

FEDERAL RESERVE BANK OF ST. LOUIS

FEBRUARY 1971



REVIEW



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Stabilization Policies and Employment

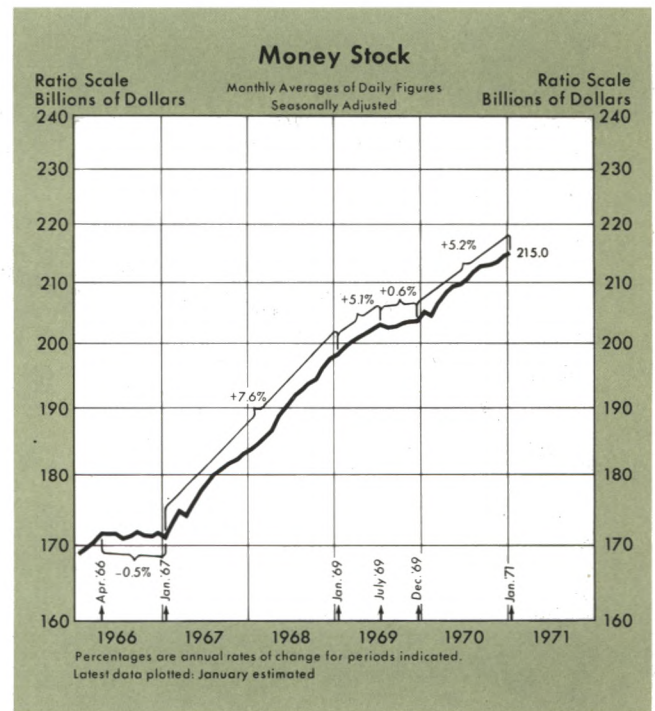
REAL OUTPUT declined and the unemployment rate rose during 1970. The restrictive monetary and fiscal policies initiated in late 1968 had an impact on aggregate demand which affected output more than prices. Moderately stimulative monetary and fiscal policies were initiated in early 1970. The rate of increase in prices has stopped accelerating. However, a large expansion in aggregate demand could revive anticipations of rapid inflation. The current policy problem is to encourage a rate of growth in aggregate demand that is consistent with the most desirable combination of growth in output and employment and reductions in the rate of inflation.

Recent Monetary and Fiscal Developments

The decisions to initiate moderately stimulative monetary and fiscal policies in early 1970 were influenced by the decline in overall economic activity in late 1969. Industrial production declined in the last two quarters of 1969, and real output fell during the fourth quarter, but unemployment did not begin to rise until early 1970. Inflation continued to be a problem for the economy throughout 1969. In fact, prices rose faster in 1969 than in the previous year. The objectives of stabilization policies initiated in early 1970 were to place downward pressure on the rate of price advance while reversing the pattern of falling output.

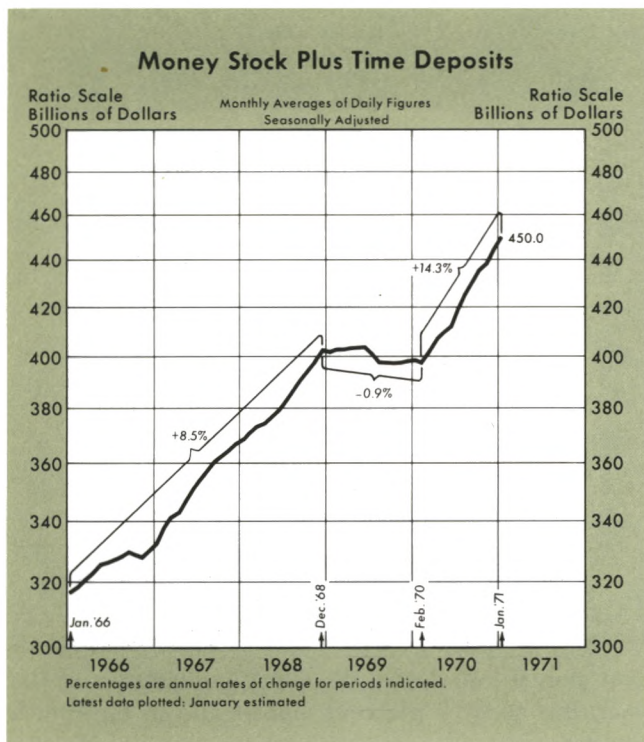
Monetary Developments

The money supply has grown since December 1969 after almost no increase in the previous two quarters. Between December 1969 and May 1970 the money supply rose at a 6.7 per cent rate, and from May 1970 to January 1971 at a slower 4.2 per cent rate. Over



the 13-month period ending January 1971, the money stock increased at a 5.2 per cent rate.

The pattern of growth and decline in time deposits at commercial banks has been dominated in recent years by the relations between interest rates on competing assets and the interest ceilings on time deposits. The interest ceilings on large short-term certificates of deposit were more than 2 percentage points below 3-month Treasury bill rates in December 1969. Interest rates on competing assets had risen relative to the interest ceilings on time deposits during the previous year, and time deposits had consequently declined 5 per cent during the 12-month period ending



December 1969. Interest ceilings on time deposits were raised in January 1970, and interest ceilings on large short-term certificates of deposit were suspended in June. Not only were banks consequently able to pay higher interest rates than previously on time deposits, but also the interest rates on competing short-term rates fell during 1970. Time deposits grew at a 23.6 per cent annual rate between February and January 1971.

The growth in both time and demand deposits during 1970 allowed banks to increase their loans and investments,¹ which grew at a 9.3 per cent annual rate between February and December 1970, compared with less than a one per cent rate from May 1969 to February 1970. The demand for bank loans was lower in the last half of 1970 than in 1969. Consequently, banks used their funds to increase holdings of investments, which had declined at about a 7 per cent annual rate during the 14 months ending February 1970. While loans rose at a 4.7 per cent annual

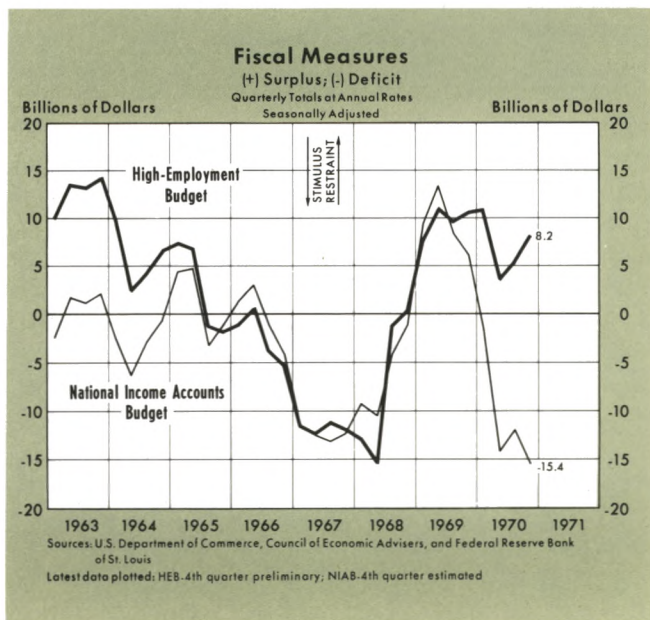
¹Bank funds obtained from nondeposit sources, such as Euro-dollar borrowings and commercial paper sold through a bank's holding company or affiliate, also affect the capacity of banks to increase loans and investments. Banks began to reduce their Eurodollar borrowing in late 1969 and continued to do so in 1970. Bank-related commercial paper expanded in late 1969, and then began to decline in August 1970. Reserve requirements were placed on bank-related commercial paper in August, and certificates of deposit had again become a source of funds. Total nondeposit sources of bank funds remained essentially unchanged during the first two quarters of 1970 and declined in the second half.

rate, investments increased at a 20.2 per cent annual rate during the 10-month period ending December 1970.

Due to the general decline in the demand for loans relative to the supply, there has been a sharp decline in all short-term market interest rates during the past 13 months. The prime rate was reduced, in eight steps, from 8.5 per cent in March 1970 to 6 per cent in January 1971. The 3-month Treasury bill rate fell from a recent peak of 7.87 per cent in January 1970 to 4.20 per cent in late January 1971, and the yield on 4- to 6-month commercial paper fell from 8.78 per cent to 4.55 per cent in the same period. The yield on the highest-grade seasoned corporate bonds declined from a recent high of 8.5 per cent in June 1970 to 7.20 per cent in late January 1971.

Fiscal Developments

The high-employment Federal budget fell from about a \$10 billion surplus during the year ending in the first quarter of 1970 to a surplus at an average annual rate of about \$5.7 billion in the last three quarters of 1970. Major changes in Federal expenditures were increases in social security benefits and Federal pay increases retroactive to January. Major changes in Federal tax policies were the reduction in the surtax in January and July. In terms of the high-employment budget, fiscal policy during the last three quarters of 1970 was slightly less restrictive than the budget policy in 1969 and early 1970, but was more restrictive than from mid-1965 to the end of 1968 when there was a deficit.

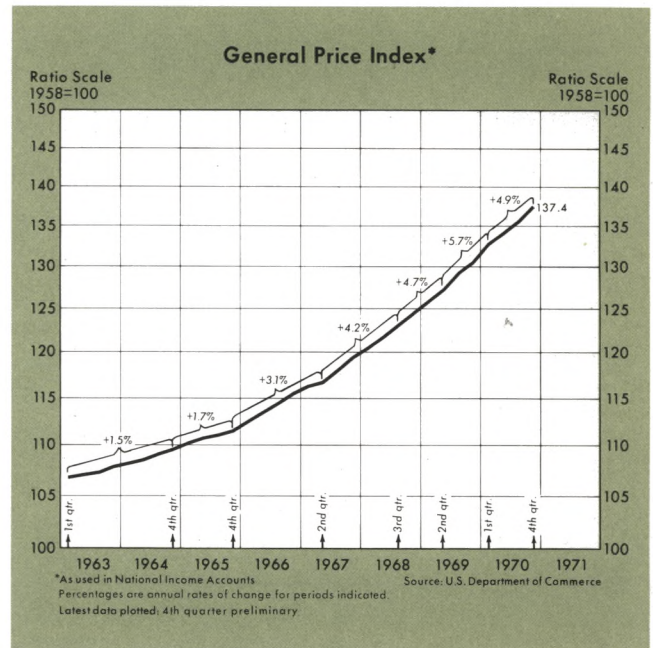


The Federal budget on a national income accounts (NIA) basis moved from a \$9.3 billion surplus in calendar 1969 to a deficit at an annual rate of about \$13.8 billion in the last three quarters of 1970. The budget deficit during the last three quarters of 1970 was due primarily to the fall of tax revenues below what they would have been at full employment. This recent NIA budget deficit is a little larger than the deficit of 1967, but as a per cent of potential GNP is slightly less.

Budget plans for calendar 1971 indicate a 9 per cent expansion of Federal expenditures (NIA basis) over 1970. This increase compares with an 8 per cent advance in 1970 and an average rate of increase of 12 per cent from 1965 to 1969. Adjusting these expenditures to a high-employment basis and combining them with an estimate of revenues at high employment yields a high-employment surplus of about \$ 7 billion for calendar 1971. This estimate would be about the same as in 1970, suggesting that the economic impact of budget plans for 1971 is little changed from 1970.

Spending and Prices

Total spending increased 4.1 per cent from the fourth quarter of 1969 to the fourth quarter of 1970; the annual rate of growth in total spending in the first three quarters of 1970 was 4.8 per cent, and then 2.2 per cent during the fourth quarter. The relatively small fourth quarter growth may be attributed partially to the General Motors strike. Real output fell about 1 per cent from the fourth quarter of 1969 to the fourth quarter of 1970; it declined at a 0.3 per

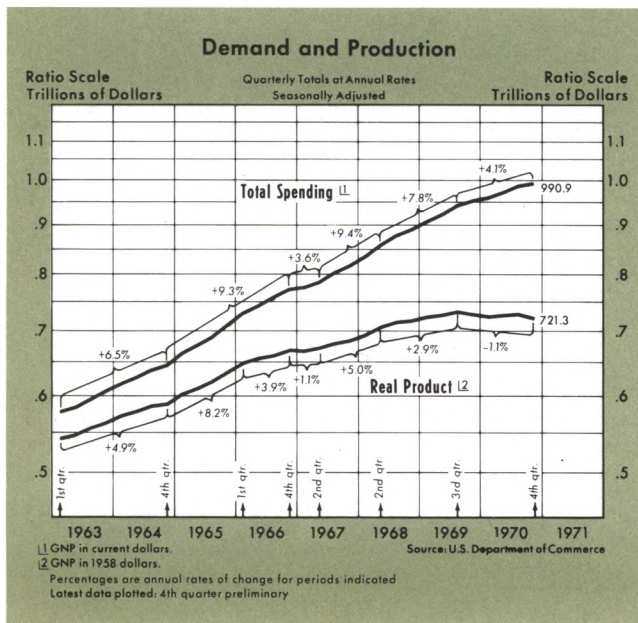


cent annual rate during the first three quarters of the year, but at a 3.3 per cent annual rate in the fourth quarter.

Inflation continued to be a problem during 1970, but the rate of increase in prices slowed a little. The GNP implicit price deflator increased at an annual rate of 5.3 per cent from the fourth quarter of 1968 to the first quarter of 1970, and at a 4.9 per cent rate during the last 3 quarters of 1970. The pattern of decline in the rate of inflation was interrupted by the 5.7 per cent annual rate of growth of the GNP deflator in the fourth quarter of 1970. A portion of the fourth quarter rise in the GNP implicit price deflator was due to the price increases in the automobile industry. Consumer prices increased at a 5.3 per cent annual rate from March to December 1970, compared with a 6.1 per cent rise in the 12-month period ending March 1970.

Employment

The unemployment rate was at the relatively low level of 3.5 per cent in December 1969. By mid-1970 the rate had risen to about 5 per cent, and by December 1970 to 6 per cent, the highest rate since late 1961. Some amount of unemployment is to be expected in a changing economy because of people searching for jobs. Even in the tight labor market of 1969, the average length of time between jobs was about 8 weeks and rose to just over 9 weeks by late 1970. But a rise in the unemployment rate from 3.5 to 6 per cent indicates that some important changes have



taken place in the demand for or supply of labor, or both.

The rise in employment during 1970 was not fast enough to absorb the expansion in the labor force. Although civilian employment was about 730,000 higher in 1970 than in 1969, unemployment rose because the civilian labor force increased about 2 million in the past year. The 320,000 reduction in armed forces personnel, and the continued rise in the labor force participation rate for women in the past year, contributed to the rise in the civilian labor force.

The unemployment rate is used as an index of labor capacity utilized and, quite often, as an indicator of the economic welfare of the society. The civilian labor force, the measure of potential labor input used in calculating the unemployment rate, includes persons who are employed or *actively seeking employment*. If persons who have not been actively seeking employment begin to do so, the unemployment rate can rise with no change in the demand for labor. If unemployed persons become discouraged in their search for jobs and drop out of the labor force, capacity utilization can appear to rise with no change in the demand for labor.

Another measure of potential labor input is the total population of working force age (16-64). Unemployed persons remain a part of this potential labor input

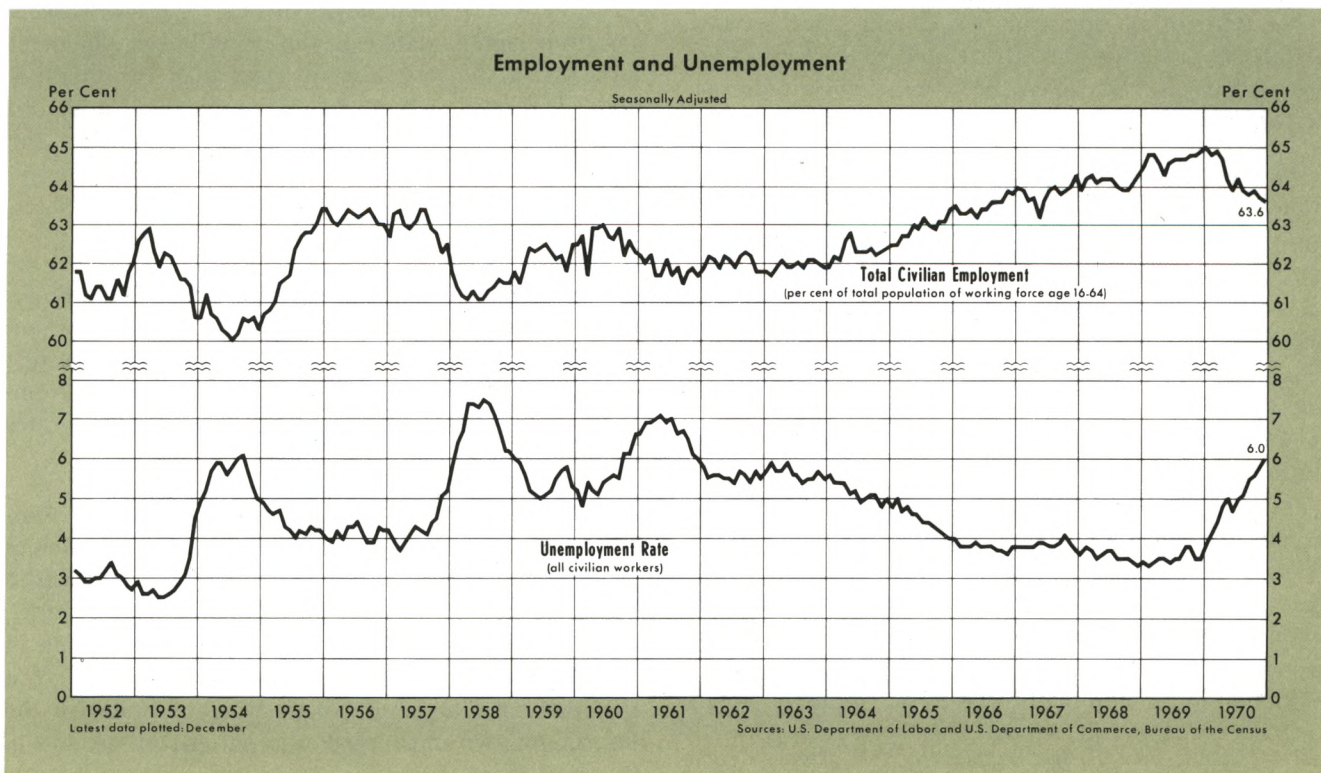
whether or not they actively seek employment. The corresponding index of labor capacity utilized is total civilian employment as a per cent of the working force age (16-64) population.

The per cent of the working force age population employed has remained high during the past year compared with other periods. Nearly 64 per cent were employed in late 1970, down from a peak of 65 per cent in early 1970 but larger than at any time during the 1950's and 1960's before 1966.

The impact of stabilization policies on employment is a reflection of their impact on total output. Real output declined slightly during the past year, and employers shifted their demand for labor downward. Employment did not expand as fast as potential labor input, measured as either the civilian labor force or the working force age population. Stabilization policies also influence the types of job opportunities available. The recent employment situation reflects to some extent the problems workers are having in moving from declining to expanding industries.

Monetary policy actions affect employment by influencing the aggregate demand for output and the anticipated future demand for output.² The linkages

²Monetary actions may also affect the supply of labor. See "Population, the Labor Force, and Potential Output: Implications for the St. Louis Model" in this *Review*, pp. 15-23.



between monetary policy actions and employment begin with Federal Reserve decisions to influence some key economic variables, such as output, employment or prices. Short-run effects of monetary expansion are reduced interest rates on bank loans and increased prices of securities and equities. The increase in the money supply temporarily increases aggregate wealth until the prices of goods are bid up. Consumers and investors respond to the changes in interest rates and wealth by increasing their demand for output, and firms correspondingly increase their demand for labor. Consumer tastes and technology determine what type of job opportunities are made available.

Fiscal policy affects employment directly by creating or eliminating job opportunities in the Federal Government or in industries producing output for the Federal Government. Fiscal policy affects employment indirectly by its influence on private spending. During some period of time workers adjust their skills to the available employment opportunities. Changes in the types of employment opportunities in the private sector due to changes in consumer tastes and technology usually come gradually, and workers can adjust to these changes with a small amount of unemployment. The long-term trend of a larger share of employment in service industries and a smaller share in manufacturing is an indication of a gradual shift in the types of job opportunities. Changes in the types of job opportunities directly related to Federal Government expenditure have been more abrupt during certain periods.

The Federal Government reduced defense expenditures from an annual rate of \$78.8 billion in the fourth quarter of 1969 to an annual rate of \$74.6 billion in the fourth quarter of 1970, a 5.3 per cent decrease. The Armed Forces were reduced about 400,000 and civilian employment in the Department of Defense was reduced about 100,000 between late 1969 and the end of 1970. Civilian employment in defense-related industries declined by an estimated 600,000 during the past year.³

The estimated 1.1 million jobs eliminated by cuts in defense expenditures were approximately 1.4 per cent of the total civilian labor force at the end of 1970. Even if there had been no decline in the aggregate demand for labor during the past year, such a large reduction in the number of jobs in one industry would

probably have increased unemployment temporarily while the workers looked for jobs in other industries.

The adjustment problems for former employees of defense-related industries are complicated by the heavy concentration of defense-related industries in the Pacific Coast states. About 35 per cent of the employment reductions in defense-related manufacturing industries between December 1967 and June 1970 were in California. The best alternative job for many of the displaced workers may be in another part of the country. The search for jobs in industries other than defense is made more difficult by having the defense expenditure cuts come during a period in which overall real economic activity is expanding slowly or not at all.

Professional and technical people appear to be bearing a larger share of the unemployment during the past few quarters than they have in other periods. Their problems are partially the result of the cuts in defense expenditures. About 6 per cent of all professional and technical workers were employed in defense-related industries in the fiscal year 1968. The number of unemployed professional and technical people increased about 58 per cent in 1970, compared with a 44 per cent increase in overall unemployment. The unemployment rate among professional and technical workers rose to 2.5 per cent by the fourth quarter of 1970. The unemployment rate for these workers has been larger relative to the overall unemployment rate during the past few quarters than in other periods. The ratio of these two unemployment rates did not appear to have a cyclical pattern during the 1960-61 recession.

Summary

Moderately stimulative monetary and fiscal policies were initiated in early 1970. The high-employment budget surplus was smaller in the last three quarters of 1970 than in the preceding year. Short-term interest rates declined during 1970, and long-term rates declined during the second half.

Total spending increased 4.1 per cent and real output fell about 1 per cent from the fourth quarter of 1969 to the fourth quarter of 1970. The slowdown in economic activity in the fourth quarter can be attributed partially to the automobile strike. The rate of increase in prices appears to have slowed in 1970, but the relatively large rate of increase in prices in the fourth quarter interrupted this pattern of decline in the rate of inflation.

³*Economic Report of the President* (Washington: United States Government Printing Office, 1971), pp. 43 and 44.

Employment increased in 1970 but not as rapidly as the labor force. The unemployment rate increased from 3.5 per cent to 6 per cent from December 1969 to December 1970. The 6 per cent unemployment rate was the highest since late 1961. The rate of labor capacity utilization, measured as the per cent of the

working force age population employed, remained relatively high during the past year. Large cuts in defense expenditures during the past year have eliminated many jobs in the defense industry. The recent employment situation reflects not only the slight decline in real output but also problems of the former defense industry employees in finding jobs in other industries.

Reprint Series

OVER THE YEARS certain articles appearing in the REVIEW have proved to be helpful to banks, educational institutions, business organizations, and others. To satisfy the demand for these articles, our reprint series has been made available on request. The following articles have been added to the series in the past year. Please indicate the title and number of article in your request to: Research Department, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, Mo. 63166.

NUMBER	TITLE OF ARTICLE	ISSUE
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51.	Some Issues in Monetary Economics	January 1970
52.	Monetary and Fiscal Influences on Economic Activity: The Foreign Experience	February 1970
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54.	Money Supply and Time Deposits, 1914-69	March 1970
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Operations of the Federal Reserve Bank of St. Louis — 1970

THE FEDERAL RESERVE BANK OF ST. LOUIS is one of the twelve Federal Reserve Banks which, along with their branches and the Board of Governors, make up the Federal Reserve System. In addition to its participation in the formulation of monetary policy, the Bank performs a variety of regular services and functions for member banks, the public, and the United States Government. Its service functions or operations include collecting checks, transferring funds, distributing currency and coin, maintaining member bank reserve accounts, and fiscal agency and depository operations for the United States Government.

This report will review most of the 1970 operations and functions of the Federal Reserve Bank of St. Louis and its three branches at Little Rock, Louisville, and Memphis. Federal Open Market Committee deliberations in which the Bank participates will be covered in other issues of this *Review*.

Money Operations

Governments generally play a large role in supplying coin and currency used by their citizens. Prior to the acceptance of paper money, the role consisted primarily of minting operations and maintenance of established standards with respect to quality and weight of coin. With the more extensive use of paper money, the necessities of maintaining a ready supply of amounts and kinds of money that people demand, and of removing unfit money from circulation, have become major functions of coin and currency supervision. These functions are performed in the United States by the Federal Reserve banks.

When a member bank desires to replenish its currency supply, it orders the funds from the Federal Reserve bank which charges the amount to the member bank's reserve deposit account.

Conversely, if a bank has excess currency on hand, it may deposit currency in the Federal Reserve bank and receive credit in its reserve account.

Coin and paper currency operations at this Bank increased in 1970 from year-earlier levels. The pieces of coin counted and sorted totaled 716 million, up 12 per cent from a year earlier, and the value totaled \$80 million, up 13 per cent (Table I). Pieces of paper currency counted rose from 237 million in 1969 to 240 million in 1970, and the value rose from \$1.7 to \$1.8 billion.

The volume of coin and paper currency handled has increased over the years with the growth in economic activity. Pieces of paper currency handled rose from 199 million in 1950 to 201 million in 1960, and to 240 million in 1970. The value of paper currency handled rose from \$1.1 billion in 1950 to \$1.2 billion in

Table I

VOLUME OF OPERATIONS¹

	Dollar Amount (millions)		Per Cent Change
	1970	1969	
Checks collected ²	138,945.2	140,348.6	-1.0%
Noncash collections items	434.3	450.7	-3.6
Coin counted	79.6	70.5	12.9
Currency counted	1,816.2	1,715.9	5.8
Transfers of funds	287,467.7	244,648.5	17.5
U.S. Savings Bonds handled ³	579.4	595.4	-2.7
Other Government securities handled ³	21,706.2	21,839.0	-0.6
U.S. Government coupons paid	202.1	172.3	17.3
	Number (thousands)		Per Cent Change
	1970	1969	
Checks collected ²	397,504	344,068	15.5%
Noncash collection items	855	914	-6.5
Coin counted	715,505	636,317	12.4
Currency counted	240,452	236,842	1.5
Transfers of funds	317	300	5.7
U.S. Savings Bonds handled ³	10,943	11,219	-2.5
Other Government securities handled ³	978	953	2.6
U.S. Government coupons paid	814	736	10.6

¹Total for the St. Louis office and the Little Rock, Louisville, and Memphis branches.

²Excludes Government checks and money orders.

³Issued, exchanged, and redeemed.

1960, and to \$1.8 billion in 1970. Number of coins handled rose from 293 million in 1950, to 427 million in 1960, to 716 million in 1970, and the value of the coins rose from \$25 million in 1950, to \$43 million in 1960, to \$80 million in 1970.

Studies by this Bank indicate that changes in the demand for a hand-to-hand medium of exchange are primarily responsible for the varying growth rates of currency. When sales which typically utilize currency have risen, currency in circulation has usually increased. When such sales have declined, currency has declined. Actions by the Federal Reserve to supply reserves to the banking system have had little direct influence on the volume of currency outstanding.

Collecting and Transferring Funds

The largest operation of the Federal Reserve Bank, as measured by number of employees, is collecting checks and transferring funds. Most large (and many small) obligations of individuals, businesses, and governments are settled by transferring bank deposits. Over 95 per cent of the value of all financial transactions represent checks drawn on commercial banks. This use of checks by individuals and businesses is facilitated by the collection facilities of the Federal Reserve banks. In addition, the Federal Reserve banks provide wire transfer services for transferring funds to bank customers' accounts in other Federal Reserve districts and a mechanism through which commercial banks settle for the funds transferred.

The number of checks collected by the Bank in 1970 totaled 398 million, up from 344 million a year earlier; the dollar volume was \$139 billion, down from \$140 billion. The volume of checks collected has trended up over the years, rising from 134 million in 1950, to 171 million in 1960, and to 398 million in 1970. In dollar amount the checks totaled \$47 billion in 1950, \$69 billion in 1960, and \$139 billion in 1970.

The sharp increase in number of checks collected by the Bank last year reflected both the long-run uptrend in check usage and a change in check collection services provided member banks in the St. Louis area. In mid-1970 the Federal Reserve Bank of St. Louis inaugurated a new program of sorting checks drawn on St. Louis area banks which are deposited by member banks. Prior to this time, these banks sorted and cleared checks on each other through the Check Exchange Division of the Collection Department. This change in procedure, along with the long-run uptrend in check usage, caused the sharp increase in the num-

ber of checks collected through the Federal Reserve System.

The reduced dollar volume of check clearings by this Bank in 1970 reflects largely a difference in method by which banks settle for checks. Prior to 1970, most banks paid for checks drawn on themselves with a draft on their correspondent bank which was included in the dollar volume of check clearings. Now most of these banks pay for such checks through an automatic charge arrangement whereby their account or their correspondent bank's account is charged for the checks. This process eliminates the use of drafts which were included in the clearings, thereby reducing the dollar volume. However, the change had little impact on the number of checks cleared.

Over the years the efficiency of collecting checks has been increased by innovations such as the conversion to electronic equipment. The St. Louis Federal Reserve Bank in 1970 processed through high-speed computers about 97 per cent of all checks received.

The telegraphic transfer of funds is another growing service which the Federal Reserve provides to member banks in order to speed the movement of funds around the country. In 1970 wire transfers of funds by this Bank totaled \$287 billion, an increase of 18 per cent from a year earlier. The dollar volume of funds transferred by the St. Louis Federal Reserve Bank in this manner increased about fourfold during the past decade.

Fiscal Agency Operations

The Federal Reserve banks carry the general accounts of the U.S. Treasury, handle much of the work entailed in issuing and redeeming Government obligations, and perform numerous other fiscal duties.

When the Treasury offers a new issue of Government securities, the Federal Reserve banks send out subscription forms, receive applications from those who wish to buy, make allotments of securities in accordance with instructions from the Treasury, deliver the securities to the purchasers, receive payment for them, credit the amounts received to Treasury accounts, and make exchanges of denominations. In addition, the Federal Reserve banks pay interest on coupons by charging the Treasury's account and redeem securities as they mature.

Excluding the marketing of short-term Treasury bills which are sold through auction, all Government securities until last year had been marketed at fixed

yields. This system of debt marketing required the Treasury to estimate rates and terms at which the securities would sell. In 1970 the Treasury expanded the use of the auction method of debt marketing. In November \$2 billion of 6¾ per cent, one and one-half year notes were marketed successfully through the auction system.

The four offices of this Bank issued, exchanged, or redeemed 11 million United States Savings Bonds valued at \$579 million in 1970. The number and value were each about 3 per cent less than in 1969. Other Government securities issued, serviced, or retired totaled 978 thousand, 3 per cent above a year earlier, while dollar volume, totaling \$21.7 billion, was down 1 per cent.

Lending to Member Banks

The rate charged on loans to member banks by the Federal Reserve Bank of St. Louis was reduced twice during 1970. At the turn of the year a rate of 6 per cent was in effect on discounts under Sections 13 and 13a of the Federal Reserve Act. It was reduced to 5¾ per cent on November 11 and to 5½ per cent on December 11.

The discount rate reductions followed rather than led the decline in market interest rates. Average monthly yields on three-month Treasury bills, for example, peaked at just under 8 per cent in December 1969, but they had declined to about 5½ per cent when the discount rate was reduced to 5¾ per cent in November 1970. After the market yield on three-month Treasury bills had dropped below 5 per cent later in the year, the discount rate was reduced to 5½ per cent.¹

Borrowing from the Federal Reserve Bank of St. Louis and its three branches declined sharply in 1970 from the previous year. Daily borrowing averaged only \$12.7 million in 1970, compared with \$41.8 million in 1969. The proportion of member banks that borrowed from the Federal Reserve Bank during the year declined from 22 per cent in 1969 to 17 per cent in 1970.

In late 1970 the Federal Reserve Board announced some major changes in procedures designed to simplify lending operations of the Federal Reserve banks. The new procedures eliminate the necessity for submitting a note in connection with each loan, permit

¹Further reductions occurred in both market rates and the discount rate in early 1971.

the use of continuing lending agreements, permit the Federal Reserve banks to collect interest on loans to member banks at the time of repayment rather than on the borrowing date, and make changes in the discount rate applicable to all outstanding Federal Reserve bank loans. Thus the rate will cease to be a discount rate once the announced procedures become effective.

Supervision

The Federal Reserve Bank of St. Louis, along with the respective state supervisory authorities, exercises supervision over state chartered member banks in the Eighth Federal Reserve District which includes portions of seven states (Table II). Such supervision includes annual examinations for evaluating the assets, operations, policies, and management of the banks.

Table II

Number of Banks by Type In Eighth Federal Reserve District

	12/31/70	12/31/69	Per Cent Change
National	348	348	0.0%
State Member	111	117	-5.1
State Nonmember	1,058	1,047	1.1
Total	1,517	1,512	0.3

Through such evaluations and the resulting recommendations, the authorities attempt to contribute to a more "sound" banking system. All of the 111 state member banks in the district were examined by Federal Reserve examiners in 1970. The 348 national banks in the district, which are required by law to be members of the Federal Reserve System, are examined by the staff of the Comptroller of the Currency. State nonmember banks that are insured by the Federal Deposit Insurance Corporation (FDIC) are examined by both the FDIC and their respective state supervisory authorities. The few noninsured banks are examined only by the state banking authorities. The nonmember banks, although numbering 1,058 in the district at the close of 1970, are smaller on the average than member banks and hold only about two-fifths of the total district bank deposits.

In addition to the examining function, the Federal Reserve bank exercises supervisory functions in admission of state banks to membership in the System, approval of branches and mergers of state chartered member banks, and of acquisitions by registered bank holding companies. Also, late in the year the "Bank

Holding Company Act Amendments of 1970" was passed, and will place most one-bank holding companies in about the same category as registered bank holding companies with respect to supervision and permissible activities. This amendment will greatly enlarge the supervisory activities of the examination function.

Research

Research activities at the Bank include, first and foremost, the gathering and analyzing of national and regional data with a view to the formulation of monetary policy recommendations. These recommendations are used by the President of the Bank in Federal Open Market Committee deliberations, and are also used to provide economic information to the public through the monthly *Review* and other recurring releases, available upon request.

The research department has in recent years taken a more active part in decision-making relative to bank mergers and bank holding company acquisitions. The recent amendments to the bank holding company act are expected to enlarge research department activity with respect to bank holding company analyses.

Statements

The Federal Reserve Bank of St. Louis participates in the System's earnings and expenses. Preliminary figures indicate that during 1970 gross current earnings of the System amounted to \$3,877 million and expenses totaled \$321 million, leaving net current earnings of \$3,556 million. With an \$11 million net addition to the profit and loss account, net earnings

Table III

COMPARATIVE PROFIT AND LOSS STATEMENT

(Thousands of Dollars)

	1970	1969	Per Cent Change
Total earnings	\$138,738	\$117,877	17.7%
Net expenses	18,248	15,515	17.6
Current net earnings	120,490	102,362	17.7
Net additions (+) or deductions (-)	+ 416	- 2	-
Net earnings before payments to U.S. Treasury	\$120,906	\$102,360	18.1
Distribution of Net Earnings:			
Dividends	\$ 1,406	\$ 1,351	4.1
Interest on Federal Reserve notes	118,298	100,168	18.1
Transferred to surplus	1,202	841	42.9
Total	\$120,906	\$102,360	18.1

Table IV

COMPARATIVE STATEMENT OF CONDITION

December 31, 1970 Compared with

December 31, 1969

(Dollar Amounts in Thousands)

ASSETS		
	December 31, 1970	December 31, 1969
Gold certificate account	\$ 468,866	\$ 345,289
Special drawing rights certificate account	15,000	—
Federal Reserve notes of other banks	32,102	29,347
Other cash	12,279	9,828
Discounts and Advances	380	15,200
Acceptances	—	—
U. S. Government securities:		
Bills	952,157	820,240
Certificates	—	—
Notes	1,218,810	1,156,476
Bonds	107,825	128,808
TOTAL U. S. GOVERNMENT SECURITIES	\$2,278,792	\$2,105,524
TOTAL LOANS AND SECURITIES	\$2,279,172	\$2,120,724
Cash items in process of collection	671,121	621,658
Bank premises (net)	12,125	9,592
Other assets	28,468	84,373
Total Assets	\$3,519,133	\$3,220,811

LIABILITIES AND CAPITAL ACCOUNTS

LIABILITIES

	December 31, 1970	December 31, 1969
Federal Reserve notes (net)	\$1,951,221	\$1,796,579
Deposits:		
Member banks — reserve accounts	884,761	824,090
U. S. Treasurer — general account	73,887	67,998
Foreign	4,250	4,550
Other	10,906	11,316
Total Deposits	\$ 973,804	\$ 907,594
Deferred availability cash items	525,050	449,575
Other liabilities and accrued dividends	20,972	21,021
Total Liabilities	\$3,471,047	\$3,175,129

CAPITAL ACCOUNTS

Capital paid in	24,043	22,841
Surplus	24,043	22,841
Other capital accounts	—	—
Total Capital Accounts	\$ 48,086	\$ 45,682
Total Liabilities and Capital Accounts	\$3,519,133	\$3,220,811

MEMORANDA: Contingent liabilities on acceptances purchased for foreign correspondents increased from \$5,107,000 on December 31, 1969 to \$8,503,000 on December 31, 1970.

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before payments to the United States Treasury were \$3,567 million. Under the policy adopted by the Board of Governors at the end of 1964, all net earnings, after the statutory dividend to member banks and additions to surplus to bring it to the level of paid-in capital, were paid to the United States Treasury as interest on Federal Reserve notes. Payments in 1970 to the United States Treasury as interest on Federal Reserve notes amounted to \$3,493 million; statutory dividends to member banks, \$41 million; and additions to surplus accounts, \$33 million.

Compared with 1969, gross earnings of the System were up \$504 million, or 15 per cent. Earnings on Government securities increased \$591 million, but earnings on foreign currencies and discounts and advances decreased \$73 million and \$15 million, respectively. Expenses in 1970 were up \$46 million, about 17 per cent, and dividends on member bank stock rose \$2 million.

The St. Louis Federal Reserve Bank's share of System net earnings in 1970, before payments to the U.S. Treasury, totaled \$120.9 million (Table III). This was

18 per cent above earnings of a year earlier, reflecting both the higher rates received on earning assets and the larger volume of assets. The St. Louis Bank's portion of System earnings paid to the U.S. Treasury rose 18 per cent, a rise from \$100 million to \$118 million, while additions to surplus rose from \$841,000 to \$1.2 million.

The Bank's portion of System assets rose to \$3.5 billion at the end of 1970 from \$3.2 billion a year earlier. Most of the assets, \$2.3 billion, are investments in U.S. Government securities, largely short-term Treasury bills and notes. The Bank's portion of the System Gold Certificate Account totaled \$0.5 billion, and other assets including the Special Drawing Rights Certificate Account, notes on other Reserve banks, other currency, discounts to member banks, cash items in the process of collection, and the Bank premises totaled about \$0.8 billion. The gain in assets from a year earlier largely reflects an increase in holdings of Government debt and the Gold Certificate Account. These items rose about \$200 million and \$100 million, respectively.

WORKING PAPERS

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<u>Number</u>	<u>Title of Working Paper</u>	<u>Release Date</u>
13	A Historical Analysis of the "Crowding Out" of Private Expenditures by Fiscal Policy Actions (24 pages)	January 1971

Population, The Labor Force, and Potential Output: Implications for the St. Louis Model

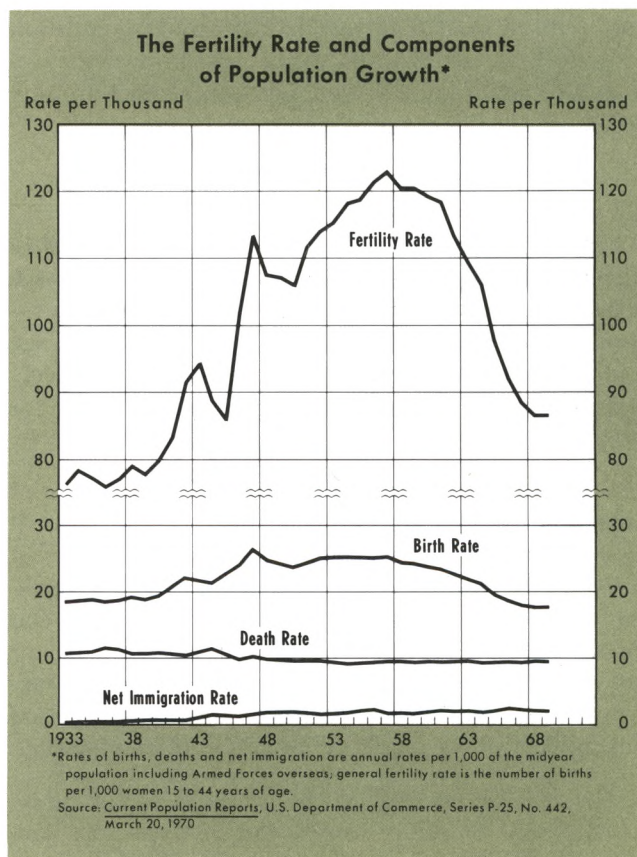
by ROGER W. SPENCER

POPULATION, the labor force and output have been increasing in this country for the past two hundred years. The simple observation that population growth leads to increases in the labor force and, consequently, to employment and output gains, holds quite well over the long run, but the relationships are considerably more complex over shorter periods. The current interest in population growth, and the present uncertainties surrounding the expected future course of employment and overall economic activity, encourage this investigation into the relevant short-term relations.

This article discusses first the chief determinants of population growth. Labor force considerations and employment are then introduced. Next, output and potential output concepts are considered. Finally, all of these factors are combined in a projection of the future course of prices, unemployment and real output, using the model of the economy developed at this Bank. The results of the projection indicate that varying rates of growth of the forces which determine the potential supply of goods and services have different implications for the future course of prices, unemployment, and real output.

Population

Population growth in a country is determined by the birth rate, the death rate, and the net immigration rate. Usually, these rates are expressed in ratio form. For example, the birth rate is the number of births during a year divided by the midyear population. Multiplying this figure by 1000 gives the number of births per 1000 people.



The death rate in this country has stabilized at about 9.5 deaths per 1000 people annually since World War II, and the net immigration rate has stabilized at about 2 per 1000 people, making the birth rate the key determinant of population growth. The "crude" birth rate, or the number of births per 1000 people, should be supplemented in population analysis by examina-

tion of more sophisticated birth measures, such as the general fertility rate (see accompanying chart). This is an "age-specific" rate,¹ and is usually calculated as the ratio of births to all women 15-44 years old divided by the midyear female population in this age group (with the ratio multiplied by 1000).

Fertility rates are highest among women 20-29 years of age. An analysis of the number of women in this age group and their corresponding fertility rate is a key element in the ability to forecast population growth. This fertility rate is largely dependent upon attitudes toward marriage, birth control and family size, and employment. The difficulties in attempting to gauge these changing attitudes are reflected by the Census Bureau's projection of several widely differing, alternative fertility rates into the 21st century.

Current birth or fertility rates are of major significance in the analysis of current population trends and, with at least a 16-year lag, trends in population of labor force age. Current births add to the total demand for goods and services, but their impact on total supply is not felt for a minimum of 16 years.

The Labor Force

The population of labor force age, often defined to include all persons 16-64 years of age, is known with considerable certainty nearly two decades into the future. Knowledge of the population of labor force age and the proportion of this population which actively participates in the labor force provides a basis for projecting the size of the total labor force.

Certain groups of persons within the population of labor force age can be expected to seek employment as a matter of course. The evidence suggests that males between the ages of 25 and 54 (primary workers) participate actively in the labor force, in that nearly all who are employable either hold a job or are seeking one. Other groups (often called secondary workers) within the population of labor force age are not so likely to be regularly interested in employment.

The reasons underlying the decisions of secondary workers to seek or not to seek employment vary considerably.² Many are only a little less likely to par-

ticipate in the labor force than primary workers, but others, such as students and housewives, require additional motivation. In general, desired hours of work, particularly for secondary workers, are based on leisure-wage considerations. A rise in the wage rate (which is often accompanied by improved working conditions and shorter job search time) may encourage an individual to work fewer hours and maintain the same level of income, or substitute work for leisure because each hour of leisure becomes more expensive in terms of foregone income. Falling wage rates, which would probably be accompanied by falling income levels and longer job search time, may stimulate some potential workers to seek at least part-time employment in order to supplement the lower basic family income. These additional entrants to the labor force may be offset, however, by workers who become discouraged by the low demand for their services and withdraw from the labor force. Most studies indicate that the "discouraged worker" effect (the substitution of leisure for work) is generally stronger than the "additional worker" (or income) effect.³

The trend of participation rates has shifted in recent years. The participation rate of women, for example, has increased strikingly in the past two decades. Their participation rate rose from 34 per cent in 1950 to nearly 43 per cent in 1969. Changing attitudes toward family size and the role of women in society have contributed to an increased supply of female labor. Other factors include shifts from physical and manual labor to lighter work in factories, and the growth of white collar jobs in government and business, especially service-oriented industries.

Output

The number of workers of labor force age, and the rate at which this volume of potential labor resources

Aldrich Finegan, *The Economics of Labor Force Participation* (Princeton, New Jersey: Princeton University Press, 1969); N. J. Simler and Alfred Tella, "Labor Reserves and the Phillips Curve," *The Review of Economics and Statistics*, February 1968; V. Perella, "Women and the Labor Force," *Monthly Labor Review*, February 1969; Jacob Mincer, "Labor Force Participation and Unemployment: A Review of Recent Evidence," in *Prosperity and Unemployment*, edited by Robert A. Gordon and Margaret S. Gordon (New York: John Wiley and Sons, Inc., 1966); and A. Butler and G. Demopoulos, "Changing Patterns of Labor Force Participation," a paper presented at the National Economic Conference, Thessaloniki, Greece, March 1970.

³Studies of the United States economy, covering the period from the end of World War II up through the early 1960's, are unanimous in finding the 'discouraged' worker effect predominating over the 'additional' worker effect." See Butler and Demopoulos, p. 8.

¹An age-specific rate is employed for a particular subgroup of the population. A specific rate applied to a gender, for example female, combined with a particular age group, for example 20-29 years, gives an age-specific rate for females aged 20-29. See Donald J. Bogue, *Principles of Demography* (New York: John Wiley and Sons, Inc., 1969), p. 119.

²A large body of literature on participation rates has emerged in recent years. See, for example, William Bowen and T.

actively participates in the work force, are major determinants of the level of employment. The level of employment is a key determinant of the volume of labor input (man-hours worked) in the economy. Man-hours worked, and the degree of efficiency with which they are combined with other productive factors, determine the volume of output.

A constant level of employment does not necessarily suggest a constant number of man-hours worked. Overtime, moonlighting, a reluctance to release employees at the beginning of a recession, and a trend toward more leisure hours, all tend to influence the linkages between employment and labor input.

Rising efficiency in the combination of labor and other productive factors generates productivity gains. Advances in technology and education are largely responsible for the rising trend of output relative to factor inputs. In the short run, however, output relative to input may vary in response to changing business conditions. For example, a cyclical downturn is often marked initially by a fall in output which develops before the downward adjustment of employment growth.

If cyclical influences are ignored, it is possible to estimate the level of output which can be generated by an economy operating at full employment, that is, potential output. The best-known measure of potential output is that which is calculated by the President's Council of Economic Advisers (CEA). Assumptions regarding the labor force, employment, and productivity must be made in order to derive this measure of potential output.

The CEA bases its estimate of the growth of real potential output on assumed rates of change of the civilian labor force and the average hours of work per person (to obtain estimates of labor input) and the assumed growth in productivity (to indicate the degree of efficiency with which labor is combined with other productive factors). The CEA projections of real potential output from 1970 to 1975 assume that a state of full employment exists when 96.2 per cent of the labor force is employed.⁴ The increasing desire for leisure is reflected in a projection of further declines in the annual average hours of work per person. Productivity estimates allow for the fact that a rising government sector (in which productivity is defined to be equal to zero) reduces overall productivity growth.

⁴See *The Economic Report of the President* (Washington: United States Government Printing Office, 1970), pp. 84-5. Earlier editions of the *Economic Report* indicate an assumed level of full employment of 96 per cent of the labor force.

Estimates employing these assumptions yield a relatively constant trend line of real potential output. For example, real potential output is estimated by the CEA to rise at a 4.3 per cent annual rate in each quarter from the fourth quarter of 1971 to the fourth quarter of 1975.⁵

The Interaction of the Labor Force, Productivity and Other Economic Variables

The interaction of the labor force, productivity, and other variables to form potential output is illustrated in Exhibit I. The diagram is a simplified representation of a possible method of determining potential output.⁶ Several alternative methods are currently available (see footnote 5). The diagram indicates that population, social and economic (demand) factors are the prime determinants of labor input. Economic, technological and educational factors must be considered in the determination of productivity.⁷ Industry mix is also of importance. For example, a large in-

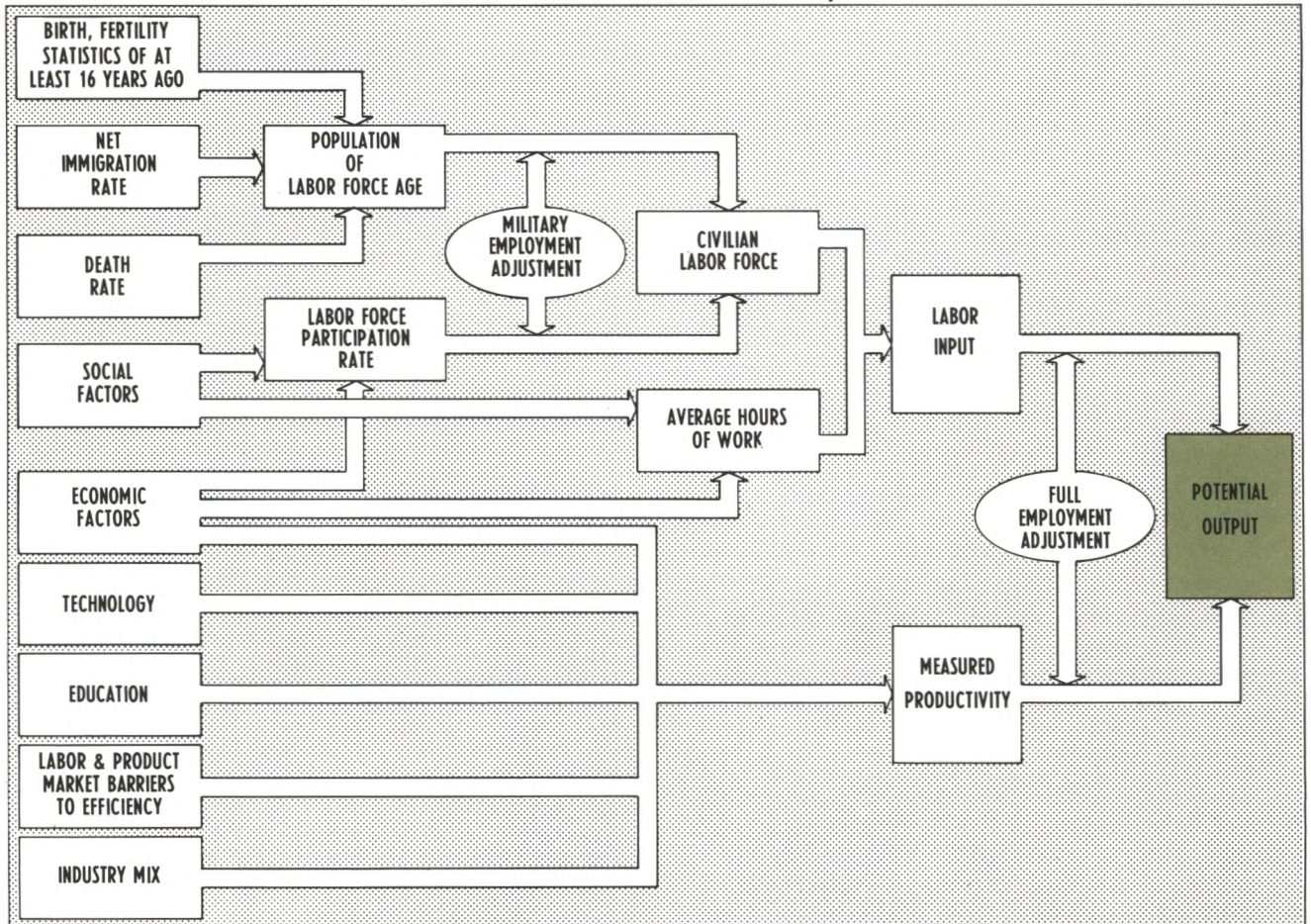
⁵An alternative estimate of the growth of potential output has been calculated by Ray Fair. His estimates allow explicitly for the fact that labor hours worked differ from labor hours paid for, and for the often rapidly changing flow of manpower between military and civilian employment. As a result, his estimates of potential output (calculated at a 96 per cent level of employment) vary from quarter-to-quarter. See Ray Fair, "Aggregate Price Changes and Price Expectations," this *Review* (November 1970), and "The Determination of Aggregate Price Changes," mimeographed, Princeton University, June 1969.

For other methods of estimating potential output, see Stanley Black and Robert Russell, "An Alternative Estimate of Potential GNP," *Review of Economics and Statistics*, February 1969, pp. 70-6; Arthur Okun, "Potential GNP: Its Measurement and Significance," *Proceedings of the Business and Economic Statistics Section of the American Statistical Association*, 1962; and Lester Thurow and L. D. Taylor, "The Interaction Between the Actual and the Potential Rates of Growth," *Review of Economics and Statistics* (November 1966), pp. 351-60. Black and Russell utilize regression analysis in combining their estimates of potential labor force and hours of work with a "Cobb-Douglas" production function. Their production function, which is characterized by a constant rate of disembodied technical progress, provides the necessary input-output relation. Okun's estimates of potential output, derived from a simplistic "law" which relates output and employment, are marked by quarter-to-quarter variances. Thurow and Taylor calculate several potential rates of growth under different assumptions about embodied and disembodied technical progress. A primary difference between their approach and that of Black and Russell is Thurow and Taylor's employment of a Solow production function instead of the more basic Cobb-Douglas production function.

⁶One simplification found in Exhibit I is the full employment adjustment made after the determination of labor input and measured productivity. This adjustment is generally made at earlier stages than shown in this diagram.

⁷Productivity, or measured productivity as it is labeled in Exhibit I, roughly corresponds to an average productivity of labor function in which $AP_L = Q/L$: AP_L = average productivity of labor, Q = aggregate level of output, and L = aggregate level of labor inputs. See M. Ishaq Nadiri, "Some Approaches to the Theory and Measurement of Total Factor Productivity: A Survey," *Journal of Economic Literature*, December 1970, p. 1138.

Exhibit I
Determination of Potential Output



crease in the size of the government sector (a sector in which productivity is defined to be equal to zero) relative to other sectors of the economy would tend to reduce overall productivity, other things equal. Sizable shifts toward service industries, in which productivity is relatively low, would also tend to diminish total productivity. Productivity is lessened by labor and product market barriers to efficiency. Efficiency, in most instances, is enhanced by permitting the free play of competitive forces.

Potential output is comprised of those productive factors which supply goods and services to an economy. An accurate estimate of the potential supply of goods and services relative to the demand should provide some information on the outlook for real output, employment, and prices. Since potential output is influenced by the size of the labor force, among other things, and the labor force is dependent upon the population of labor force age (and the participation rate), one step in analyzing potential output

growth is to examine population statistics of at least 16 years ago.

The rapid rise in the fertility and birth rates in the 1946 to 1957 period accounts for the large increase in the population of labor force age throughout most of the 1960's. Teenagers and women entered the labor force in large numbers in the 1960's. Teenagers accounted for 7.3 per cent of the labor force in 1960 and 8.8 per cent in 1969. Women constituted 32.3 per cent of the labor force in 1960 and 36.3 per cent in 1969. Assuming an unchanged participation rate, teenagers should continue to enter the labor force at rapid rates until the mid-1970's. After that, the generally declining birth rate since 1957 will tend to slow the volume of teenage entrants, while the proportion of workers in the labor force (both men and women) in their late 20's and early 30's will rise. The population of working force age should rise at about a 1.7 per cent rate from 1970 to 1975 and slow to a 1.5 per cent rate from 1975 to 1980 (see Table I).

Table I
U. S. Population of Working Force Age*
(Compounded Annual Rates of Change)

Terminal Year	Initial Year						Thousands of Persons (July 1)
	1950	1955	1960	1965	1970	1975	
1955	0.7						100,158
1960	0.8	1.0					105,156
1965	1.0	1.2	1.5				113,064
1970	1.2	1.4	1.5	1.6			122,567**
1975	1.3	1.4	1.6	1.7	1.7		133,325**
1980	1.3	1.5	1.6	1.6	1.6	1.5	143,638**

*Ages 16-64 includes Armed Forces, Alaska and Hawaii.
Source: 1950-66, *1970 Economic Report of the President*; 1967-9, *Current Population Reports*, P-25, #441; **1970-80, *Current Population Reports*, Series C Projections, P-25, #448.

Projecting the labor force participation rate is a much more difficult task than gauging the population of labor force age. Each sex-age group is influenced differently by numerous economic and social factors. The Bureau of Labor Statistics anticipates that 94 per cent of the growth in the labor force throughout the 1970's will be due to a rising population of labor force age, and the remaining 6 per cent will be attributable to expected increases in the participation rate.⁸

Determination of potential output requires modifying total labor force estimates by subtracting military personnel in order to obtain the size of the civilian labor force. Currently, it appears that military employment will continue to slacken in response to the scheduled withdrawal from Vietnam. Release of manpower from military duty tends to expand the size of the civilian labor force, increase the volume of labor input and, therefore, potential output. Longer-run projections of military requirements generally assume a return of Armed Forces strength to pre-Vietnam escalation levels.⁹

The size of the civilian labor force adjusted for average hours of work provides a measure of the volume of labor input. Average hours of work paid for have been declining for several years and are expected to continue to fall slowly.¹⁰ The chief reasons for the decline are an apparent rise in the desire for leisure and the increasing proportion of part-time workers, associated, in large measure, with the rising significance of the service sector in the American economy.

⁸See "The U. S. Economy in 1980," *Monthly Labor Review*, April 1970, p. 6.

⁹*Ibid.*, p. 4.

¹⁰*Ibid.*, pp. 6-7.

Table II
Productivity in Manufacturing Industries*
(Annual Rates of Change)

Year Before Recession	Recession	Year After Recession
3.9%	IV/48-IV/49	4.0%
3.8	III/53-III/54	2.7
2.7	III/57-II/58	1.8
.8	II/60-I/61	0.0
		6.3%
		4.3
		4.5
		6.0

*Postwar period one year before, during and one year after recessions. Productivity in manufacturing industries is more sensitive to business cycle influences than in governmental or service-oriented industries.

Source: U. S. Department of Commerce.

Productivity gains, which in the long run depend largely on advances in technology and education, vary over shorter periods with industry and business cycle shifts. Total productivity has risen at a 3.1 per cent annual rate in the post World War II period, but a definite cyclical pattern has emerged, probably reflecting the lagged response of input to output changes (see Table II). Productivity growth is expected to slacken somewhat to an annual rate of 3 per cent or slightly less in the 1970's.¹¹

Short-Term Impact of Variations in Potential Output

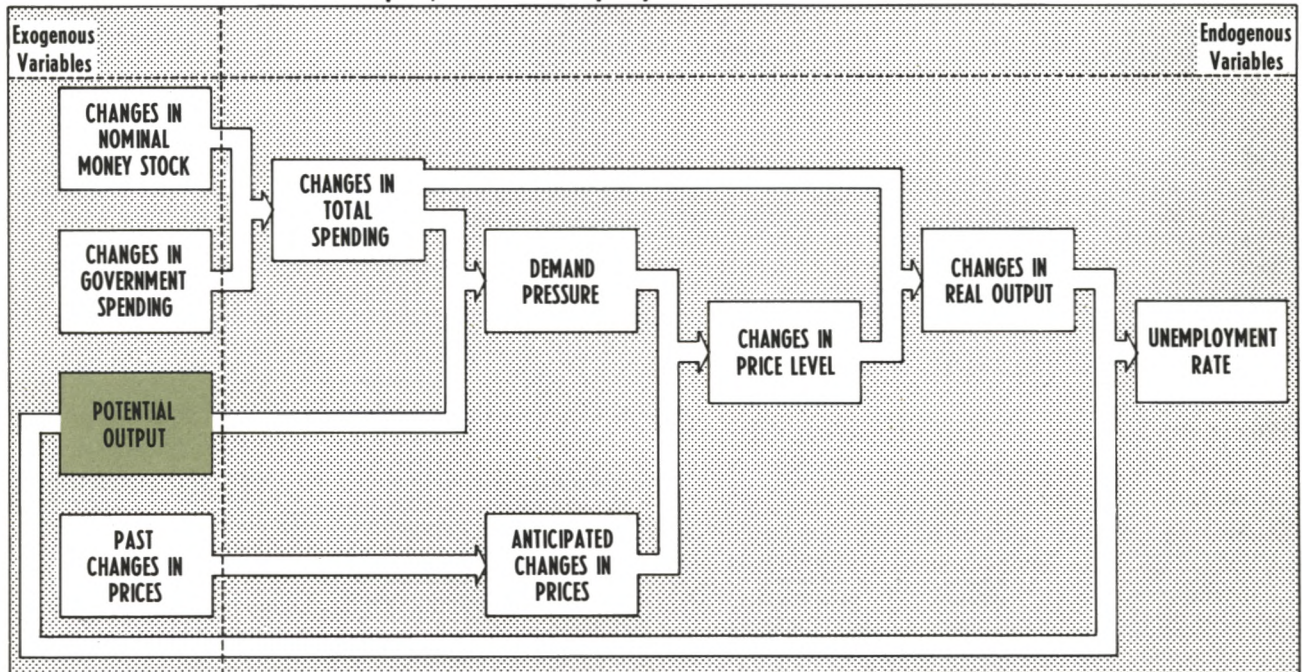
One technique for analyzing the effect of varying rates of growth of labor inputs and productivity is to examine the role played by potential output in this Bank's model of the economy. Potential output enters the model to reflect the economy's supply capacity (see Exhibit II).¹² Total demand for goods and services, which is determined by monetary and fiscal actions, interacts with a supply capacity variable to determine demand pressure on the price level. The further the economy is from producing goods and services at a full employment level of output, the less the demand pressure on prices and the more the "spillover of demand" into real output. The closer the economy is to supplying the full-employment level of output, the more total demand is reflected in rising prices and the less is manifested in greater real output.

The model combines the demand pressure variable with an estimate of anticipated prices to obtain the current price level. Real output is obtained by eliminating the effects of price changes from nominal GNP. A fourth endogenous variable, the unemployment rate, can be derived as shown in Exhibit II.

¹¹*Ibid.*, p. 3, and *Economic Report of the President*, 1970, p. 84.

¹²The potential output relation actually employed in the model is the difference between current potential output and last quarter's real output ($X_t^P - X_{t-1}$).

Exhibit II
**Relation of Potential Output to the Price Level,
 Real Output, and Unemployment in the St. Louis Model**



Lagged variables, with the exception of past changes in prices, are omitted from this diagram. See "A Monetarist Model for Economic Stabilization," this *Review* (April 1970), p. 10, for a flow diagram of the St. Louis Model.

Potential output is the only exogenous variable which has not been analyzed in some detail in earlier discussions of the model in this *Review*. The model currently employs the trend-dominated CEA estimates of potential output. Because of short-run variations in labor input and productivity, however, realistic estimates might allow for quarterly potential output changes.¹³

Projections of the model's endogenous variables over the relatively short period of two years may reflect some impact of the varying estimates of potential output. In order to gauge this impact, the model was simulated over the I/1971-IV/1972 period with potential output calculated to grow at a relatively slow rate of 2.5 per cent and a relatively rapid rate of 5.5 per cent annually (see Table III). It is possible to conjecture circumstances which would lead to very slow or very rapid increases in potential output over the next two years. These circumstances depend primarily on

shifts in labor input, since those factors influencing full employment productivity are primarily of a long-run nature.

Labor input could fall because of a downward shift in the civilian labor force, the participation rate, or average hours worked. For example, a sizable shift away from the practice of birth control could lead to a withdrawal of women from the labor force. If the Vietnam effort is not de-escalated as anticipated, or if some new military conflict arises, the civilian labor force would not grow as rapidly as otherwise. Productivity could be restrained if 1971-72 economic activity is dominated by economic sectors not employing efficient production techniques. The use of older machinery, failure to replace deteriorating plant or equipment or failure to embark on new investment projects, could lessen capital/labor productive efficiency.

A more optimistic outlook for potential output could be achieved by reversal of the factors outlined above. For example, if military personnel are returned from Vietnam and channeled into the civilian labor force as fast as they were withdrawn in 1965-66, labor inputs would rise rapidly. Improvements in labor mobility and skills and the elimination of product and labor

¹³The estimates of potential output made by Ray Fair, "Aggregate Price Changes and Price Expectations," in gauging quarterly changes since 1954, reflect a 4.5 per cent average rise in potential output from mid-1962 to mid-1963 and a 2.5 per cent average increase from mid-1965 to mid-1966 (the Vietnam troop escalation). At no time from 1955 to 1975 (estimated) have the CEA estimates been less than 3.5 per cent nor more than 4.4 per cent.

market monopolies might increase both labor inputs and productive efficiency.

Employing the slow (2.5%) and rapid (5.5%) potential output alternatives in the model of this Bank gives the results summarized in Table III. The money supply is assumed to grow at a 5 per cent rate throughout the two-year period; high-employment Government expenditures are estimated to second quarter 1972, and projected to grow at an 8 per cent annual rate thereafter.

Since the growth rate of nominal GNP is determined in the St. Louis model solely by a constant term and monetary and fiscal actions, changes in the growth rate of potential output cannot influence total spending. The division of nominal GNP into its components, real GNP and the price level, is strongly influenced by the rapid or slow growth of potential output. The postulated relation between real and potential output also proves to have considerable significance for the unemployment rate.

Slow growth of potential output at a 2.5 per cent rate has the effect of restraining the rate of real GNP growth. Even the slow rise of real GNP is large relative to potential output growth, however, thus stimulating continued price increases through the demand pressure variable. Anticipations of continued inflation, based on past changes in prices (see Exhibit II), also tend to retard progress in halting price rises. By the end of 1972, real output is projected to increase at a 2.7 per cent annual rate while prices rise at a 3.8 per cent rate. The poor progress in combatting inflation is

"traded-off" over this two-year period against a 5.6 per cent rate of unemployment at the end of 1972.

The discouraging feature implied by a 5.5 per cent rate of growth of potential output is the rise of the unemployment rate to 7 per cent at the end of the two-year period. A rapid infusion of Vietnam war veterans into the civilian labor force is consistent with this projection. By way of contrast with the projection of potential output at a slow rate, a 5.5 per cent rate of increase in potential output implies that prices will slow to a 2.4 per cent rate, and the rate of increase of real output will rise to 4.1 per cent by the end of 1972.

The economic conditions existing at the beginning of the simulation period are particularly important with regard to the movements of the endogenous variables under either potential output growth assumption. The existence of both a large gap between real and potential output and a high rate of price rise at the beginning of 1971 strongly influences the response pattern of the endogenous variables over a short period.

Intermediate-Term Impact of Variations In Potential Output

With some qualifications, the St. Louis model may be used to analyze the effect of variations in potential output on key economic indicators over some intermediate period. The period selected is the 1971-80 decade, a period long enough for trend factors to dominate the changes in potential output. The range of average growth of potential output over a decade

should be less than for over the relatively short interval of two years. Given that potential output grew at about an average 3.8 per cent rate in both the 1950's and 1960's, and that it is expected to grow at a slightly faster rate in the 1970's, a 3.5 per cent to 4.5 per cent range should adequately capture the next ten-year average growth rate.

Changes in productivity resulting from variations in the rate of accumulation of capital, in technological progress, in educational advancement, in industry mix and in changing barriers to competitive markets, should be allowed for in this range of potential output growth. A severe change in the economic climate, such as occurred in the depression-dominated 1930's and

Table III

Simulation of the Effects of Slow and Rapid Potential Output Growth, 1971-72, Utilizing the St. Louis Model*

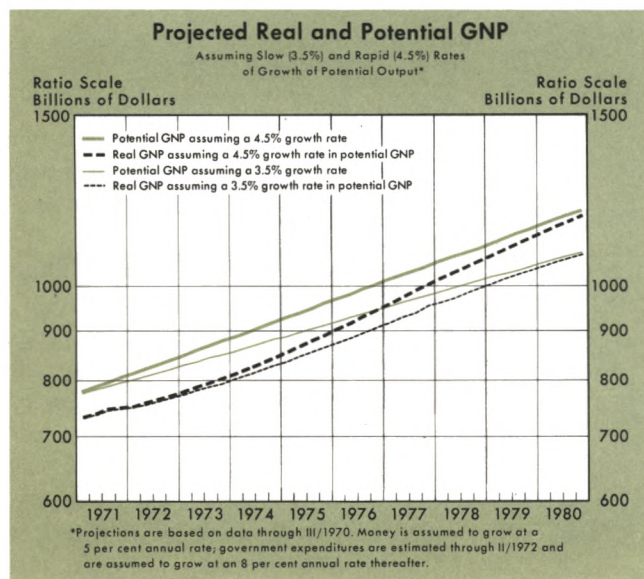
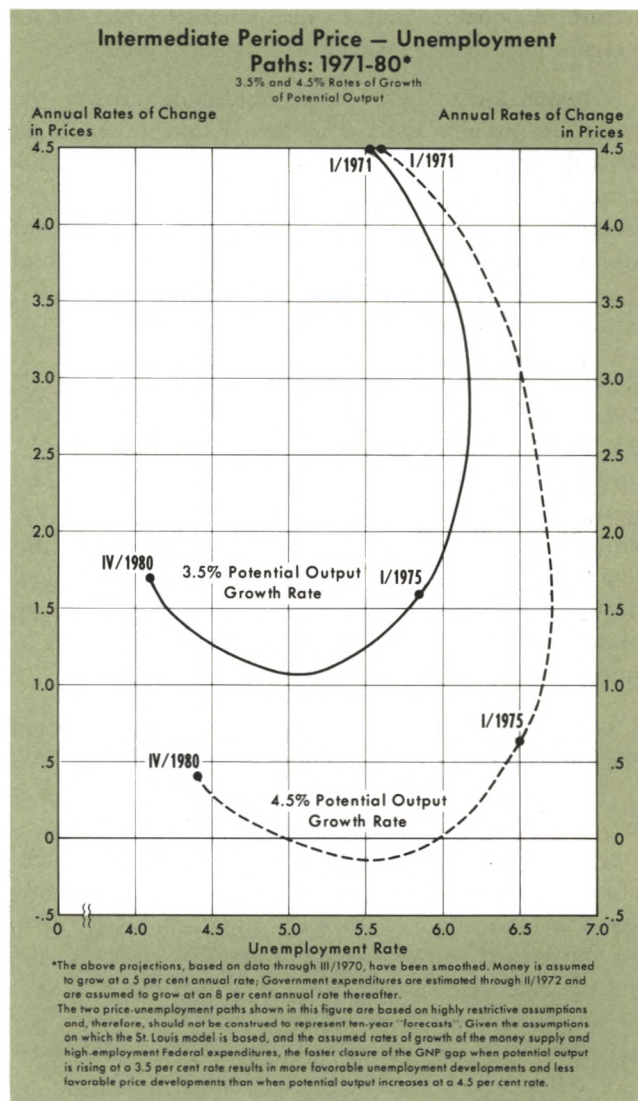
Projected Rate of Change of Potential Output	1971				1972			
	I	II	III	IV	I	II	III	IV
Slow 2.5%								
Rate of Change in:								
Nominal GNP	6.8%	6.8%	8.7%	5.5%	4.8%	6.7%	7.0%	6.6%
Real GNP	2.1	2.2	4.1	1.1	0.5	2.5	2.9	2.7
GNP Price Deflator	4.6	4.5	4.5	4.5	4.3	4.1	4.0	3.8
Unemployment Rate	5.4	5.5	5.5	5.4	5.5	5.6	5.6	5.6
Rapid 5.5%								
Rate of Change in:								
Nominal GNP	6.8	6.8	8.7	5.5	4.8	6.7	7.0	6.6
Real GNP	2.3	2.5	4.5	1.7	1.3	3.5	4.2	4.1
GNP Price Deflator	4.4	4.2	4.1	3.8	3.5	3.1	2.8	2.4
Unemployment Rate	5.7	5.9	6.1	6.2	6.5	6.8	6.9	7.0

*This simulation is based on equations using data through III/1970. The money stock is projected to grow at a 5 per cent rate from IV/1970 through IV/1972. High-employment expenditures are estimated through II/1972 by this Bank, and are projected at an 8 per cent rate thereafter.

the wartime 1940's, could strongly influence the growth of those factors determining potential output. For example, a sizable shift in the rate of capital accumulation could cause potential output to grow at some rate outside the postulated range of 3.5 to 4.5 per cent from 1971 to 1980. The 3.5 to 4.5 per cent range should also permit normal variations in labor input to occur. The results obtained from the 1971-80 simulations employing the 3.5 to 4.5 per cent potential output range are given in the accompanying charts (the money supply is again assumed to grow at a 5 per cent rate; high-employment Federal expenditures are estimated to II/1972, and assumed to grow at an 8 per cent rate thereafter).

The ten-year simulations based on varying only the exogenous supply variable in the St. Louis model suggest that the composition of total spending (between prices and real output) depends strongly on the postulated rate of growth of potential output. The 3.5 to 4.5 per cent range is not wide, compared with the 2.5 to 5.5 per cent range employed in the short-run simulations, but it nevertheless provides an effective constraint on the performance of the economy over a decade. Because of the sizable degree of slack in the economy at the beginning of the simulation period, real output rises and the rate of inflation falls under slow or rapid potential output growth for several years. Eventually, the slack is eliminated and the slowing inflation—rising real output relation is reversed.

When potential output is assumed to grow at a 3.5 per cent rate, real output at the end of 1980 is rising at less than a 4 per cent rate while prices are increasing at a 1.7 per cent rate. In contrast, a 4.5 per cent



rate of growth of potential output throughout the 1970's is accompanied by prices rising at the rate of only 0.4 per cent at the end of 1980 and real output increasing at a 5.3 per cent rate. The unemployment rate in late 1980 is somewhat higher when potential output grows at the faster 4.5 per cent rate, but only slightly above 4 per cent in either case. The differences in the price-unemployment paths over the next ten years (described by the above chart) arise because the gap between real and potential output is closed faster when potential output is increasing at the slower 3.5 per cent rate.¹⁴ The smaller the gap, that is, the closer the economy is to a full employment level of output, the more total spending is manifested in price increases and the less in real

¹⁴Note that the price-unemployment paths are traced only over an intermediate period, not a long-run period over which the endogenous variables would be permitted to attain their equilibrium values.

output. A smaller gap is also characterized, other things equal, by a lower unemployment rate.¹⁵

A faster rate of growth of potential output — the exogenous supply variable in the model — would be consistent with a faster rate of growth of the money supply — the chief exogenous demand variable. That is, if the supply of goods and services could be encouraged to grow at a relatively rapid rate, faster rising demand (stimulated by, say, a supply of money increasing at a rate which exceeds 5 per cent) would not foster either strong inflationary pressure or excessive unemployment over a ten-year period. Alternatively, more rapid increases in the secular trend of income velocity than are implied by the model would foster more rapid rates of growth of total spending over the decade without increasing the money supply at more than a 5 per cent rate. This article has stressed possible changes in supply conditions, however, rather than demand factors which might lead to improved economic well-being over short- and intermediate-run periods.

Summary

Changes in productivity and labor input have important implications for the U.S. economy over short- and intermediate-run periods. Two principal determinants of the volume of labor inputs are labor force growth and work — leisure attitudes. The size of the labor force is determined by the death and net immigration rates, which have about stabilized in this

country, the birth rate of at least 16 years earlier, and the labor force participation rate. A rising birth rate from 1955 to 1957 will expand the growth of the population of labor force age over the next few years, but a generally declining birth rate after 1957 will tend to slow the growth of this population in the second half of the 1970's.

The size of the military establishment at a given time introduces an additional variable into the determination of the civilian labor force. The different age-sex groups of labor force age are buffeted by varied forces either encouraging or discouraging them from participating in the labor force, but, on balance, it appears that the overall participation rate will rise slightly over the next decade. Productivity, on the other hand, is expected by the Labor Department to rise at a slightly lower rate in the next decade than over the postwar period heretofore.

The short- and intermediate-run simulations employing the model of this Bank suggest that rapid increases in potential output are accompanied by relatively beneficial movements in prices and real output, but somewhat unfavorable changes in the unemployment rate. The unemployment rate could be lowered, however, despite rapid potential output advances, if total spending were stimulated sufficiently.

Potential output growth may be enhanced over short- or intermediate-term periods by increased labor and/or capital inputs and increased efficiency in their combination. Technological and educational advances, the lowering of entry barriers to individuals and firms, and more efficient utilization of labor and capital resources encourage potential output growth. The difficulty of implementing such measures would quite likely be outweighed by the resulting increases in the flow of goods and services.

¹⁵The unemployment rate is determined directly in the St. Louis model by the gap between real and potential output. The function may be written in algebraic form as:

$U_t = a_0 + b_1G_t + b_2G_{t-1}$, where U_t = unemployment rate in the current quarter, G_t = the gap in the current quarter, G_{t-1} = the gap in the previous quarter, and a_0 , b_1 and b_2 are parameters. The gap is defined by $G_t = [(X_t^p - X_t) / X_t^p] (100)$ where X_t^p = current quarter potential output and X_t = current quarter real output. See Leonall Andersen and Keith Carlson, "A Monetarist Model for Economic Stabilization, this *Review* (April 1970), pp. 9, 14.

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