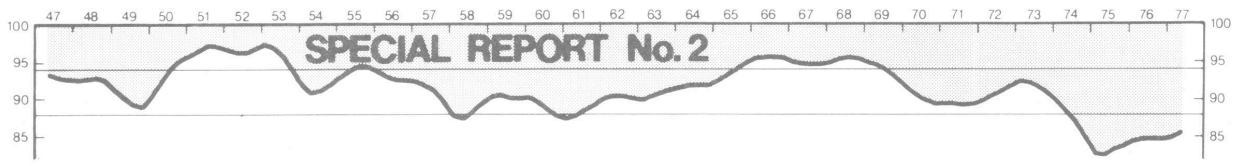

A NEW MEASURE OF THE MONETARY "VELOCITY" (STOCK/FLOW) RATIO AND ITS IMPLICATIONS FOR MONETARY POLICY AND ECONOMIC FORECASTING

June, 1977

SUMMARY AND CONCLUSIONS

This is a report on significant new developments in IEA's continuing efforts to devise a more stable and reliable statistical measure of the monetary stock/flow ("velocity") ratio. It shows that when this ratio is expressed in its most appropriate form, it has much greater stability and predictability than previously realized, and is thus a correspondingly more useful tool for both monetary policy and economic forecasting.

Part I reviews the basic relationship between monetary growth and real economic growth, noting the key functional significance of the stock/flow ratio and its long-run declining trend.

Part II describes briefly the IEA concept of the ratio, which uses final sales rather than GNP as the denominator, and which thus provides a more stable and predictable trend value. The most recent improvement in this series is a supplemental seasonal adjustment. Removing the surprisingly large seasonal components (Figure 2) further reduces the short-run fluctuations of the ratio and thus further increases its reliability for policy and forecasting.

Part III describes an experiment in using the new stock/flow ratio in short-run "monetary forecasting" for the years 1969-76. The growth rate of nominal final sales was "predicted" for each quarter by adding together the money-stock growth rate and the trend decline of the stock/flow ratio with its seasonal factor for that quarter. The average prediction error (Figure 4, Panel D) during the whole eight years was 1-3/4% (much of that accounted for by 70:4, 71:1, 74:3, and 74:4). The average for the past two years was only l-4%.

The significance of this experiment in "monetary forecasting" is even greater than indicated by the moderate prediction errors, because the seasonal adjustment of the stock/flow ratio used here (which was responsible for much of the improved performance) was a rather unsophisticated "machine" operation. The prediction error could undoubtedly be further reduced by taking explicit account, prior to machine processing, of the various specific factors which have tended to cause changes in, or deviations from, the "normal" seasonal pattern, and of several other technical factors.

If "velocity" can actually be reliably predicted, then monetary policy will probably become more generally recognized as the primary tool for achieving full recovery and stable growth.

Note to 2008 reprint: IEA CHARTS HISTORICAL SUPPLEMENT is not on the web, but the MONTHLY CHARTS are, and web references are included here wherever possible.

I. THE BASIC RELATIONSHIP BETWEEN MONEY SUPPLY GROWTH AND REAL ECONOMIC GROWTH

In order to understand the key significance of the "velocity" (stock/flow) ratio in macroeconomic analysis and policy, it is necessary to understand the even more basic relationship between money growth and the growth of total GNP spending. Therefore, in view of the very widespread misconceptions regarding this relationship, it is probably useful to include a brief review at the beginning of this report.[1]

HOW MONEY IS CREATED

Money is "created" in the process by which banks make loans and investments. When a bank makes a loan, it credits the borrower's checking account. And because that particular portion of the nation's money supply did not exist prior to the loan, it is sometimes said that checking deposit money is created flout of thin air." The process is easier to understand when the government prints ordinary paper money, but the result is the same.

Because banks are required by law to hold an average of about 13% reserves against their checking deposits, the amount of money which they can create is limited by the amount of "reserve money" which the Federal Reserve itself creates when it purchases Treasury securities in the open market. This is the primary means by which the Federal Reserve controls the money supply. This reserve money is sometimes called "high-powered money" because the average 13% fractional reserve ratio makes it possible for the banks to create about eight times[2] as much new money as the amount of reserve money supplied by the Federal Reserve to increase the money stock.

It is only checking deposits and currency which are "created" in the Process of bank lending People borrow only to spend; they don't borrow to make savings deposits. Thus, an increase in savings deposits does not involve the creation of any net additional purchasing power; it represents merely a transfer of purchasing power from savers, through the financial intermediary, to a borrower/spender.[3]

HOW MONEY GROWTH "FINANCES" ECONOMIC GROWTH

It is precisely because additions to our stock of checking deposits and currency are newly created, rather than coming from prior income and saving, that they can finance the growth of total GNP spending.

Moreover, each dollar of "new money" generates many more dollars of total income and spending as it is spent and re-spent over and over. However, this "multiplier effect" is progressively diminished as the new money gradually becomes "locked into" the higher level of cash balances which is actually needed to service the higher level of GNP, given any particular level of the stock/flow ratio.

In fact, this "monetary multiplier" by which each dollar of new money generates many more dollars of GNP is very similar to the "reserve multiplier" process mentioned above, by which each dollar of additional "high-powered money" (bank reserves created by the Federal Reserve) ultimately creates a much larger increase in checking deposit money.[4]

Of course, it is not just the *nominal* dollar amount of GNP growth which is important, but the *real* growth of physical goods and services, after allowing for inflation. However, the OPEC "oil tax" and other recent experience have demonstrated that where the economy is operating well below its full employment potential -- as it has been since 1973 -- the rate of inflation is determined primarily by other factors than the money supply. Therefore, the present analysis deals solely with the linkage between money growth and the growth of *nominal* GNP.

THE KEY FUNCTIONAL SIGNIFICANCE OF THE STOCK/FLOW RATIO

In determining how much "new money" is needed to achieve a particular economic growth rate, a key factor is the functional link between them: the relationship between the *stock* of money and the *flow* of income and spending which it services.

This relationship is similar to the one between business inventory stocks and sales volume. It can be thought of either as the *turnover rate* of the stock, or as its inverse form, the *inventory/sales* (stock/flow) *ratio*. American economists have traditionally used the "turnover" version, usually referred to as "velocity" (i.e. the speed with which money travels around the "circular flow" of income and spending, measured as the ratio of GNP to money stock).

However, as British economists emphasize, this relationship is more significant and useful when expressed as a *stock/flow* ratio, with the money stock as the denominator of the ratio, because it is the *money stock*, rather than GNP, which is subject to direct monetary policy control, and because individual businesses and households affect their own monetary "velocities" primarily by the way they manage their own individual shares of the money supply -- their checking account balances.

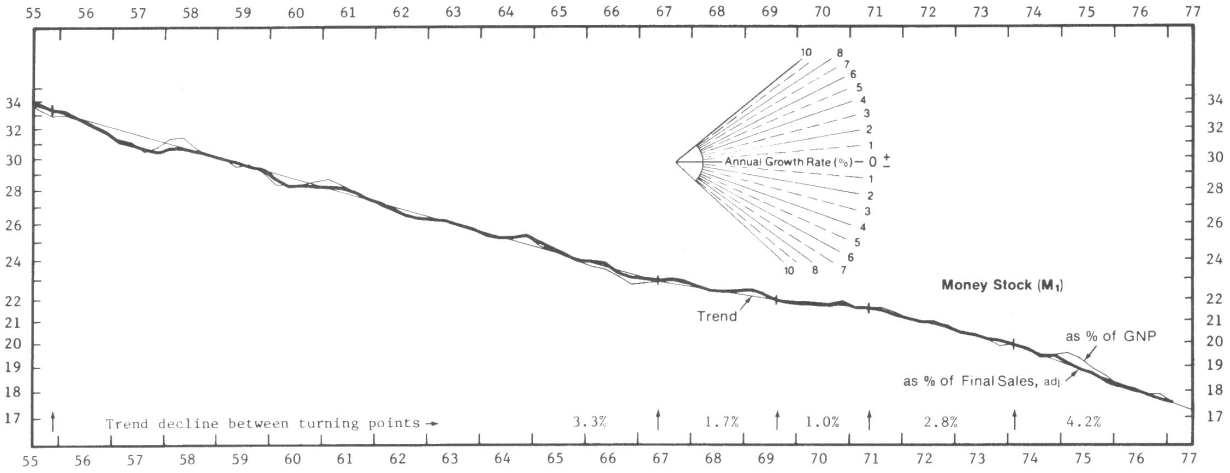

FIGURE 1

The effect of the long-run declining trend of the stock/flow ratio -- Figure 1 shows that the basic trend of the stock/flow ratio has been declining at a substantial rate for more than 20 years (actually, ever since World War II, as shown by series 1 to 5 on page 7 of IEA CHARTS HISTORICAL SUPPLEMENT). This has been largely because rising interest rates over this period have induced depositors -- particularly business firms and state and local government units -- to "economize" on their non-interest-paying checking deposits, in order to keep all funds not actually needed for transaction purposes (or tied up by minimum balance requirements) invested in interest-earning savings deposits or securities.

The importance of this decline for economic policy lies in the fact that a *decline* in the stock/flow ratio has approximately the same effect as a proportionate *increase* in the total money stock. This can be illustrated by a simple example. If banks, on the average, were to reduce their minimum balance requirements from $300 to $200, all depositors who manage their accounts so as to maintain the minimum would then have an additional $100 to spend without needing to replenish their accounts. The total increase in their effective purchasing power would be much the same as if they had each borrowed $100 of newly created money from the bank.[5]

II. THE NATURE AND SIGNIFICANCE OF IEA'S NEW STOCK/FLOW RATIO

ADJUSTED FINAL SALES RATHER THAN GNP AS THE DENOMINATOR.

In the traditional "velocity" ratio -- the one still used by the Federal Reserve -- *total GNP* is used for the "flow" aspect of the stock/flow ratio. IEA has found, however, that this ratio is much more stable -- and also more functionally significant -- when *final sales* (GNP minus inventory fluctuations) is used as the denominator. Presumably this is mainly because final sales tends to represent more adequately the total volume of non-financial money transactions which must be serviced by the money stock.[6]

Furthermore, in order to have the long-run trend of the final sales ratio coincide with the GNP ratio -- and to show more clearly their relative behavior during economic fluctuations -- IEA has added to final sales what would tend to be the normal amount of inventory investment during stable growth of the economy at its basic potential-GNP growth rate. We call this series "*FINAL SALES, adjusted*." It could equally well be called "inventory-normalized GNP," because it nets out, in effect, the abnormal-fluctuations component of inventory investment, the factor which causes the sharpest fluctuations in GNP. Actual GNP and adjusted final sales are shown together (series 7 and 8) on page 7 of the IEA CHARTS HISTORICAL SUPPLEMENT.[7] [Note: Chart of 1965-1979 data is available at http://www.iea-macro-economics.org/charts/chart18.html]

Because inventory fluctuations may also be caused by many other short-run factors which tend to give a distorted indication of the basic trend of the economy, IEA has found that final sales -- or final sales, adjusted -- is also a more appropriate basis than GNP for evaluating current macro-economic performance, and for economic policy formation. Thus, in the following analysis of

the relationship between monetary growth and growth of the economy, we use adjusted final sales instead of GNP. (The *growth rate* of the official measure of *actual* final sales and the IEA measure of *adjusted* final sales are virtually identical. Therefore, for the sake of brevity in the remainder of this analysis, we will refer to *adjusted* final sales simply as "final sales."

SUPPLEMENTAL SEASONAL ADJUSTMENT

When IEA noticed that the stock/flow ratio computed from the official seasonally adjusted estimates of GNP and final sales seemed to have significant "seasonal" characteristics, we ran GNP, final sales, money stock, and the stock/flow ratios through a computer (modified Census X11) seasonal adjustment program. We found that all the series had significant residual seasonal components. Figure 2 shows these components for the growth rate of the money/final sales ratio.

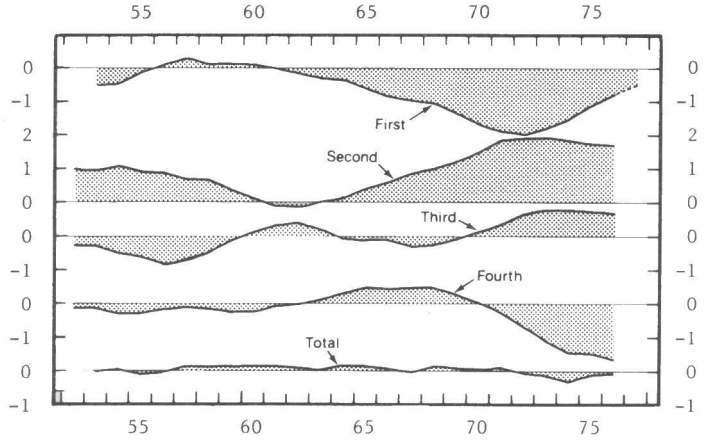

FIGURE 2

RESIDUAL QUARTERLY SEASONAL FACTORS IN MONEY/FINAL SALES RATIO
(% change of unadjusted minus % change of adjusted)

In Figure 4 (page 9), Panel A shows how much even this unsophisticated preliminary seasonal adjustment was able to reduce fluctuations in the growth rate of the stock/flow ratio. Panel C shows the improvement in the final sales growth rate.

LONG-RUN vs SHORT-RUN USES OF THE STOCK/FLOW RATIO

Since the long-run trend of the monetary stock/flow ratio (Figure 1) indicates the basic "money inventory" requirements of the economy -- i.e. the "demand" for money -- it provides an important basis for monetary policy. In addition, since this ratio is the key functional link between money growth and real economic growth, it can also be combined with the current changes in actual money growth and inflation trends to provide a basis for short-run economic forecasting which is more useful than the composite index of so-called "leading" indicators, and, indeed, may even approach the accuracy of the sophisticated computer forecasting models.

THE LONGER-RUN STABILITY
AS A BASIS FOR MONETARY POLICY

As noted above, a *decrease* in the monetary stock/flow ratio has approximately the same effect as a proportionate *increase* in the actual money stock. Thus, conceptually, *the percentage increase in the money supply plus the "new-money equivalent" of the decline in the stock/flow ratio "determines" the economic growth rate.*

This relationship is shown empirically in Figure 3, where the heavy dotted line represents the sum of the money supply growth rate (stippled area), and the "new money equivalent" of the trend decline in the money/final sales ratio (crosshatched area). Note that this line corresponds closely to the actual 4-quarter moving average of final sales (upper heavy line). In this presentation, the main solid lines are 4-quarter (centered) moving averages to eliminate, for the moment, the problem of poor seasonal adjustments and other sources of short-run fluctuations. However, the actual (unaveraged) money growth rate (light dashed line) and final sales growth rate (fine solid line) are also shown, for comparison.

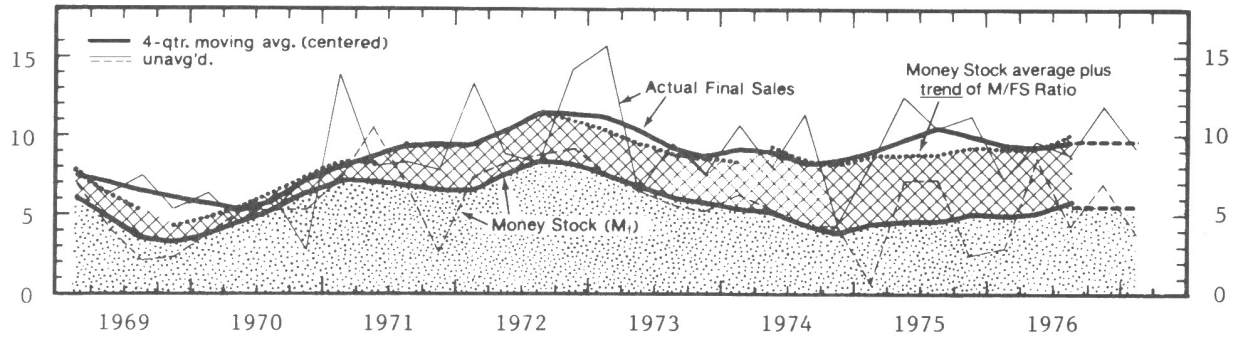

FIGURE 3. MONEY SUPPLY AND "NEW-MONEY EQUIVALENT" OF TREND DECLINE OF MONEY/FINAL SALES RATIO IN THE DETERMINATION OF TREND OF ACTUAL NOMINAL FINAL SALES (Annual Growth Rates, %)

This relationship has a clear implication for monetary *policy*. If the trend decline of the ratio is predictably stable at close to 4%, as it has been for the past three years, and the policy makers want the economy to grow at a rate of 11% (5% real growth plus 6% allowance for inflation), this could be achieved by a 7% money supply growth rate (7% + 4% = 11%).

(It needs to be noted, of course, that if government price/wage policies allow the rate of inflation to exceed 6%, the nominal money supply would need to be increased proportionately to achieve the 5% real growth.)

Since the *trend* of the monetary stock/flow ratio tends to be relatively stable -- particularly in comparison with most other economic series -- it provides a sound, functionally appropriate basis for a much more stable growth of the money stock.

This is particularly true if we use fiscal policy (i.e. appropriate flexible changes in tax rates and resulting changes in the federal deficit), *rather than monetary policy as the primary means for controlling interest rates*. It is our understanding that a study is already underway in Congress to

determine how the federal budget might be related more effectively to the basic credit balance of the economy.

Effect of NOW Accounts -- The longer-run trend of the stock/flow ratio would probably suffer considerable distortion if NOW accounts (interest-paying checking accounts) are extended nationwide, as is now being proposed in Congress. (For further analysis of this effect, see the forthcoming IEA SPECIAL REPORT #3, "The Potentially Disastrous Effects of 'NOW' Accounts on Monetary Management and Recovery/Stabilization Policy.") In fact, the Federal

Reserve assumes that the steeper decline of the stock/flow ratio since 1971, and particularly since 1974, was due in large part to the initial permission for NOW accounts in New England, and to other recently-permitted "substitutes" for regular checking accounts.

III. AN EXPERIMENT IN USING THE NEW STOCK/FLOW RATIO IN SHORT-RUN "MONETARY FORECASTING"

Since the more efficient tools for management of monetary and fiscal policy noted above will probably not be perfected and win political acceptance for several more years, there is continued interim need for short-run economic forecasting. The new IEA measure of the monetary stock/flow ratio provides a promising basis for such forecasting.

Panel D in Figure 4 (page 9), and Table 1 (page 11), present the results of an experimental application of this method to quarterly forecasting during the period since 1968.

As in Figure 3, *the rate of nominal final sales (Column 3 in Table 1) was "predicted" (Column 5) by adding together the growth of the money stock (Column 1) and the "new-money equivalent" of the* ***trend*** *decline in the monetary stock/flow ratio (Figure 1)* ***together with its seasonal factor*** *(Figure 2), as these are combined in Column 2.* (See also the note to Column 2.)

In Panel D, "predicted" final sales is shown by the fine line, actual final sales by the heavy line. The difference between them, the "prediction error" (Column 6), is indicated by the dotted shading above and below the actual final sales growth rate, and also separately, disregarding signs.

In a few cases the prediction error was uncomfortably large. However, for the past two years, during which the decline of the stock/flow ratio was relatively stable (Panel A), the average error was only about 1.25%. Over the whole eight years, the average error was 1.75%. For perspective, there was an average 1.0% *difference*, during 1964-76, between the government's first official estimate of GNP (three weeks after the end of the quarter) and its revised estimate the following July. (We have not as yet made any systematic comparison of the results of this method with those of the various computer models.)

Several other implications of this forecasting experiment are also significant:

Money growth is predominant factor in economic growth -- Changes in the money supply growth rate appear to be the predominant factor determining changes in the final sales growth rate. This is particularly notable in the longer-run perspective of Figure 3, and in the quarter-to-quarter fluctuations during the past two years. Since 1971 an apparent faster decline of the stock/flow ratio seems superficially to have contributed an increasing proportion of the final sales growth. However, this is undoubtedly due in part to the exclusion of New England NOW accounts and other recently-permitted "substitutes" for checking-deposits from the official Federal Reserve measure of the money supply.

By contrast, when interest rates decline to more non-inflationary rates, this will tend to cause a **slower** decline in the stock/flow ratio, so that this component will become a correspondingly smaller proportion of the total growth of final sales.

Immediate effect -- There still seems to be widespread belief that there is a significant tag between a change in monetary policy and its ultimate effect on the economy. In earlier postwar periods, when the stock/flow ratio was two or three times as high -- and the level of interest rates two or three times as low -- there was, in fact, a lag of as much as three quarters. But since 1973 (or even 1970) there seems to have been no systematic lag -- presumably because the "excess" or "inactive" cash balances subject to significant influence by short run changes in financial conditions have apparently been reduced so low that a change in the monetary growth rate tends to cause an almost immediate corresponding change in the rate of spending. This relationship is also seen perhaps most clearly in the 4-quarter average of Figure 3 (since 1971) and in the quarter-to-quarter fluctuations of the past two years.

More improvement possible -- Figure 3 suggests that there is a slight downward bias to this forecasting formula (i.e. a general tendency for the predicted value to be too low). However, the main source of forecasting error (in a technological sense) is the quarter-to-quarter deviation of the actual stock/flow ratio from its longer-run trend value (after allowance for seasonal factors), as shown by the heavy line at the bottom of Panel B.

Some part of these deviations is undoubtedly caused by actual functionally significant short-run variations in the "demand for money" -- i.e. in the spending proclivities of households and businesses *within the normal range of their cash-balance and cash-flow plans and practices which determine the **trend** of this ratio*.[8]

However, the stability of this ratio is subject to a number of other influences which are mainly "technical" in nature, and thus could probably be further reduced by appropriate statistical analysis and adjustment.

Panels A, B and C in Figure 4 show the considerable improvement in the performance of this series which was produced by a rather unsophisticated supplemental computer seasonal adjustment. Undoubtedly more could be done to improve the performance of this series merely by a more sophisticated seasonal adjustment of the ratio itself, and/or its money-supply and final-sales components.

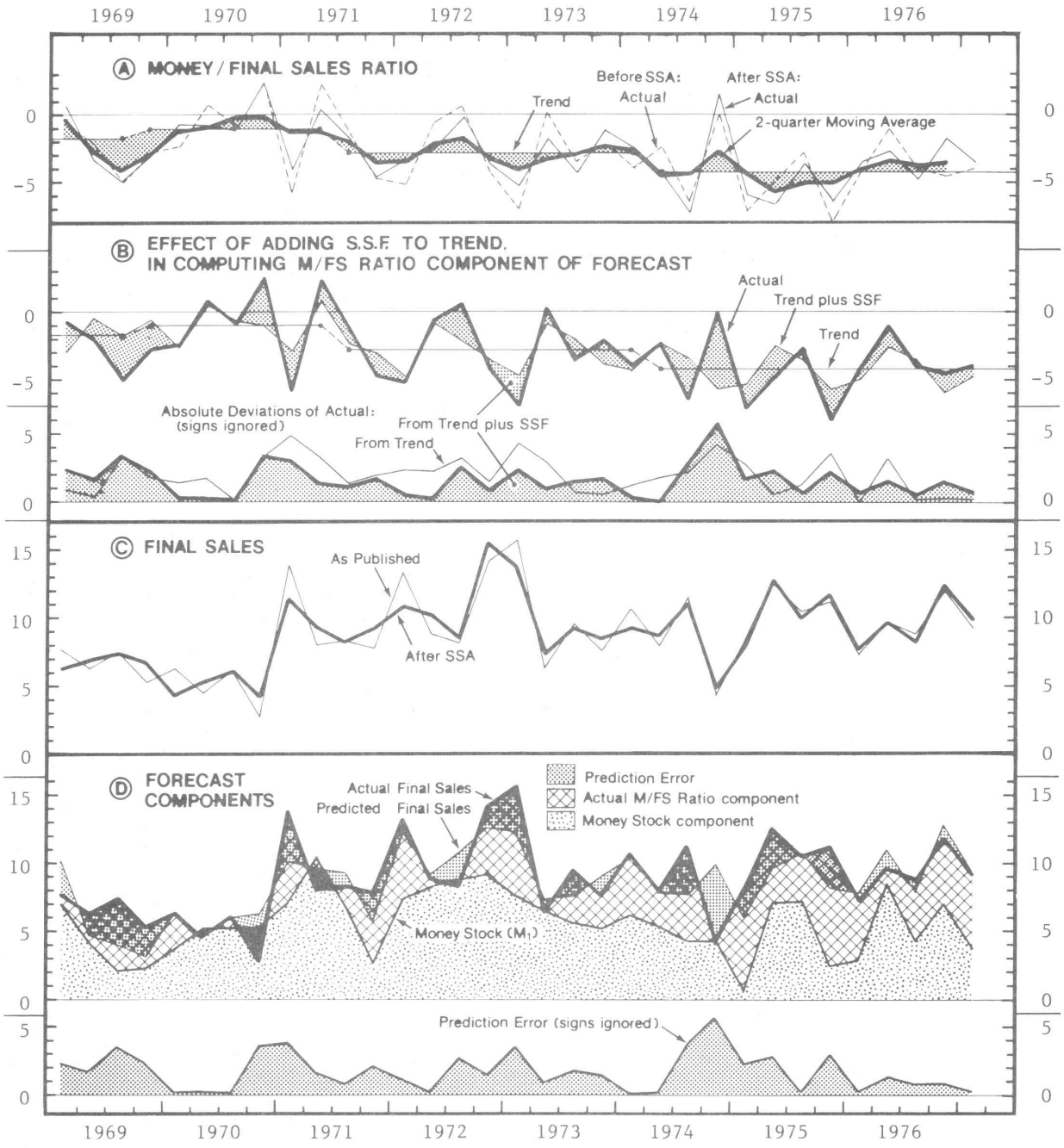

FIGURE 4

SEASONAL ADJUSTMENT OF MONEY/FINAL SALES RATIO
AND USE OF THIS RATIO IN "MONETARY FORECASTING"
(% changes, annual rates)

Other technical factors which may have contributed to the observed deviations are differences in the pattern of week-to-week growth rates of the money supply *within* quarters (since *sharp* fluctuations of the money supply require time to work out their full effect), and errors in the official estimates of the money stock and/or final sales.[9]

ADVANTAGES OF "MONETARY FORECASTING"

A key advantage of the "monetary forecast" is that it can be revised currently as soon as it becomes clear what will be the trend of the money supply growth rate, and the fact that the growth rate for the complete quarter is available within little more than a week after the end of the quarter.

A second key advantage is that it focuses attention on one of the factors most responsible for actually *determining* the growth rate of the economy, and thus, implicitly, provides an appropriate basis for evaluating current economic policies.

Moreover, because this forecast of nominal final sales must be translated *directly* into a forecast of real final sales by an adjustment for the expected rate of inflation, it implicitly focuses attention on another major *determining* factor which is subject to independent policy influence.

LONGER-RUN FORECASTING HINDERED BY PRESENT MONETARY POLICIES

Reliable longer-run forecasting by this method is probably not possible as long as the money supply growth rate has functionally inappropriate fluctuations as large as those during the past two years. The Federal Reserve's stated "target range" for monetary growth is of relatively little use because the range itself is so wide and "subject to change without notice." Moreover, what matters most is the real growth rate of the economy, after allowing for inflation, and there is no reliable means of knowing to what extent the Fed will allow for exogenous non-monetary causes of increased inflation, such as the OPEC "oil tax," or the tax increases expected to accompany the Carter energy policy.

8-2-77

TABLE 1. DATA FOR "MONETARY FORECASTING EXPERIMENT"

(% changes, annual rate, except Column 7)

	(1) Money Stock (M1)	(2) Trend Decline of M/FS (+ SSF)	(3) Actual Final Sales	(4) Final Sales with SSA	(5) Predicted Final Sales (columns 1+2)	(6) Prediction Error (columns 5 less 3)	(7) M/FS Ratio with SSA
69 1	7.0	3.1	7.8	6.2	10.1	2.3	22.43
2	4.2	0.5	6.4	6.9	4.7	*-1.7*	22.24
3	2.2	1.8	7.5	7.4	4.0	*-3.5*	21.97
4	2.3	0.7	5.3	6.6	3.1	*-2.3*	21.79
70 1	3.7	2.7	6.3	4.3	6.4	0.1	21.75
2	5.2	*-0.5*	4.5	5.3	4.7	0.2	21.71
3	5.2	0.8	6.1	6.1	6.0	*-0.1*	21.65
4	5.3	1.0	2.8	4.1	6.3	3.5	21.78
71 1	7.1	2.9	13.9	11.4	10.1	*-3.8*	21.56
2	10.5	*-0.8*	8.0	9.2	9.6	1.6	21.58
3	6.8	2.4	8.3	8.2	9.3	0.9	21.48
4	2.6	3.0	7.8	9.1	5.7	*-2.1*	21.24
72 1	7.4	4.8	13.3	10.8	12.2	*-1.2*	21.06
2	8.3	0.9	8.9	10.2	9.2	0.2	20.93
3	8.7	2.2	8.2	8.0	10.8	2.7	20.92
4	9.2	3.4	14.1	15.4	12.6	*-1.5*	20.73
73 1	7.6	4.6	15.7	13.6	12.2	*-3.5*	20.45
2	6.5	0.9	6.4	7.4	7.4	1.0	20.36
3	5.6	2.0	9.5	9.2	7.6	*-1.8*	20.14
4	5.2	3.9	7.6	8.5	9.1	1.5	20.08
74 1	6.2	4.3	10.6	9.3	10.5	*-0.1*	19.96
2	5.4	2.4	8.0	8.6	7.8	*-0.2*	19.74
3	4.3	3.4	11.4	11.0	7.7	*-3.7*	19.38
4	4.4	5.7	4.4	4.9	10.0	5.7	19.45
75 1	0.7	5.3	8.3	7.9	6.0	*-2.3*	19.16
2	7.1	2.5	12.5	12.7	9.6	*-2.9*	18.84
3	7.3	3.5	10.5	10.0	10.8	0.3	18.66
4	2.5	5.7	11.2	11.6	8.2	*-3.0*	18.36
76 1	2.9	5.0	7.4	7.7	7.9	0.4	18.20
2	8.5	2.6	9.6	9.6	11.0	1.4	18.08
3	4.4	3.5	8.8	8.2	8.0	*-0.9*	17.86
4	7.0	5.9	12.0	12.3	12.8	0.9	17.73
77 1	4.8	4.7	9.2	9.9	9.5	0.3	17.57

Col. 1 Data are Federal Reserve daily average series, average of the three monthly averages in the quarter.

Col. 2 (SSF) The seasonal factors from the supplemental seasonal adjustment of the ratio are added to the trend values (see Figure 4, Panel B) so that the sum will correspond more closely to published final sales data which have a residual seasonal factor (see Figure 4, Panels B & C).

Cols. 3,4 Although these growth rates were computed from IEA's Adjusted Final Sales, which includes a normal rate of inventory investment, they are virtually identical to the growth rates of published final sales data.

Cols. 4,7 (SSA) supplementally seasonally adjusted by IEA, using a version of the Census X-11 program.

Note: All data precede the 1977 annual July NIPA revisions, and before the money supply revisions of 6-23-77.

NOTES

1. (page 2) For the benefit of those familiar with the various "schools" of traditional economic theory, it should be noted that although this analysis deals mainly with the key role of our money supply, it differs signficantly from the "Chicago" (Milton Friedman) approach to economic analysis.

2. (page 2) This is approximately the reciprocal of the 13% reserve ratio.

3. (page 2) There is another sense in which ordinary savings accounts are *not money*: they can be *spent* (used to carry out *transactions*) only by *withdrawing* the funds first -- i.e. by exchanging the savings account funds for the true *money* in the form of a checking account balance or currency. The Federal Reserve's recent use of the term "money and credit aggregates," and the confusing Ml, M2, M3, etc. terminology, has served, whether intentionally or not, to blur the distinction between money and other financial assets. *Conceptually* and *functionally* however, the distinction is still crystal clear: money is what you can *spend, in the form in which you can spend it* -- whether it be checking deposits, paper dollars, metal coins, or even wampum. The supposed distinction on the basis of "relative liquidity," which presumably underlies the Fed's "multiple M's," is conceptually and functionally invalid: on Sunday a used car is probably more "liquid" (i.e. can be changed into money more quickly and efficiently) than a savings account.

4. (page 3) As in the case of the "reserve multiplier," the precise value of this "monetary multiplier" is the reciprocal of the monetary stock/flow ratio -- the ratio of money stock to total spending. For instance, if the ratio were to remain unchanged at 17% (the value it will probably reach by the end of 1977), each dollar of new money would generate about *six* dollars increase in GNP.

5. (page 4) The same principle applies to business inventories: if a retailer finds that by more efficient inventory control he can reduce his average stock by $1000 without affecting his average sales volume, he then has $1000 worth of additional goods to sell, just as if, with his old inventory/sales ratio, he had purchased $1000 worth of new stock.

6. (page 4) During recessions, the inventory-investment component of GNP is greatly reduced or even negative, thus causing the typical 'sharp reduction in the GNP growth rate. However, the decline in actual cash *expenditure* by business is less than the decline in GNP *value* of inventory investment -- because the inventory *value* includes overhead costs excluded from actual cash expenditure.

   In addition, final sales, tends to be sustained by an increase in transfer payments (unemployment insurance, social security, etc.). However, the increase in transfer payments -- which are *excluded* from the measure of GNP expenditure -- tends to be *financed* by essentially the same funds which previously financed the inventory investment-which is *included* in GNP expenditure. This is because a recession tends to increase the "automatic-stabilizer" component of federal borrowing by roughly the same amount as the decline in business inventory borrowing.

Since the *transactions demand for money* (as indicated by the trend of the monetary stock/flow ratio) is related to the volume of *transactions* (whether for final demand or inventory stockpiling, and regardless of how it is financed), *the stock/flow ratio tends to be more stable -- and more functionally significant -- when final sales is used as the denominator*, rather than GNP.

7. (page 4) The trend line in Figure 1 differs from the one in the HISTORICAL SUPPLEMENT because the Figure I trend was drawn to correspond as closely as possible both with peaks of the *final sales* operating rate, treating 71:1 as a peak, and with periods of normal inventory investment, whereas the HISTORICAL SUPPLEMENT trend was drawn to correspond with peaks of the *GNP* operating rate (i.e. the Operating Rate of the Economy, ORE), excluding the "submerged" 1971 peak. (See http://www.iea-macro-economics.org/charts/chart01.html)

8. (page 8) In his reports to Congress, Fed chairman Arthur Burns tends to emphasize business and consumer "confidence" as a significant factor affecting "velocity." IEA has not yet been able to find any clear evidence of such a correlation in the ratio of money stock to *final sales*. When total GNP is used as the denominator, of course, there does tend to be a significant increase in the ratio during recessions of GNP -- which tend to correspond with recessions of "confidence." But our analysis suggests that this rise is due primarily to the recession of inventory investment caused by recession of the final sales growth rate -- which in turn is caused mainly by recession of the real money supply -- rather than being due to any independent (exogenous) decline in business "confidence. " Similarly, the sharper decline of the ratio of money to *GNP* during recovery is due primarily to the recovery of the inventory-investment component of GNP rather than to any independent recovery of "confidence."

9. (page 9) We also tested another hypothesis which seemed quite plausible. Available evidence suggests that a fairly large proportion of both checking deposits and currency is held in large balances which tend to be relatively "idle" in the sense of not being used or needed for current transactions purposes (e.g. see *New England Economic Review*, Federal Reserve Bank of Boston, March/April 1977). To the extent that this is so, it seems reasonable to suppose that any increase in final sales would tend to be proportionate to the increase in the "active" portion of the money stock, and that an increase in the money stock would thus tend to produce a *larger* proportionate increase in final sales. Although we tried several approaches, we could find no such systematic correlation.