [contracyclical] monetary, debt-management, and fiscal adjustments can be counted on to have their predominant direct effects within three to six months, soon enough that if they are undertaken moderately early in a cyclical phase they will not be destabilizing".

Kareken and Solow [5] also appear to have been unwilling to accept Friedman's estimates. They summarized their results as follows: "Monetary policy works neither so slowly as Friedman thinks, nor as quickly and surely as the Federal Reserve itself seems to believe. . . . Though the *full* results of policy changes on the flow of expenditures may be a long time coming, nevertheless the chain of effects is spread out over a fairly wide interval. This means that *some* effect comes reasonably quickly, and that the effects build up over time so that some substantial stabilizing power results after a lapse of time of the order of six or nine months."

However, as Mayer [27] pointed out, this statement is inconsistent with the evidence presented by Kareken and Solow. They reported estimates of the complete lag in the effect of monetary policy on the flow of expenditures for only one component of gross national product (GNP), namely, inventory investment, and this lag is much longer than Friedman's lag. For another sector—producers' durable equipment—they provided data for only part of the lag, but even this is longer than Friedman's lag. Thus,

* The author, who is a Special Assistant in the Research and Statistics function, wishes to acknowledge the helpful comments of Richard G. Davis, David H. Kopf, Robert G. Link, and other colleagues at the Federal Reserve Bank of New York. In addition, the excellent research assistance of Susan Skinner and Rona Stein is gratefully acknowledged. The views expressed in this paper are the author's alone and do not necessarily reflect those of the individuals noted above or the Federal Reserve Bank of New York.

[1] The numbers in brackets refer to the works cited at the end of this article.

Mayer noted that Kareken and Solow "should have criticized Friedman, not for overestimating, but for underestimating the lag".

More recently, it is the *monetarists* who have taken the view that the lag in the effect of monetary policy is relatively short, and the nonmonetarists who seem to be claiming longer lags. This showed up in the reaction to the St. Louis (Andersen and Jordan) equation [4]. According to this equation, the total response of GNP to changes in the money supply is completed within a year.

In his review of the Andersen and Jordan article, Davis [12] wrote "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". If the level of the money supply undergoes a $1 billion once-and-for-all rise in a given quarter, it will (according to the St. Louis equation) raise GNP by $1.6 billion in that quarter and by $6.6 billion during four quarters. In contrast, Davis found that in the Federal Reserve Board-Massachusetts Institute of Technology model—which was estimated by assuming nonborrowed reserves to be the basic monetary policy variable—a once-and-for-all increase in the money supply of $1 billion in a given quarter has almost no effect on GNP in that quarter and, even after four quarters, the level of GNP is only about $400 million higher than it otherwise would be. Thus, he concluded, "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".[2]

The Federal Reserve Board-MIT model (henceforth called the FRB-MIT model) is not the only econometric model suggesting that monetary policy operates with a long distributed lag. Indeed, practically every *structural* model of the United States economy which has been addressed to this question has arrived at essentially the same answer.[3]

The most recent advocates of short lags are Arthur Laffer and R. David Ranson [25]. They have argued that: "Monetary policy, as represented by changes in the conventionally defined money supply [demand deposits plus currency], has an immediate and permanent impact on the level of GNP. For every dollar increase in the money supply, GNP will rise by about $4.00 or $5.00 in the current quarter, and not fall back [or rise any further] in the future. Alternatively, every 1 percent change in the money supply is associated with a 1 percent change in GNP."

This article reviews some of the recent professional literature on the lag in the effect of monetary policy, with the objective of examining the factors which account for differences in the results. Among the factors considered are: (1) the type of statistical estimating model, i.e., structural versus reduced form equations; (2) the specification of the monetary policy variable; and (3) the influence of the seasonal adjustment procedure. For the most part, the analysis is confined to the results obtained by others. New estimation is undertaken only in those instances where it is considered necessary to reconcile different sets of results.

## STRUCTURAL VERSUS REDUCED FORM MODELS

We turn first to the question of whether it is more appropriate to use structural or reduced form models to estimate the effects of stabilization policy on the economy. A structural model of the economy attempts to set forth in equation form what are considered to be the underlying or basic economic relationships in the economy. Although many mathematical and statistical complications may arise, such a set of equations can, in principle, be "reduced" (solved). In this way key economic variables, such as GNP, can be expressed directly as functions of policy variables and other forces exogenous to the economy. While the difference between a structural model and a reduced form model is largely mathematical and does not necessarily involve different assumptions about the workings of the economy, a lively debate has developed over the advantages and disadvantages of these two approaches.

Users of structural models stress the importance of tracing the paths by which changes in monetary policy are assumed to influence the economy. Another advantage often claimed for the structural approach is that it permits one to incorporate *a priori* knowledge about the economy, for example, knowledge about identities, lags, the mathematical forms of relationships, and what variables should or should not be included in various equations (Gramlich [20]).

On the other hand, those who prefer the reduced form approach contend that, if one is primarily interested in explaining the behavior of a few key variables, such as

[2] The properties of the Federal Reserve-MIT model are discussed by de Leeuw and Gramlich [13, 14] and by Ando and Modigliani [6].

[3] See Hamburger [21] and Mayer [27]. For a recent discussion of why the lag should be long, see Davis [12], Gramlich [19], and Pierce [28]. The alternative view is presented by White [31], who also gives reasons for believing that the procedures used to estimate the parameters of large-scale econometric models, particularly the FRB-MIT model, may yield "greatly exaggerated" estimates of the length of the lag.

GNP, prices, and unemployment, it is unnecessary to estimate all the parameters of a large-scale model. In addition, it is argued that, if the economy is very complicated, it may be too difficult to study even with a very complicated model. Hence, it may be useful simply to examine the relationship between inputs such as monetary and fiscal policy and outputs such as GNP.

Considering the heat of the debate, it is surprising that very little evidence has been presented to support either position. The only studies of which I am aware come from two sources: simulations with the FRB-MIT model, reported by de Leeuw and Gramlich [13, 14], and the separate work of de Leeuw and Kalchbrenner [15]. The latter study reported the estimates of a reduced form equation for GNP, using monetary and fiscal policy variables similar to those in the FRB-MIT model. The form of the equation is:

Equation 1

$$\Delta Y_t = a + \sum_{i=0}^{7} b_i \Delta NBR_{t-i} + \sum_{i=0}^{7} c_i \Delta E_{t-i} + \sum_{i=0}^{7} d_i \Delta RA_{t-i} + u_t$$

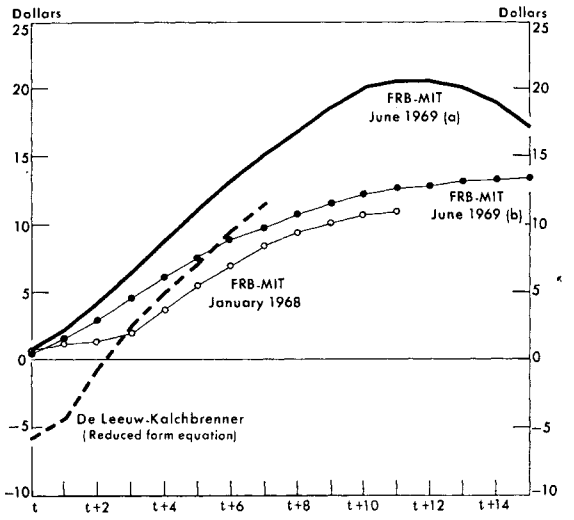
where

$\Delta Y$ = Quarterly change in GNP, current dollars.
$\Delta NBR$ = Quarterly change in nonborrowed reserves adjusted for reserve requirement changes.
$\Delta E$ = Quarterly change in high-employment expenditures of the Federal Government, current dollars.
$\Delta RA$ = Quarterly change in high-employment receipts of the Federal Government in current-period prices.
$u$ = Random error term.

All variables are adjusted for seasonal variation, and the lag structures are estimated by using the Almon distributed lag technique.[4]

Chart I illustrates the lag distributions of the effect on GNP of nonborrowed reserves—the principal monetary variable used in the studies just mentioned. The chart shows the cumulative effects of a one dollar change in nonborrowed reserves on the level of GNP as illustrated by four experiments, the reduced form equation of de Leeuw and Kalchbrenner and three versions of the FRB-MIT model. The heavy broken line traces the sum of the regression coefficients for the current and lagged values of nonborrowed reserves in the de Leeuw-Kalchbrenner equation (i.e., the sum of the $b_i$'s). The other lines show the results obtained from simulations of the FRB-MIT model; FRB-MIT 1969(a) and FRB-MIT 1969(b) represent simulations of the 1969 version of the model, with two different sets of initial conditions.[5] FRB-MIT 1968 gives the simulation results for an earlier version of the model.

Chart I
CUMULATIVE EFFECTS OF A ONE DOLLAR CHANGE IN NONBORROWED RESERVES ON GNP




Note: FRB-MIT = Federal Reserve Board-Massachusetts Institute of Technology econometric model.

Although there are some large short-run differences in the simulation results, these three experiments suggest similar long-run effects of nonborrowed reserves on in-

[4] Use of the Almon [1] procedure has become quite popular in recent years as it imposes very little *a priori* restriction on the shape of the lag structure, requiring merely that it can be approximated by a polynomial. In the applications discussed in this article, it is generally assumed that a second- or a fourth-degree polynomial is sufficiently flexible to reproduce closely the true lag structure.

[5] For the FRB-MIT 1969(a) simulation, the values of all exogenous variables in the model, except nonborrowed reserves, are set equal to their actual values starting in the first quarter of 1964. For the FRB-MIT 1969(b) simulation, the starting values for these variables are their actual values in the second quarter of 1958. The obvious difference between these two sets of initial conditions is the difference in inflationary potential. The quarters during and after 1964 were ones of high resource utilization, and an expansion of reserves at such a time might be expected to stimulate price increases promptly. On the other hand, there was substantial excess capacity in 1958 and a change in reserves under such conditions would be expected to have a minimal short-run effect on prices. The difference in these price effects is significant since it is movements in *current*-dollar GNP which are being explained.

come. Such a finding is not very surprising; what is significant, in view of the debate between those who prefer structural models and those who prefer reduced forms, is that after the first three or four quarters the de Leeuw-Kalchbrenner results lie well within the range of the simulation results.[6]

Thus, we find that when nonborrowed reserves are chosen as the exogenous monetary policy variable, i.e., the variable used in *estimating* the parameters of the model, it makes very little difference whether the lag in the effect of policy is determined by a structural or a reduced form model. There is, to be sure, no assurance that similar results would be obtained with other monetary variables or with other structural models (including more recent versions of the FRB-MIT model). In the present case, however, the use of reduced form equations does not lead to estimates of the effects of monetary policy on the economy that differ from those obtained from a structural model. For the purposes of our analysis, this finding implies that the type of statistical model employed to estimate the lag in the effect of monetary policy may be less important than other factors in explaining the differences in the results that have been reported in the literature.

## SPECIFICATION OF THE MONETARY POLICY VARIABLE

Another important difference among the various studies of the lag is the variable used to represent monetary policy. The aim of this section is not to contribute to the controversy about the most appropriate variable, but rather to summarize the arguments and spell out the implications of the choice for the estimate of the lag in the effect of policy.

In recent years, three of the most popular indicators of the thrust of monetary policy have been the money supply, the monetary base, and effective nonborrowed reserves.[7] Monetarists prefer the first two variables on the grounds that they provide the most appropriate measures of the impact of monetary policy on the economy. Critics of the monetarist approach contend that these variables are deficient because they reflect the effects of both policy and nonpolicy influences and hence do not provide reliable (i.e., statistically unbiased) measures of Federal Reserve actions. The variable most often suggested by these economists is effective nonborrowed reserves.[8] In reply, the monetarists have argued that, since the Federal Reserve has the power to offset the effects of all nonpolicy influences on the money supply (or the monetary base), it is the movements in the money variable and not the reasons for the movements which are important (Brunner [7] and Brunner and Meltzer [8]). However, this sidesteps the statistical question of whether the money supply or the monetary base qualify as exogenous variables to be included on the right-hand side of a reduced form equation. (For a further discussion, see Gramlich [20] and Hamburger [22].)

Chart II presents the cumulative percentage distributions of the effects of various monetary variables on nominal GNP, as implied by the parameter estimates for equations similar to equation 1, that is, reduced form equations relating quarterly changes in GNP to quarterly changes in monetary and fiscal policy variables. The monetary variables are effective nonborrowed reserves, the monetary base, the narrowly defined money supply (private holdings of currency and demand deposits), and total reserves. The latter is defined as effective nonborrowed reserves plus member bank borrowings from the Federal Reserve. It is also approximately equal to the monetary base less the currency holdings of nonmember banks and of the nonbank public. Once again, the lag structures for the monetary and fiscal policy variables are estimated using the Almon distributed lag technique. In all cases, with the possible exception of the monetary base, the lags chosen are those which maximize the $\bar{R}^2$ (coefficient of determination adjusted for degrees of freedom)

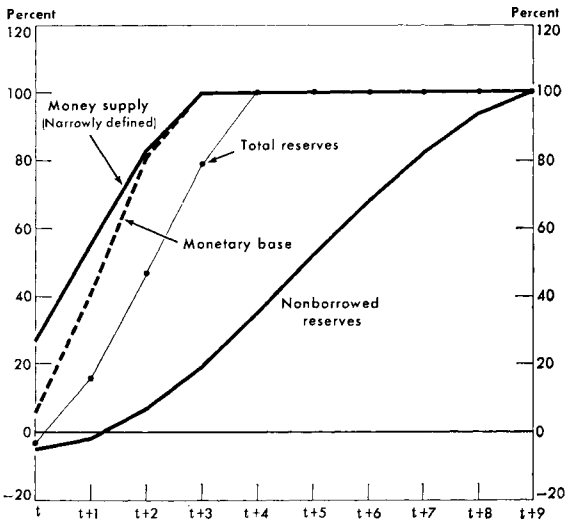
[6] De Leeuw and Kalchbrenner do not estimate lags longer than seven quarters. While it is conceivable that the curve representing their results could flatten out (or decline) after period t-7, the shape of the curve up to that point and the results obtained by others, such as those shown in Chart II, make this possibility seem highly unlikely. The initial negative values for the de Leeuw-Kalchbrenner curve arise because of the large negative estimate of $b_0$ in equation 1; the estimates for all other b's are positive. As de Leeuw and Kalchbrenner pointed out, it is difficult to provide an economic explanation for changes in nonborrowed reserves having a negative effect on GNP in the current quarter. It seems more reasonable, therefore, that the result reflects "reverse causation", running from GNP to nonborrowed reserves—that is, the Federal Reserve's attempt to pursue a contracyclical monetary policy. This point is discussed at greater length in Hamburger [22].

[7] Nonborrowed reserves adjusted for changes in reserve requirements. A similar adjustment is made in computing the monetary base, which is defined as total member bank reserves plus the currency holdings of nonmember banks and the nonbank public. The reserve figure included in the base is also adjusted to neutralize the effects of changes in the ratio of demand deposits to time deposits and changes in the distribution of deposits among banks subject to different reserve requirements.

[8] Among others, see de Leeuw and Kalchbrenner [15], Gramley [18], and Hendershott [23].

Chart II

CUMULATIVE PERCENTAGE DISTRIBUTIONS OF THE EFFECTS OF VARIOUS MONETARY AGGREGATES ON GNP




Sources: See footnote 9.

of the equation. Percentage distributions are used to highlight the distribution of the effects over time as opposed to their dollar magnitudes.[9]

The results indicate that the choice of the exogenous monetary policy variable has a significant effect on the estimate of the lag in the effect of policy. If the money supply, the monetary base, or total reserves are taken as the monetary variable, the results suggest that the total response of GNP to a change in policy is completed within four or five quarters. On the other hand, those who consider nonborrowed reserves to be the appropriate variable would conclude that less than 40 percent of the effect occurs in five quarters and that the full effect is distributed over two and a half years.[10]

Thus, the evidence suggests that the relatively short lags that have been found by the monetarists in recent years depend more on their specification of the monetary policy variable than on the use of a reduced form equation. Whether or not these estimates understate the true length of the lag, they seem roughly consistent with the prevailing view among economists in the early 1960's. They are, for example, essentially identical with Mayer's [26] results which suggested that most of the effect of a change in policy occurs within five quarters. As indicated above, wide acceptance of the proposition that monetary policy operates with a long lag—i.e., a substantial portion of the impact of a policy change does not take place until a year or more later—is of relatively recent vintage and appears to have been heavily influenced by the results of those who do not consider the money supply to be an appropriate measure of monetary policy impulses.

## THE SEASONAL ADJUSTMENT PROBLEM

One of the most recent investigations of the effects of monetary and fiscal policy on the economy is that conducted by Laffer and Ranson for the Office of Management and Budget [25]. Perhaps the most striking finding of this study is that every change in the money supply has virtually all its effect on the level of GNP in the quarter in which it occurs. Or, to put this differently, there is little evidence of a lag in the effect of monetary policy. This finding which stands at odds with most other evidence, both theoretical and empirical, is attributed by Laffer and Ranson largely to their use of data that are *not* adjusted for seasonal variation.[11] They contend that the averaging (or smoothing) properties of most seasonal adjustment procedures tend to distort the timing of statistical relationships. Hence, specious lag structures may be introduced into the results.

As shown below, however, the results reported by Laffer and Ranson are much more dependent on their choice of time period (1948-69) than on the use of seasonally unadjusted data. For, if their nominal GNP equation is reestimated for the period 1953-69 (the period employed in the current version of the St. Louis model [3]

[9] The estimates shown in Chart II are derived from the equations reported by Corrigan [10] and by Andersen and Jordan [4]. Corrigan's results are used for the nonborrowed reserves, total reserves, and money supply curves (the nonborrowed reserves equation is not shown in his article but is available on request). He did not estimate an equation for the monetary base. The fiscal policies variables used in all three equations are the changes in the Government spending and tax components of the "initial stimulus" measure of fiscal policy. The monetary base curve is derived from the Andersen and Jordan results. The fiscal measures used in this study are the Government expenditure and receipt components of the high-employment budget. The criterion used by Andersen and Jordan to select their lag structures is described by Keran [24].

[10] A similar conclusion was reached by Andersen [2], who found even longer lags when nonborrowed reserves are used as the monetary policy variable.

[11] Other studies which find very short lags in the effect of monetary policy are cited by Laffer and Ranson [25].

and in most other recent investigations), it makes very little difference whether one uses seasonally adjusted or unadjusted data. They both indicate that a significant portion of the effect of a change in money does not occur for at least two quarters.

The equation selected by Laffer and Ranson to explain the percentage change in nominal GNP is:[12]

Equation 2

$$\%\Delta Y = \underset{(4.9)}{3.21} + \underset{(5.5)}{1.10}\%\Delta M_1 + \underset{(6.9)}{.136}\%\Delta G - \underset{(3.3)}{.069}\%\Delta G_{-1} - \underset{(1.9)}{.039}\%\Delta G_{-2} - \underset{(1.2)}{.024}\%\Delta G_{-3} - \underset{(3.7)}{.046}\Delta SH + \underset{(2.2)}{.068}\%\Delta S\&P_{-1} - \underset{(12.1)}{9.8}\,D_1 + \underset{(2.6)}{2.5}\,D_2 - \underset{(4.1)}{3.0}D_3$$

$\bar{R}^2 = .958$ SE = 1.31 Interval: 1948-I to 1969-IV

[12] The numbers in parentheses are t-statistics for the regression coefficients. SE is the standard error of estimate of the regression. A subscript preceded by a minus sign indicates that the variable is lagged that many quarters. In estimating their model, Laffer and Ranson use quarterly changes in the natural logarithms of the variables. This is roughly equivalent to using quarter-to-quarter percentage changes.

where

$\%\Delta Y$ = Quarterly percentage change in nominal GNP.
$\%\Delta M_1$ = Quarterly percentage change in $M_1$ (the narrowly defined money supply).
$\%\Delta G$ = Quarterly percentage change in Federal Government purchases of goods and services.
$\Delta SH$ = Quarterly change in a measure of industrial man-hours lost due to strikes.
$\%\Delta S\&P$ = Quarterly percentage change in Standard and Poor's Composite Index of Common Stock Prices (the "S&P 500").
$D_1$ = Seasonal dummy variable for the first quarter.
$D_2$ = Seasonal dummy variable for the second quarter.
$D_3$ = Seasonal dummy variable for the third quarter.

All data used in the calculations are unadjusted for seasonal variation. The three dummy variables ($D_1$, $D_2$, and $D_3$) are introduced to allow for such variation and to permit estimation of the seasonal factors. In principle, joint estimation of the seasonal factors and the economic parameters of a model is preferable to the use of data generated by the standard type of seasonal adjustment procedure. However, in having only three dummy variables, Laffer and Ransom assume that the seasonal pattern in income is constant over the entire sample period. If this assumption is not correct, it becomes a purely empirical question as to whether their procedure is any better or

**Table 1**

**REGRESSIONS EXPLAINING THE PERCENTAGE CHANGE IN GROSS NATIONAL PRODUCT**

Quarterly seasonally unadjusted data

| Equation | Constant | $\%\Delta M_1$ | $\%\Delta M_{1-1}$ | $\%\Delta M_{1-2}$ | $\%\Delta M_{1-3}$ | $\%\Delta M_{1-4}$ | $\%\Delta G$ | $\%\Delta G_{-1}$ | $\%\Delta G_{-2}$ | $\%\Delta G_{-3}$ | $\Delta SH$ | $\%\Delta S\&P_{-1}$ | $D_1$ | $D_2$ | $D_3$ | $\bar{R}^2$ SE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1948-I to 1969-IV** | | | | | | | | | | | | | | | | |
| 2 | 3.21 (4.9) | 1.10 (5.5) | | | | | .136 (6.9) | −.069 (3.3) | −.039 (1.9) | −.024 (1.2) | −.046 (3.7) | .068 (2.2) | −9.8 (12.1) | 2.5 (2.6) | −3.0 (4.1) | .958 1.31 |
| 3 | 3.36 (3.9) | 1.03 (4.4) | −.41 (1.7) | .49 (2.1) | −.31 (1.3) | .30 (1.3) | .136 (7.1) | −.073 (3.7) | −.034 (1.7) | −.024 (1.3) | −.045 (3.6) | .095 (2.9) | −9.5 (7.6) | 1.3 (0.9) | −2.9 (2.4) | .961 1.26 |
| **1948-I to 1952-IV** | | | | | | | | | | | | | | | | |
| 2a | 5.05 (4.8) | .61 (1.6) | | | | | .125 (5.7) | −.119 (5.6) | −.022 (1.2) | −.015 (0.6) | −.050 (3.3) | .221 (3.2) | −11.0 (8.8) | −1.5 (0.8) | −2.7 (2.3) | .983 0.86 |
| 3a | 2.38 (1.06) | 1.11 (2.0) | −.29 (0.5) | −.18 (0.2) | −.24 (0.3) | .66 (1.4) | .121 (3.7) | −.122 (4.0) | −.024 (0.9) | −.030 (0.9) | −.036 (1.9) | .171 (2.0) | −7.2 (2.3) | 3.7 (0.8) | 1.0 (0.3) | .983 0.86 |
| **1953-I to 1969-IV** | | | | | | | | | | | | | | | | |
| 2b | 4.16 (5.1) | .73 (3.1) | | | | | .143 (3.8) | −.008 (0.2) | −.042 (1.1) | −.048 (1.3) | −.022 (1.4) | .061 (1.8) | −11.2 (10.2) | 1.8 (1.6) | −4.2 (4.2) | .964 1.20 |
| 3b | 5.18 (5.1) | .64 (2.4) | −.40 (1.3) | .88 (3.1) | −.07 (0.3) | −.05 (0.2) | .160 (4.4) | .002 (0.1) | −.044 (1.2) | −.068 (1.9) | −.026 (1.7) | .079 (2.1) | −11.6 (7.8) | −1.8 (1.0) | −5.2 (3.6) | .968 1.13 |

Note: Values of "t" statistics are indicated in parenthesis. For explanation of the symbols other than those shown below, see equation 2 above.

$\bar{R}^2$ = Coefficient of determination (adjusted for degrees of freedom).

SE = Standard error of estimate of the regression.

**Table II**

**SELECTED REGRESSION RESULTS FOR EQUATIONS EXPLAINING THE PERCENTAGE CHANGE IN GROSS NATIONAL PRODUCT**

Quarterly data

| Equation | Time period | Data | Regression coefficients | | | | | $\bar{R}^2$ SE |
|---|---|---|---|---|---|---|---|---|
| | | | $\%\Delta M_1$ | $\%\Delta M_{1_{-1}}$ | $\%\Delta M_{1_{-2}}$ | $\%\Delta M_{1_{-3}}$ | $\%\Delta M_{1_{-4}}$ | |
| 3 | 1948-I to 1969-IV | NSA | 1.03<br>(4.4) | −.41<br>(1.7) | .49<br>(2.1) | −.31<br>(1.3) | .30<br>(1.3) | .961<br>1.26 |
| 3b | 1953-I to 1969-IV | NSA | .64<br>(2.4) | −.40<br>(1.3) | .88<br>(3.1) | −.07<br>(0.3) | −.05<br>(0.2) | .968<br>1.13 |
| 3b′ | 1953-I to 1969-IV | SA | .37<br>(1.8) | −.08<br>(0.3) | .53<br>(1.9) | .32<br>(1.2) | −.21<br>(1.1) | .541<br>0.71 |

Note: Values of "t" statistics are indicated in parenthesis. For explanation of the symbols other than those shown below, see equation 2 on page 294.

$\bar{R}^2$ = Coefficient of determination (adjusted for degrees of freedom).

SE = Standard error of estimate of the regression.

NSA = Not seasonally adjusted.

SA = Seasonally adjusted data are used for $M_1$, GNP, and G.

worse than the use of seasonally adjusted data.

Stock market prices are included in the equation on the assumption that the current market value of equities provides an efficient forecast of future income. The variable representing the percentage of man-hours lost due to strikes (SH) is included for institutional reasons.

Aside from these factors, the Laffer-Ranson equation is quite similar to the St. Louis equation. The most important difference is that the former contains only the current-quarter value of money. This implies that a change in the money supply has a once-and-for-all effect on the level of income. Equation 3 shows the results obtained when four lagged values of the percentage change in $M_1$ are included in the model. Only the coefficients of the money variables are shown below; the rest of the results for this equation as well as those for equation 2 are reproduced in the first portion of Table I.

Equation 3

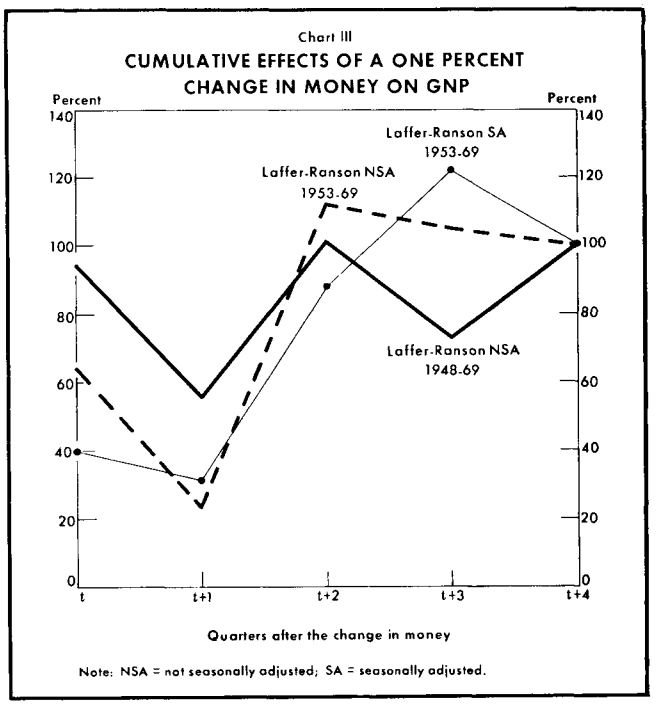
$$\%\Delta Y = \underset{(3.9)}{3.36} + \underset{(4.4)}{1.03}\%\Delta M_1 \underset{(1.7)}{-.41}\%\Delta M_{1_{-1}} + \underset{(2.1)}{.49}\%\Delta M_{1_{-2}}$$
$$\underset{(1.3)}{-.31}\%\Delta M_{1_{-3}} + \underset{(1.3)}{.30}\%\Delta M_{1_{-4}} \ldots .$$

$\bar{R}^{-2} = .961$ SE = 1.26 Interval: 1948-I to 1969-IV

Following Laffer and Ranson, the coefficients of this equation are estimated without the use of the Almon distributed lag technique. Although some of the lagged money coefficients approach statistical significance, equation 3—like equation 2—implies that the current and long-run effects of money on income are, for all practical purposes, the same. An increase of 1 percent in $M_1$ is associated with a roughly 1.0 percent rise in income in the current quarter and a 1.1 percent rise in the long run.

To test the hypothesis, suggested above, that it is the time interval used by Laffer and Ranson which is largely responsible for this result, equations 2 and 3 were reestimated for the subperiods 1948-I to 1952-IV and 1953-I to 1969-IV. The results (see the two lower sections of Table I) show that: (a) the relationship between money and income in the 1948-52 period is not statistically significant (equations 2a and 3a)[13] and (b) there is a significant lag in the effect of money on income during the more recent period. Indeed, the largest single change in income as a result of a change in money during this period occurs after a lag of two quar-

[13] The contribution of the five money variables to the explanatory power of equation 3a may be evaluated by using the statistical procedure known as the F-test. When this is done, we find that the relationship between money and income is not significant even at the .20 confidence level. It should also be noted that the poor showing of the money variables in the 1948-52 period cannot be attributed simply to the shortness of the period and hence the limited number of degrees of freedom. These conditions do not prevent us from finding statistically significant relationships for most of the other variables included in equations 2a and 3a.




ters (equation 3b).[14]

Perhaps the most interesting feature of the results is the similarity between the "money coefficients" for the period 1953-69 (equation 3b) and those which have been obtained by other researchers using seasonally adjusted data for the same period. To demonstrate this, equation 3b was re-estimated with seasonally adjusted data for $M_1$, GNP, and G. The coefficients for the current and lagged money variables for this equation (3b′) and for equations 3 and 3b are reported in Table II. Once again the equations are estimated *without* the use of the Almon distributed lag technique. Chart III shows the cumulative percentage distribution of the effects of money on income as implied by these equations. It is clear from the chart that it is the time period chosen by Laffer and Ranson which is largely responsible for their controversial result rather than the use of seasonally unadjusted data. This shows up even more dramatically when the equations are estimated with the Almon procedure. When this is done there is very little difference between the distributed lag implied by the Laffer-Ranson equations (using seasonally unadjusted data but fitted to the 1953-69 period) and that implied by the St. Louis equation [3], see Chart IV.[15] Thus, once the period through the Korean war is eliminated from the analysis, it makes no difference at all whether the relationship between money and income is estimated with seasonally adjusted data or unadjusted data and dummy variables. Both procedures yield a relatively short, but nevertheless positive, lag in the effect of monetary policy.[16]

## THE ALMON LAG TECHNIQUE

Finally, it seems worthwhile to say a few words about the use of the Almon technique and its effect on the estimates of the structure (or distribution) of the lag. As noted earlier, this procedure has become quite popular in recent years. It tends to smooth out the pattern of the lag coefficients and makes them easier to rationalize. However, the extent of the differences in the estimates obtained for individual lag coefficients, with and without the use of the technique, provides some reason for concern.

For example, in his experiments with the St. Louis equation, Davis found that either 29 percent or 46 percent of the ultimate effect of money on income could be attributed to the current quarter. The lower number was obtained when the equation was estimated using the Almon technique, while the higher value occurred when the Almon constraint was not imposed on the equation. The explanatory power of the equation was essentially the same in

[14] In fairness to Laffer and Ranson, it should be noted that even for equation 3b we are unable to reject the hypothesis (at the .05 confidence level) that the current-quarter money coefficient is less than 1.0. However, there appears to be no necessary reason why the current-quarter effect should be singled out for special consideration. Thus, equation 3b also implies that after six months the cumulative effect of money on income is not significantly different from zero.

The hypothesis that the same regression model fits the entire Laffer-Ranson sample period (1948-69) may be evaluated by means of a procedure developed by Chow [9]. Doing this, we find that the hypothesis may be rejected at the .01 confidence level, that is, the differences in the parameter estimates of equations 2a and 2b and equations 3a and 3b are statistically significant.

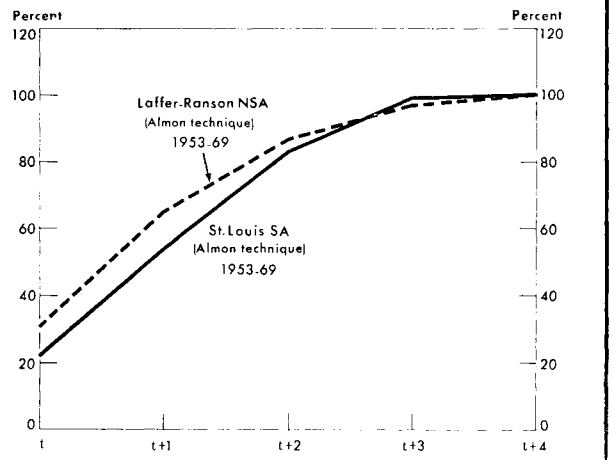
[15] For comparative purposes, the constraints imposed in estimating the Laffer-Ranson equations with the Almon procedure are the same as those used in the St. Louis equation, i.e., a fourth-degree polynomial with the t+1 and t—5 values of the money coefficients set equal to zero.

[16] An almost identical conclusion is reached in a forthcoming paper by Johnson [23a]. Laffer and Ranson provide an alternative explanation of the difference between their own lag results—shown in equation 3—and the St. Louis results. However, there is no mention in their article that the time period employed to estimate their equations is considerably different from that used in the St. Louis model and most other recent studies.

both cases.[17] In the Laffer-Ranson model as well, substantially different estimates of the lag structure are consistent with about the same $\bar{R}^2$. In this model the estimates of the current-quarter effect of money on income are 31 percent with the Almon technique and 64 percent with unconstrained lags (compare the Laffer-Ranson NSA curves for the 1953-69 period in Charts III and IV). On the other hand, over the first six months it is the *Almon* technique which yields a faster response of income to money, for both the Davis experiments and the Laffer-Ranson model, than is obtained with unconstrained lags.

The wide divergence in these estimates of the impact of monetary variables over short periods, depending on the nature of the estimating procedure employed, suggests that existing estimates of the underlying lag structure are not very precise. One reason for this may be that the pattern of the lag varies over time.[18] In any event, the uncertainties surrounding the structure (distribution) of the lag are not eliminated by the Almon technique. Thus, use of any existing estimates of the lag structure as a firm basis for short-run policy making would seem rather hazardous at this time.

Chart IV
CUMULATIVE PERCENTAGE DISTRIBUTION OF THE EFFECTS OF MONEY ON GNP




Note: NSA = not seasonally adjusted; SA = seasonally adjusted.

## CONCLUDING COMMENTS

One finding stands out from the results presented above, namely, that there is a lag in the effect of monetary policy. Nevertheless, estimates of the length of the lag differ considerably. Of the three factors considered in this paper that might account for these differences, the most important is the specification of the appropriate monetary policy variable (or variables) in the construction of econometric models. Use of nonborrowed reserves as the exogenous monetary variable suggests that less than 40 percent of the impact of a monetary action occurs within five quarters and that the full effect is distributed over two and a half years. On the other hand, use of the money supply, the monetary base, or total reserves suggests that most of the effect occurs within four or five quarters. The latter estimate of the lag may appear to be relatively short. However, it does not seem to be grossly out of line with the view held by the majority of economists in the early 1960's.

The two other factors considered and found to be less important in explaining the differences in the estimates of the length of the lag are (1) the type of statistical estimating model (structural versus reduced form equations) and (2) the seasonal adjustment procedure. In both of these instances, though, there is not enough evidence available to draw very firm conclusions; hence further work might prove fruitful.

Finally, more work is also needed to help refine estimates of the distribution of the lag. Existing estimates of the lag structure do not appear to be sufficiently precise to justify large or frequent short-run adjustments in the growth rates of monetary aggregates.

[17] See Davis [12]. The estimates of $R^2$ are .46 and .47, respectively. The period used to estimate the equation was 1952-I to 1968-II.

[18] Some support for this hypothesis is provided by the simulation results for the FRB-MIT model shown in Chart I as well as the results obtained by Warburton [30] and Friedman and Schwartz [17] in their analyses of the timing relations between the upswings and downswings in money and economic activity.

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