Federal Reserve Bank of New York

Quarterly Review

Inflation, Taxes, and Corporate Investment Incentives

The relatively slow expansion of capital spending in the current recovery has been a cause of widespread concern. Some analysts have pointed to dramatic increases in the yields required by holders of corporate debt and equity claims to induce them to finance investments in plant and equipment. Other investigators have pointed to a number of factors which have acted to reduce the prospective earnings generated by the physical assets of corporations.

What is the relative importance of developments in financial markets, compared with the capital goods markets? With regard to financial markets, conventional measures of investors' returns have greatly overstated the yields that investors in the securities markets in fact required to finance corporate assets in the late sixties and seventies. In contrast, with regard to the markets for capital goods, the increase in the inflation rate over the past decade or so has greatly raised the effective tax rate on income from capital and has had a major role in impairing incentives for business investment. The interaction of inflation and the corporate tax structure also has been an important reason behind the dramatic increase in corporate use of debt financing over this period.

Overview of the analysis

When a corporation purchases a new capital asset, it anticipates certain net earnings from the expected

sale of the output of the new asset after deducting expected labor and materials costs, taxes, and wear and tear on the asset. These net earnings may be paid out to bondholders in the form of interest, to stockholders in the form of dividends, or reinvested in the firm. The expected profitability of the capital asset is obviously greater the larger is the expected earnings stream and the smaller the cost of purchasing the asset. The ratio of current annual earnings to the replacement cost of corporate assets, therefore, is a summary measure of the expected profitability of acquiring a new capital asset. This important measure is referred to as the *rate of return* on corporate assets in the remainder of this article. Although in principle the rate of return on corporate assets should be measured by using an expected earnings series, here current earnings are used instead, since there is no data on businessmen's earnings expectations. While it is possible to try to construct an expected earnings measure based on a hypothesis about expectations, the difficulty is that there are many plausible hypotheses that would give widely differing results.

Another deficiency of the measure used here is that the rate of return incorporates the earnings performance of both old and new assets rather than new assets alone. It is not generally possible to decompose aggregate corporate earnings into earnings from older assets and those from newly purchased assets.

To assess the outlook for business capital spending, the rate of return on corporate assets must be compared with the average yield required to be paid when floating new securities in the debt and equity markets. The larger the spread between the rate of return on corporate assets and the yield required to finance such investments, the greater will be the incentive for

business to expand existing facilities. In the discussion below, the yield required in corporate debt and equity markets to finance corporate assets will be referred to as the *cost of capital*.

The return on corporate assets

Both stockholders and debt holders provide financing for a firm's activities. The net earnings that could be paid out to these two groups of investors represent the total earnings of investors or *total capital income*. It might appear that income accruing to stockholders could easily be measured using corporate profits after taxes. However, corporate profits as conventionally measured do not fully take into account all operating costs. Operating costs include both labor and materials costs as well as the depreciation outlays required to offset the wear and tear and the obsolescence of physical plant and equipment. Actual wear and tear on the stock of capital is not the same as the deductions for depreciation used in computing corporate income tax liability. Tax-allowable depreciation will vary over time in accordance with the provisions of existing tax laws. To compute economic profits, the appropriate deduction is the replacement value of the wear and tear on plant and equipment, not the tax-allowable deduction. In computing these economic profits, all resource costs —labor, materials, and wear and tear on plant and equipment—must be valued at current market prices. This issue is discussed in detail later.

Holders of corporate debt also have claims on corporate revenues and, to calculate total income accruing to capital, the interest payments which they receive should be added in. When these interest payments are added to economic profits, the result is an estimate of the total income earned by the assets of nonfinancial corporations.

This income measure does not include capital gains on corporate plant, equipment, or inventories, since these gains primarily reflect increases in the general level of prices. Even if these assets could be liquidated readily, no increase in command over economic resources would be obtained. Exclusion of such capital gains is consistent with the following definition of income: total capital income is the maximum amount of money which could be spent by holders of corporate debt and equity during the current period and which would still enable them to spend the same amount in real terms in each ensuing period. In other words, if equity and bondholders elected to spend nominal capital gains from plant and equipment and inventories, they would have to liquidate some physical assets and thereby reduce the real value of the earnings stream in succeeding periods.

Total capital income also excludes the reduction of the real value of corporate liabilities to debt holders, which occurs as the general price level rises. There is no net effect on income, because total capital income is the sum of returns to holders of both corporate debt and equity. While the net debt of corporations is a liability of equity holders, it is an asset of individuals holding the debt. Hence, a decline in the real value of net debt makes equity holders better off

---

Table 1

Selected Balance-Sheet Items of Nonfinancial Corporations in 1976

At midyear; in billions of dollars

Assets		Liabilities
Plant and equipment valued at replacement cost 1,022.9		467.7 ..... Market value of net interest-bearing debt
Inventories valued at replacement cost 360.0		860.2 ..... Market value of outstanding equity
Net noninterest-bearing financial assets 214.4		
Total replacement cost.. 1,597.3		1,327.9 ... Total market value

All items were calculated in the same manner as in the *Annual Report* of the Council of Economic Advisers (January 1977), Table 1, page 29. The data differ from that presented by the Council because the statistics the Council had available for 1976 were preliminary.

The right-hand side of the table shows the market value of the claims held against nonfinancial corporations. These items include both the market value of net interest-bearing debt and the market value of outstanding equity. The left-hand side of the table includes the replacement value of plant and equipment and inventories. These assets are valued at the current prices prevailing in the markets for new investment goods and materials. On the left-hand side of the table, the final item is "Net noninterest-bearing financial assets", which include a number of financial assets that have not been netted out against corporate fixed income liabilities and hence do not appear in the "Market value of net interest-bearing debt". The most important components are demand deposits, currency, net trade credit, and direct foreign investment.

It will be noted that total assets and liabilities are not equal, as is the case in conventional accounting. Since in this table the valuations of the left- and right-hand side items are taken from different markets, there is no reason why they must add up to the same totals.

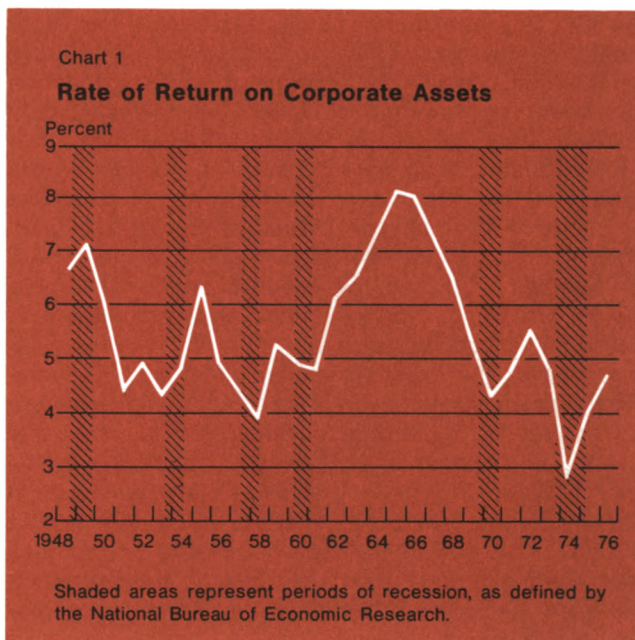and debt holders worse off, leaving total capital income unchanged.

The debt concept which underlies the calculation of total capital income is a net concept, defined as the Council of Economic Advisers and many other economists have defined it. It is equal to the market value of gross corporate liabilities, including corporate bonds, notes, debentures, bank loans, and commercial paper outstanding, *minus* the market value of various fixed income assets such as Treasury bills, time and savings deposits, and certificates of deposit held by these same corporations. The market value of debt in 1976, as well as a number of other balance-sheet items, are recorded in Table 1.

While purchasing power reductions of the real value of net interest-bearing debt do not have an impact on total capital income, inflation-induced reductions in the real value of demand deposits, currency, and net trade credit do have an impact. Total capital income must be adjusted to reflect these purchasing power losses. Thus, total capital income after corporate taxes consists of aftertax economic profits (including adjustments to put depreciation and materials outlays on a current market price basis) plus the net interest payments of corporations and minus the purchasing power loss on currency, demand deposits, and net trade credit.

The rate of return that is earned on corporate assets, shown in Chart 1, is simply total capital income divided by the total replacement cost of all assets. Other investigators have sometimes omitted the value of net noninterest-bearing financial assets from total replacement cost when calculating the rate of return on assets. Their inclusion here is designed to preserve consistency in the definitions of total capital income and replacement cost.[1]

As would be expected, the rate of return on nonfinancial corporate capital displays substantial variation over the business cycle. It posts peaks in 1949, 1952, 1955, 1959, 1965, and 1972. The troughs and peaks generally correspond to expansions and contractions of the domestic economy. Taking the twenty years ended in the midsixties, there appears to be little trend in the data. However, the rate of return fell dramatically in the second half of the 1960's and in the 1970's. From a postwar high of 8.1 percent in 1965, the rate of return fell to a postwar low of 2.8 percent in 1974 and recovered to only 4.7 percent in 1976.

---

[1] Total capital income represents returns on both physical investments and financial assets. If one excludes financial assets from the asset base, then the income component in total capital income which arises from the holding of these financial assets should be excluded from capital income. It is not posssible to do this with the available data.

Chart 1
Rate of Return on Corporate Assets

Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.

The cost of capital

Total capital income is more than an important concept with which economists can assess the true profitability of corporations. It is also an important notion for investors in corporate debt and equities. For these investors, total capital income represents the maximum corporate payout they can expect while keeping the prospect of future payouts—and hence their consumption possibilities—unimpaired.

The relationship between total capital income and the aggregate amount investors are willing to pay in order to obtain claims on this income is summarized by the cost of capital. The cost of capital is measured as total capital income after taxes divided by the sum of the market values of net corporate debt and outstanding equity. For example, if capital market participants are paying $20 for each dollar of capital income, the cost of capital works out to 5 percent.

Ideally, the cost of capital should indicate the value capital markets place on a permanent income stream of constant purchasing power. However, the cost of capital is measured here by using actual earnings rather than investors' long-run expected earnings, since no measure of those expectations is available. Thus the series used in this analysis is more sensitive to short-run changes in earnings than an ideal measure would be. This same deficiency, it will be recalled, characterized the rate of return.

The most striking feature of the cost of capital series, as shown in Chart 2, is its sharp decline during

the fifties. The extremely high values of the cost of capital in the very early postwar period may have been due to the fact that consumer goods production had been very low during World War II. Immediately following the war, funds that might otherwise have been available to finance corporate investment were channeled instead into rebuilding consumers' stocks of goods to "normal" peacetime levels. At this time, consumption by households, especially of the stream of services furnished by durable and semidurable goods, was far below the levels commensurate with household incomes. Since the cost of capital can be regarded as the reward investors require to postpone their present consumption, one should have expected a large reward for further postponement at that time.

Another explanation of the high cost of capital following World War II is that investors required high "risk premiums" to hold claims to corporate income during this period. They may have done so because they were still wary after the unnerving investor experience during the 1929 market crash and the depression that followed.

In later postwar years, from the midfifties to the midseventies, the trend of the cost of capital was essentially flat—but with some cyclical variation. The series reached a peak of 6.6 percent in 1966 and then
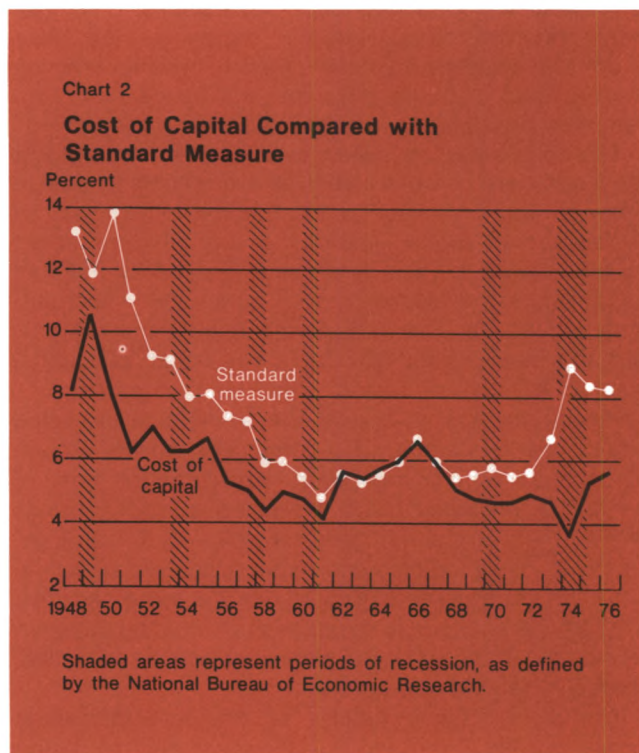
fell, on balance, to a level of 3.6 percent in 1974. Thereafter, it rose sharply in 1975 and by last year was up to 5.7 percent.

The path of the cost of capital in recent years stands at odds with the impression of many businessmen and economists that the cost of financing investments has been very high in the past few years. These views have seemingly received empirical support from the elevated levels of earnings-price ratios of many corporations in the 1970's. There is a serious difficulty with the standard earnings-price measures, however. The "earnings" series used to construct them are based upon measures of production cost which do not properly value the materials used up in production, nor do they properly value the wear and tear (depreciation) on plant and equipment.

The difference arises because in conventional accounting the costs of goods used in production and of depreciation are measured in the prices prevailing at the time they were acquired; they are not measured at current market prices. It is crucial that all revenues and costs used to compute earnings be measured in dollars of the same period. Indeed, if some costs are measured in 1977 dollars and other costs are measured in 1965 dollars, then little meaning can be attached to aggregate cost or profits measures consisting of such disparate components.

In earlier years, when the underlying inflation rate was much lower and less volatile, the significance of such difficulties was not great. However, the problem of interpreting these measures becomes much harder in an inflationary environment, when profits as usually calculated and economic profits (profits measured on the basis of current market prices) give widely different results. The distortions which higher inflation rates have introduced into earnings-price ratios (as usually measured) mean that earnings-price ratios in the late sixties and seventies are not comparable to earnings-price ratios in earlier periods.

The misleading impression given by the standard earnings-price ratio can be illustrated by comparing the cost of capital with a weighted average of the standard earnings-price ratio and the yield on debt financing.[2] The latter series is called the "standard measure" in Chart 2 where it may be compared with the cost of

Chart 2

Cost of Capital Compared with Standard Measure

Percent

Standard measure

Cost of capital

1948 50 52 54 56 58 60 62 64 66 68 70 72 74 76

Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.

[2] The cost of capital, C, is defined as total capital income after tax (TCI) divided by total market value, V. Total market value equals the sum of the market value of outstanding equity (S) and the market value of net debt (D). Thus, denoting net interest payments of nonfinancial corporations by the symbol NI, we may write the cost of capital as follows:

$$C = \frac{TCI}{V} = \frac{TCI-NI}{S}\frac{S}{V} + \frac{NI}{D}\frac{D}{V}$$

In this formula, the term (TCI—NI) ÷ S can be thought of as a revised earnings-price ratio.

capital. While the two series look very similar over much of the sixties, in the past ten years they have diverged increasingly. Although the cost of capital in 1976 stood very close to its average value during the past twenty years, the standard measure reached its highest levels in over twenty years in 1974-76. The levels of the latter series in the past three years stem, of course, from its failure to measure aftertax corporate profits and the earnings-price ratio on the basis of current market prices.[3] When all costs and revenues which enter into corporate profits are measured in comparable units, the cost of capital in 1976 turns out to be almost a percentage point below its 1966 peak.

Incentives for capital formation

The incentives for capital formation depend on the spread between the rate of return on corporate assets and the cost of capital. It was pointed out previously that the aftertax return on corporate assets fell dramatically after 1965. Yet, the cost of capital did not fall nearly as much during the identical period and has on the whole been relatively stable ever since the midfifties (Chart 2). The spread between the rate of return and the cost of capital is shown in Chart 3. It appears that there was a continued improvement in the incentive to invest from the early 1950's to the mid-1960's, and there have been sharp declines in this incentive since then. Indeed, in 1975 and 1976, the spread between the rate of return on corporate assets and the cost of capital reached its lowest levels in more than twenty years.

The prevalence of negative values for the spread in Chart 3 seems surprising. However, this difference measures only imperfectly the spread between the expected rate of return on *new* assets and the cost of capital because it is an average spread of the many different vintages of capital. There are a number of reasons why this average spread for old assets could differ systematically from the expected spread on new assets. For example, the existing capital stock always contains a certain number of obsolete or inefficient assets with negative spreads. The recent very rapid increases in energy prices, for instance, undoubtedly lowered the spreads for existing assets more than it lowered expected spreads on new assets. A second example concerns the different tax treatment of old and new assets. Many statutory changes in the tax

[3] The standard measure also lies significantly above the cost of capital during the late forties and fifties. Much of this divergence is attributable to the spread between economic profits and accounting profits that arose during the very rapid inflation in the years 1945-51. While inflation rates were moderate during the remainder of the fifties, the initial postwar inflation continued to cause the two profits measures to diverge during the subsequent decade.

law have applied only to new assets. In addition, the real value of the tax depreciation deductions for capital assets can be eroded by increases in the general price level during their lifetimes. This point is elaborated below; here it is sufficient to note that variations in the inflation rate are another source of difference in tax treatment of old, compared with new, assets. In addition to these kinds of complications, there are shortcomings in the measurement of the aggregate spread for existing assets. For all these reasons, the *movement* in the spread series is of more interest than its level in any particular period. Since most new capital goods are substitutes for existing assets, one may expect that the aggregate spread as charted and the expected spread for new assets will move very closely together.

The sharp drop in the spread between the rate of return and the cost of capital in the past decade or so essentially mirrors the decline in the rate of return on corporate assets. An important part of the reduction in the rate of return is attributable to the interaction of inflation and the corporate tax structure. This interaction has proceeded through a number of different mechanisms which are highlighted in Table 2. Column 1 provides a conventional accounting measure of capital income. Conventional methods of depreciation and inventory accounting understate costs and overstate profits during inflationary periods; adjustments for these overstatements are given in columns 2 and 3. Inflation also reduces the real value of the short-term financial assets held by corporations, and an adjust-

Chart 3
Difference between Rate of Return on Corporate Assets and Cost of Capital

Percent

Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.
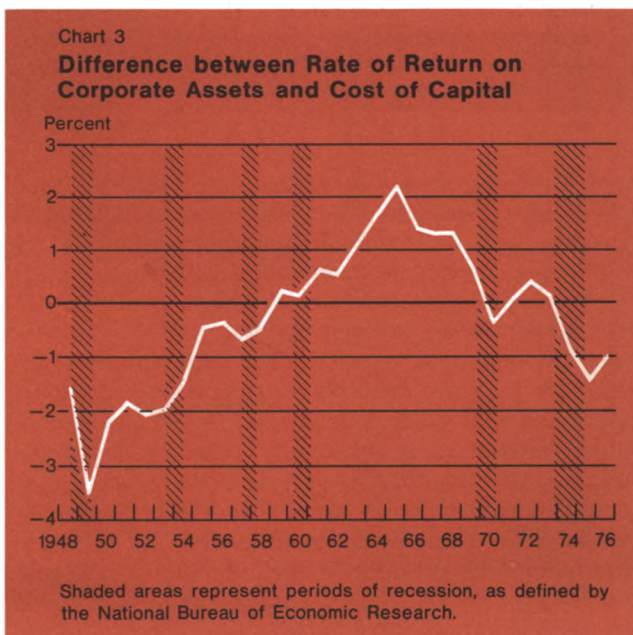
Table 2

Capital Income and Adjustments

Year	(1) Accounting capital income before tax	(2) CCA	(3) IVA	(4) Purchasing power loss	(5) Total capital income before tax
1948	32.6	− 3.8	− 2.2	−1.9	24.7
1949	26.0	− 3.8	1.8	0.3	24.3
1950	39.3	− 3.9	− 4.9	−0.3	30.2
1951	40.2	− 4.5	− 1.2	−2.4	32.1
1952	35.1	− 4.4	1.0	−0.8	30.9
1953	36.2	− 4.0	− 1.0	−0.3	30.9
1954	33.6	− 3.2	− 0.3	−0.1	30.0
1955	43.8	− 2.1	− 1.7	0.1	40.1
1956	43.4	− 3.0	− 2.7	−0.6	37.1
1957	41.9	− 3.3	− 1.5	−1.5	35.6
1958	36.3	− 3.4	− 0.2	−1.2	31.5
1959	46.1	− 2.9	− 0.4	−0.4	42.4
1960	42.9	− 2.3	0.3	−0.7	40.2
1961	43.1	− 1.8	0.1	−0.5	40.9
1962	48.2	1.0	0.1	−0.6	48.8
1963	53.1	1.9	− 0.1	−0.7	54.1
1964	59.9	2.6	− 0.6	−0.8	61.2
1965	70.4	3.6	− 1.9	−0.9	71.3
1966	76.9	3.8	− 2.1	−1.8	76.8
1967	74.1	3.6	− 1.7	−1.7	74.2
1968	82.0	3.6	− 3.4	−2.6	79.5
1969	81.5	3.5	− 5.5	−3.6	75.9
1970	72.1	1.5	− 5.0	−4.2	64.5
1971	81.1	0.5	− 5.0	−3.0	73.6
1972	94.9	2.7	− 6.6	−2.5	88.5
1973	115.8	1.8	−18.6	−5.1	94.0
1974	132.8	− 3.0	−40.4	−9.9	79.5
1975	133.2	−12.0	−12.0	−8.7	100.5
1976	163.0	−14.5	−14.1	−5.5	128.8

Entries in the fourth column are the previous year's average holding of demand deposits, currency, and net trade credit multiplied by the current year's growth in the consumer price index with its sign reversed.

All other data are from the national income and product accounts. The first column is equal to accounting profits before corporate taxes plus net interest payments of nonfinancial corporations. The second column is the capital consumption adjustment. The third column is the inventory valuation adjustment. The fifth column is the sum of the first four columns.

Source: Department of Commerce, Department of Labor, and Board of Governors of the Federal Reserve System.

ment for these losses is shown in column 4. Since taxable profits are overstated, corporate tax liability is increased and, as described below, the effective tax rate on capital income is therefore raised.

Depreciation based on historical cost

Since depreciation expenses allowable for tax purposes are tied to a historical cost valuation of capital assets, the real value of such tax deductions is continually eroded in an inflationary economy. The process is cumulative, so that over time the original cost depreciation base of an asset is worth progressively less in terms of purchasing power. As the revenues of corporations rise with the upward march in the general level of prices, depreciation deductions fixed in historical dollars provide an ever less effective shield against the bite of the corporate income tax.

Another variable that affects the adequacy of depreciation deductions is how long a write-off period the tax authorities allow for various fixed assets. Prior to 1962, aggregate depreciation for tax purposes was less than the actual wear and tear on plant and equipment valued at replacement cost. Following the institution of more generous accelerated depreciation provisions in 1962, aggregate tax-allowable depreciation expenses taken by nonfinancial corporations were larger than wear and tear valued at replacement cost. The second column of Table 2—CCA (capital consumption adjustment)—shows the difference between tax-allowable depreciation claimed by nonfinancial corporations and replacement-cost depreciation. The positive values of the adjustment between 1962 and 1973 reflected the

more generous tax depreciation measures after 1962.

The impact of inflation on the erosion of the real value of depreciation deductions is cumulative. Therefore, total erosion depends on the rise in the general price level between the year of an asset's acquisition and the years in which depreciation allowances are taken. The erosion, which occurred as inflation accelerated after 1966, can be seen in the difference between tax-allowable depreciation and replacement-cost depreciation. It declined from a positive $3.8 billion in 1966 to a negative $14.5 billion in 1976, a swing of $18.3 billion. The adjustment declined in every year after 1966—except in 1972, when tax depreciation guidelines were liberalized. This decline indicates that the growth of tax-allowable depreciation has increasingly lagged behind the growth of the replacement-cost depreciation.

Rapid increases in the general price level occurred in the six years immediately following World War II as well as in the past ten years. The rapid inflation between 1945 and 1951 is reflected in the negative values of the CCA throughout the 1950's as shown in Table 2. Although inflation was much lower after 1951, the real value of the tax depreciation deductions of many assets was permanently reduced by the initial inflationary episode. The magnitude of the CCA gradually declined, however, as new assets came on stream. For one thing, these newer assets could be depreciated under the accelerated depreciation provisions which came into force in 1954. For another, the real value of the depreciation deductions for these newer assets was not affected by anything like the bout of inflation that immediately followed the war.[4]

Clearly, the faster the tax laws allow a corporation to write off an asset, the smaller will be the effects of inflation in increasing corporate tax liabilities. In an inflationary economy, the depreciation provisions currently in force discriminate against corporations that own long-lived assets with corresponding long write-off periods. One effect is to favor investment in equipment and to discourage investment in structures. Businesses also have an artificial incentive to alter their production methods so as to rely more heavily on assets that are short-lived or, better still, ones that can be completely expensed within a one-year period. Businesses that can make such changes in production methods are able to reduce at least some of their increased

[4] The differential tax treatment of old and new capital assets which stems from the 1954 tax legislation and the 1945-51 inflationary episode also helps to explain the negative spread values observable in Chart 3 for the forties and fifties. While the rate of return might be less than the cost of capital for an existing asset in the early fifties, this would not necessarily be the case for a new asset acquired in the subsequent years.

tax liability. This reduced tax liability, however, would very likely be obtained only at a cost of using somewhat less efficient production methods.

Inventory accounting and inflation

The two common methods of inventory accounting employed by nonfinancial corporations are the so-called FIFO (first in-first out) and LIFO (last in-first out) methods. Under the more widely used FIFO method, materials used up in current production are assumed to have been purchased at prices corresponding to those of the oldest items in the inventory stock. In an inflationary economy, the latter prices will tend to run considerably below their replacement prices in the current market, which are the relevant valuation for materials when computing economic profits. Thus, FIFO costing of materials used in current production tends to understate materials costs and overstate profits. Nominal profits will then include nominal capital gains on inventories which do not make the corporation better off but merely reflect increases in the general price level. The understatement of materials costs will be larger the greater is the rate of inflation. Thus, with the use of FIFO inventory accounting, the effective corporate tax rate rises in an inflationary setting, thereby reducing the rate of return earned on corporate assets.

Under the LIFO inventory accounting method, materials used in current production are assumed to have been purchased at prices corresponding to those of the newest items in stock. This method comes much closer to deducting for materials used up at current market prices, the approach used in computing economic profits. In an inflationary environment, businesses have an incentive to switch from FIFO to LIFO inventory accounting to avoid an increase in effective tax rates. A disadvantage of switching to LIFO accounting, however, is that reported profits will show a large one-time reduction in the year of the switchover, and this reduction may be interpreted incorrectly by the equity markets. In 1974, when the inflation rate soared to double-digit levels, there was a good deal of changing over to LIFO inventory accounting in the manufacturing sector, particularly among the major materials industries where price increases were the largest. Since then, however, there has been little switching activity, as the inflation rate has moderated and firms appear to have become more concerned with the impact of a decline in reported profits on the prices of their shares in the stock market.

The third column of Table 2 shows the so-called inventory valuation adjustment (IVA), which puts the costing of materials used in current production on a current market price basis. The adjustment is largely a

correction for understatement of materials costs associated with FIFO accounting practices. It has been substantial since 1973, with an especially large correction occurring in 1974.

Loss of purchasing power on financial assets

Inflation reduces the purchasing power of the dollar-denominated noninterest-bearing financial assets of corporations. These assets include cash, demand deposits, and net trade credit. The sum of these losses in purchasing power is shown in the fourth column of Table 2. The amounts are largest after 1973, when the underlying inflation rate has been highest. Of course, inflation also reduces the purchasing power of the corporation's debt. But since, as already pointed out, this reduction of purchasing power is a gain to equity holders and a loss to debt holders, it washes out in our measure of total capital income. Hence, the rate of return on corporate assets is unaffected.
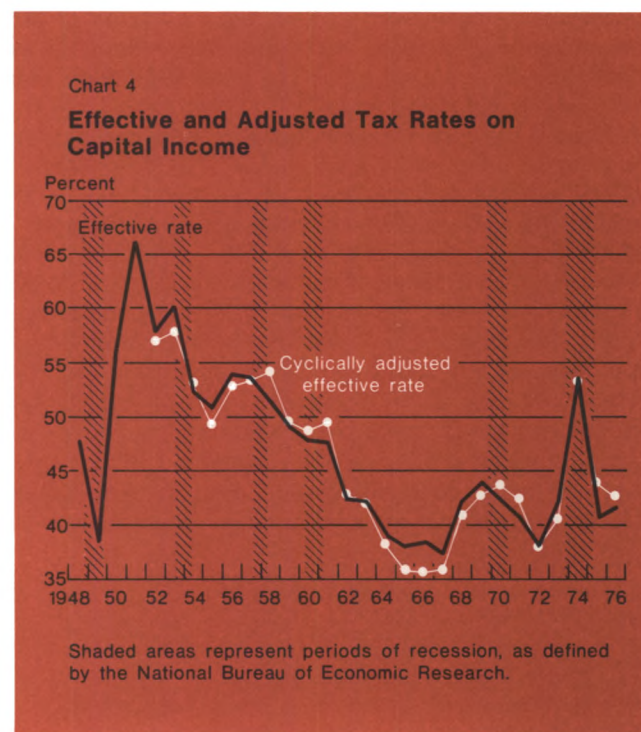
The effective tax rate

When the adjustments in columns 2-4 (Table 2) are made to accounting profits, the result is the measure of total capital income used in this article, and this is shown in the fifth column. The effective tax rate on total capital income is corporate tax liabilities divided by total capital income before taxes. The results of such a calculation are shown in Chart 4. They exhibit a downward trend from the Korean war period into the midsixties. This trend reflected the liberalized tax depreciation provisions of legislation enacted in 1954 and 1962 as well as the introduction of the investment tax credit in 1962, its liberalization in 1964 (the Long Amendment), and the 1964 reduction of the corporate tax rate. This trend also reflected the diminishing importance of the 1945-51 inflation on the effective tax rate.

The decline in the effective tax rate finally came to a halt during the midsixties. In the ensuing years, the effective tax rate exhibits a rising pattern, with a dramatic but temporary bulge in 1974. This rise between 1965 and the midseventies was primarily the result of three major crosscurrents. The dominant upward influence on the effective tax rate, of course, came from the factors already discussed above, namely, tax depreciation provisions based on historical cost, FIFO inventory accounting, and purchasing power losses on short-term financial assets. There were some offsetting influences on the tax rate. Interest payments became an increasingly important component of total capital income before taxes, reflecting both the rise in nominal interest yields and the larger share of debt in the corporate financial structure. The latter development served to moderate the increase in the effective tax

rate since corporate taxes are not paid on interest income distributed to holders of corporate debt. In addition, the share of interest payments was also increased by the relatively low levels of capacity utilization in the midseventies. These low utilization levels depressed the share of profits in total capital income, and moderated the increase in the effective tax rate further.

The path of the effective tax rate is compared in Chart 4 with that of a "cyclically adjusted" effective tax rate series. This adjustment removes the impact of variations in the capacity utilization rate on the payment of corporate taxes. The difference between the adjusted and unadjusted series is the impact of the cyclical factor on the effective tax rate.

The cyclically adjusted tax rate series reached a peak in 1974 that is well above subsequent levels in 1975 and 1976. In 1974 the tax rate hit 53.4 percent, some 18 percentage points above the 1966 level. The higher effective tax rate was largely due to the inventory gains which producers experienced in that year of double-digit inflation. However, the sharp jump in the tax rate didn't have much impact on investment decisions since a significant portion of this inflation was probably expected to be temporary and therefore the very high taxes were also not expected to persist. In addition, as noted above, the rapid 1974 run-up in materials prices induced a large number of manufac-

Chart 4
Effective and Adjusted Tax Rates on Capital Income

Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.

turing firms to switch from FIFO inventory accounting, thereby reducing in subsequent years this particular source of increased corporate taxes. Of course, the lower effective tax rates in 1975 and 1976 are in part attributable to the moderation of the inflation rate from its 1974 pace and to the switch away from FIFO inventory accounting.

Over the past ten years, the cyclically adjusted effective rate rose slightly more than 7 percentage points, compared with a level of 35.7 percent at the beginning of the period. This increase represents the combined impact of inflation operating within the corporate tax structure as well as of statutory tax changes in the seventies which acted to lower the effective tax rate. The latter changes include the liberalization of the tax depreciation provisions in 1971 and a more generous investment tax credit in 1975. Analysis of the available information suggests that these statutory changes in the corporate income tax reduced the effective tax rate by about 2.9 percentage points in 1976 relative to 1966.[5] Adding this to the 7.1 percentage point rise in the cyclically adjusted effective tax rate between 1966 and 1976, the impact of inflation on the effective tax rate in the absence of other factors comes to an increase of about 10 percentage points over the ten-year period.

This increase in the effective tax rate reduced the rate of return on corporate assets by about 1.2 percentage points.[6] The reduction constitutes about half of the cyclically adjusted decline in the rate of return, for it can be estimated that, if capacity utilization in 1976 had been at its 1966 level, the decline in the rate of return would have been 2.5 percentage points.[7] Without cyclical adjustment, the rate of return on corporate

Table 3
Corporate Borrowing Costs Adjusted for Corporate Taxes and Inflation

Change in	Percentage points
(1) Nominal interest rate	+5.0
(2) Aftertax borrowing cost	+2.6
(3) Inflation rate	+5.0
(4) Aftertax inflation adjusted borrowing cost (equals (2) minus (3))	−2.4

assets dropped 3.3 percentage points from 1966 to 1976 (Chart 1).

It might appear that the fall in the rate of return attributable to the higher effective tax rate is not large. However, suppose the rate of return falls 1 percentage point and the cost of capital remains unchanged, say, at 5 percent. This implies the market value of the debt and equity claims against nonfinancial corporations must fall by an amount equal to 20 percent of the replacement value of their assets.[8] Such a calculation suggests that an important part of the sour performance of the stock market in the past decade or so is related to inflation and the tax structure.

Taxes, inflation, and financial structure

Inflation and the corporate tax structure have had another important impact, namely, that corporations have turned increasingly to the bond markets in the past decade or so, and the importance of debt in the corporate capital structure has therefore risen greatly.

In the second half of the sixties and during the seventies, the cost of debt finance fell even though increases in nominal interest rates about kept pace with the rise in the inflation rate. In other words, if one looks at the difference between either the Aaa or the Baa bond rate and the percentage rise in the implicit price deflator of the gross national product or the consumer price index, this difference displays cyclical fluctuations but exhibits no trend after 1965. Since the marginal tax rate for most corporations is 48 percent, this

[5] This estimate, as well as the cyclically adjusted effective tax rate series, is based upon a regression equation in which movements in the effective tax rate depend on three explanatory variables. The first is a variable incorporating statutory changes in the corporate income tax, and it is measured as the cumulation of the "initial stimulus" impacts of various legislative changes. The second is a five-year moving average inflation rate (the consumer price index). The third is the Federal Reserve Board capacity utilization rate for the manufacturing sector.

[6] This result is arrived at by multiplying the cyclically adjusted before-tax rate of return of 11.6 percent in 1966 by the inflation-induced rise in the effective tax rate of 10 percentage points.

[7] The cyclical influence on the (aftertax) rate of return on corporate assets was estimated by examining a number of regression equations which "explained" the *before-tax* rate of return by movements in the capacity utilization rate, a five-year moving average inflation rate, and a time trend. The cyclical influence of the capacity utilization rate proved quite insensitive to the particular regression used. Denoting the cyclically adjusted before-tax rate of return as r_{bt} and the cyclically adjusted effective tax rate as t, we can write the cyclically adjusted rate of return on corporate assets (r_{at}) as $r_{at} = r_{bt} (1-t)$.

[8] Let the ratio of total market value to total replacement cost be denoted as q, let the cost of capital be denoted as c, and let the spread between the rate of return and the cost of capital be denoted as s. Then the spread may be written as
$$s = c (q-1)$$
If the cost of capital is assumed constant, then a change in s (Δs) and a change in q (Δq) are related as follows:
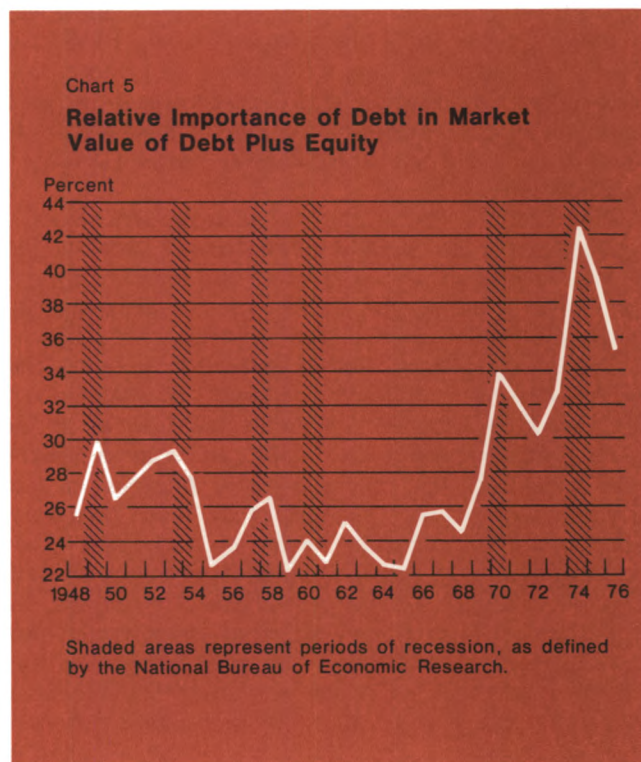$$\Delta s = c\Delta q$$
Thus, if Δs is minus 1 percent and c is 5 percent, Δq is minus 20 percent.

means that the aftertax borrowing cost of a typical corporation is 52 percent of the nominal interest yield on its debt obligations. In an inflationary environment, this aftertax borrowing cost must also be adjusted for the rise in the general level of prices, since the increase in the price level reduces the purchasing power of the outstanding debt. Thus, the real (inflation adjusted) aftertax borrowing cost of a corporation becomes 52 percent of the nominal interest rate minus the inflation rate. As shown in Table 3, if the nominal interest rate increases by 5 percentage points, the unadjusted aftertax borrowing cost rises by 2.6 percentage points (*i.e.,* 5 × .52). If inflation reduces the purchasing power of each dollar borrowed by an additional 5 percentage points, the inflation adjusted aftertax borrowing cost of the corporation falls by 2.4 percentage points (*i.e.,* 5 minus 2.6 percentage points). This decline in the cost of corporate borrowing makes it attractive for corporations to increase the importance of debt in their capital structures.[9]

The choice of a particular debt-equity ratio involves comparing the marginal tax benefits of slightly more debt with the attendant increase in financial riskiness. This increased financial riskiness arises because of greater investor concern about corporations' solvency and their ability to meet fixed interest obligations when these interest payments are large. If a firm is unable to meet its fixed interest payments to debt holders, it may be forced to liquidate assets quickly at artificially low prices or borrow at exorbitant rates to fulfill its obligations to debt holders. However, since it is nominal interest payments which are deductible in computing corporate tax liability, higher nominal interest rates increase tax deductions. As analyzed above, if inflation and interest rates are rising equally, the cost of

[9] Factors that affect decisions to issue debt or equity are also discussed in the article beginning on page 27.

Chart 5

Relative Importance of Debt in Market Value of Debt Plus Equity

Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.

debt finance falls by the amount of the increased tax deductions. In such circumstances, a higher underlying inflation rate can increase the debt-equity ratios which firms settle on. This is in fact what happened in the sixties and seventies, as Chart 5 shows. For nonfinancial corporations the importance of debt relative to the market value of debt plus the market value of equity rose from 22 percent in 1965 to 42 percent in 1974, a movement which paralleled the acceleration in the domestic inflation rate.

Patrick J. Corcoran

The business situation
Current developments

Manufacturing and trade inventories continued to grow at moderate rates during the spring . . .

Billions of dollars

Changes in manufacturing and trade inventories
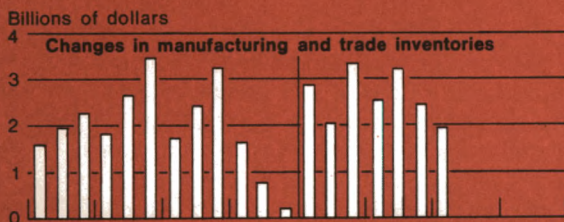
. . . but retail sales slumped before reviving in July and August . . .

Retail sales

. . . and inventory-sales ratios moved higher. Except at retail stores, the ratios were still below last year's levels.

Month of sales

Inventory-sales ratios

Manufacturing

Wholesale trade

Retail trade

1976   1977

All data are seasonally adjusted.
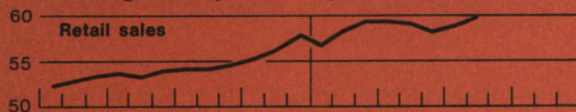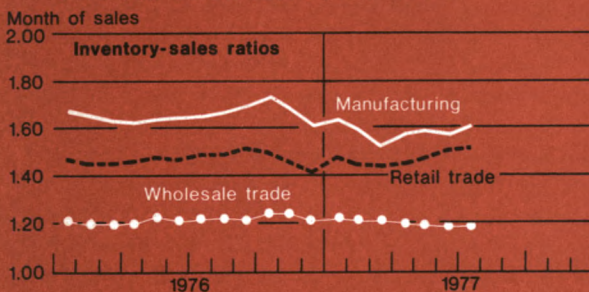Source: Department of Commerce.

The United States economy has shifted into lower gear since the unusually rapid advance of the first half of 1977. With less robust demand conditions and, more importantly, with an easing of price pressures associated with last winter's prolonged freeze, inflation has also moderated. Some slowing of consumer spending during the spring and a subsequent mild inventory correction have apparently been primarily responsible for the slackening in the rate of economic growth. At the same time, however, there appear to be continuing elements of strength undergirding final demands for goods and services.

Inventory accumulation rebounded in early 1977 after a slowdown during the final quarter of last year. During the first three months of 1977, moreover, rapid accumulation of inventories was accompanied by even faster growth of final sales, so that inventory-sales ratios declined. Following an exceptionally sharp advance in March, however, retail sales edged lower during the spring while production of consumer goods continued to increase. The inevitable consequence was a moderate increase in inventories relative to sales, which occurred in the manufacturing sector as well as in retail trade (see chart). While most of the inventory building seemed to reflect management decisions, unintentional inventory accumulation appeared to accelerate as the spring wore on. By midyear, efforts to pare inventories were beginning to spread.

The need for adjustment seemed greatest in the nondurable goods sector. At the wholesale level, stocks of nondurables were reduced by successively larger amounts in May, June, and July. In the retail sector, stocks of nondurables rose substantially as sales sagged during the second quarter, but such inventories

barely increased in July. Factory stocks of nondurables had risen rapidly in April and May but were reduced in June. Manufacturers of nondurable goods cut back substantially their stocks of materials and supplies again in July and August, while their inventories of finished products continued to build up.

Evidence of continuing efforts to pare inventories is reflected in other indicators of economic activity. Industrial production is estimated to have dipped 0.5 percent in August, the first decline in the total output of the nation's factories, mines, and utilities since the weather-induced drop last January. Output of consumer nondurable goods declined 0.7 percent, and production of furniture and appliances fell slightly. Employment in manufacturing showed no growth between June and September, while the average factory workweek fell from month to month. The latest survey of the National Association of Purchasing Management also indicates continued efforts to lighten stocks of purchased materials.

In general, recent developments strongly suggest a continuation of the cautious stance that business firms have taken toward inventory decisions throughout the recovery from the 1973-75 recession. Chastened by the serious economic and financial dislocations that were exposed by the most severe downturn in the post-World War II era, firms have reacted quickly to incipient signs of weakening of demand by cutting back orders before undesired inventory accumulation became seriously burdensome. While this pervasive caution has served as a restraining influence on production, it has also helped to foster a reasonably balanced expansion with good prospects for a relatively long life.

On the basis of presently available evidence, it appears that a comparatively mild adjustment will suffice to correct the inventory imbalances that built up during the summer lull in retail sales. As of July, inventory-sales ratios in most sectors except retail trade were well below those prevailing last fall, on the eve of the inventory correction in the closing months of 1976. Retail inventories in July were higher in relation to sales than at any time last year. In view of the strong advance in retail sales in August, together with the decline in output of consumer goods, the retail inventory-sales ratio very likely declined in that month, although pockets of excessive stocks undoubtedly persisted.

Actual inventory-sales ratios, of course, depend only partly upon deliberate investment decisions. They also are affected by sales results that may or may not accord with business executives' expectations. A precipitate drop in sales could lead to a sudden unexpected run-up in stock-sales ratios. It could, moreover,

make inventories that formerly were satisfactory in relation to sales expectations suddenly seem excessive. While such a dramatic turnaround in business fortunes can never be ruled out entirely, it appears unlikely to occur in the near future. As indicated in the article beginning on page 19, the financial sector looks to be generally free of the imbalances and strains that usually precede an economic downturn.

Even as the inventory adjustment has continued, moreover, signs of strength in final demand remain extensive. Retail sales, after edging lower during the spring, rose 0.9 percent in July and 1.7 percent in August, according to the advance report. While the growth of personal income has slowed since the first quarter, consumer spending is being supported in part by the June reduction of withholding stemming from the increase in the standard deduction for the Federal individual income tax, as well as by the 5.9 percent cost-of-living increase in social security benefits beginning in July. The incomes of 3.4 million Federal white-collar and military personnel, moreover, will be boosted in October by the 7.05 percent pay hike approved by President Carter.

Residential construction activity continues to move up. Private housing starts in July and August averaged an annual rate of 2.05 million units, 39 percent above the year-earlier level. Single-family housing starts have plateaued at a near-record annual rate of 1.44 million units during the past seven months, but apartment construction has been picking up. Multifamily housing starts averaged 600,000 at an annual rate in July and August, nearly double the year-earlier rate. Construction of multi-unit structures is still running at barely half the rate of 1972. Strong demand for housing, low rental vacancy rates, ample availability of mortgage financing, and stepped-up Federal rent supplement programs suggest further increases in construction of multi-unit housing. A near-term advance may have been signaled by the sharp rise in building permits issued in August for multifamily units.

Business investment in plant and equipment, a laggard in the current economic recovery as compared with earlier postwar cycles, shows signs of strengthening. The latest survey of plant and equipment spending plans, taken by the Commerce Department in July and August, indicates a 13.3 percent expansion of such spending this year over last year. Eliminating the effects of inflation, capital spending is estimated to increase 8 percent this year in real terms. The most recent survey represents the fourth in a series of Commerce Department surveys of 1977 capital spending intentions. In each successive query, such spending plans have been revised upward, albeit in modest steps. Looking further ahead, a brisk pace of capital

spending in the manufacturing sector is suggested by the Conference Board's survey of capital appropriations by the 1,000 largest manufacturers. In the first half of 1977, newly approved appropriations—which typically lead actual spending by about a year—were running more than 20 percent ahead of the year-earlier pace in real terms.

Government expenditures on goods and services contributed significantly to the growth of real gross national product in the second quarter of this year for the first time in one and a half years. It is likely that public sector demands will continue to be stimulative. Advance indicators of defense spending point to higher outlays for defense, and bumper crops of grains promise to swell Government crop purchases under price support programs. At the state and local government levels, rapidly rising tax receipts and inflows of revenue-sharing funds under the Tax Reduction and Simplification Act of 1977 enhance the prospects of additional stimulus to demand from this sector.

Despite the abundance of elements of strength in the economy, the declines in retail sales during the spring and the subsequent production cutbacks prompted by efforts to keep inventories under control have arrested the decline in unemployment. The overall rate of unemployment had dropped sharply from 8 percent in November 1976 to 7 percent in April 1977. Since then, the rate has hovered about the 7 percent level, as moderate increases in employment have been approximately matched by increases in the labor force. Unemployment remains very high by historical standards, especially among blacks and other minorities and, most particularly, among minority youths. This situation constitutes a serious problem, especially in the large cities with heavy concentrations of minority persons. Much of this unemployment is "structural" and does not result simply from an inadequacy of aggregate demand. indeed, as discussed, in the article beginning on page 14, a number of legislative and other structural changes have seriously compromised the usefulness of the unemployment rate as an indicator of demand pressures in the economy. A more reliable indicator of demand pressures may be found in the percentage of the population with jobs. The percentage of the noninstitutionalized population aged 16 years and over that was employed stood at 57.3 percent in September, up from 56.1 percent a year earlier and only 0.1 percentage point below the record high reached in early 1974 shortly after the peak of the last business expansion.

The rate of inflation has moderated considerably since the rapid increases of the early months of the year. Wholesale prices of farm products and processed food and feed fell sharply during June through August. Relief at the retail level was felt in July and August, when food prices rose only modestly after having climbed sharply during the first half of the year. The rate of increase in consumer prices of commodities other than food has also slowed in recent months to an annual rate of 3.8 percent during the six months ended August 1977, compared with 6 percent during the preceding twelve months.

Recent price developments doubtless understate the ongoing rate of inflation. Government price supports maintain a floor under grain prices. In reaction to plummeting farm income, moreover, the Administration has ordered a 20 percent reduction in wheat acreage next year and has proposed a new grain stockpile. Continuing wholesale price increases in industrial commodities, averaging 6 percent at an annual rate so far this year, are likely to be felt in consumer prices eventually. And upward pressures on costs are unlikely to relent in coming months. Unit labor costs in the private business sector rose almost 7 percent during the four quarters ended mid-1977. The increases already legislated in payroll taxes and the boost in the minimum wage next January will add significantly to unit costs. As long as such cost pressures persist, they will tend to limit any improvement that can be expected in the underlying rate of inflation.

An examination of employment and unemployment rates

The persistence of high rates of unemployment after more than two years of economic recovery has increased the controversy over what the best measure of labor market conditions is. The usefulness of the unemployment rate, the traditional measure, has been called into question; the employment ratio is the most frequently recommended alternative. Too frequently, the debate has implied that an absolute choice must be made between the two statistics. Such a view is mistaken, for no single measure can hope to provide a complete assessment of labor market conditions.

At the outset, it must be recognized that each measure suffers from some shortcomings. The unemployment rate has the most deficiencies, and because of them that rate has become an increasingly imperfect measure of labor market conditions. Analysts are therefore regarding the unemployment rate with increasing reservations, and some have suggested that the employment ratio be given more emphasis in the analysis of the labor market as it reflects demand pressures in the economy as a whole.

The two measures defined

The unemployment rate refers to the percentage of the civilian labor force that is seeking work but does not have a job.[1] This widely used statistic is not the only unemployment rate that the Bureau of Labor Statistics (BLS) regularly reports. A number of other unemployment rates, such as the percentage of household heads in the labor force who are unemployed, the percentage of teenagers in the labor force who are unemployed, and the percentage of the labor force out of work for fifteen weeks or longer are also available for evaluating labor market conditions. No matter whether the total or a segmental unemployment rate is ex-

amined, all these rates are intended to represent the proportion of labor force participants that offer labor for sale but are unable to find employment at the current level of wages. Thus, each measures the unutilized or excess supply of labor in the market at existing wages.

The employment ratio, in contrast, is defined as the proportion of the noninstitutionalized *population* in the working ages—16 years of age and older—that is employed, and it thus measures the extent of utilization of potential labor resources.[2] Employment ratios analogous to many of the published unemployment series may be constructed. These ratios measure the proportion of labor resources whose services have been purchased in the labor market.

A rate of unemployment supposedly indicates the extent of utilization of available rather than potential labor resources. The unemployment rate is also used to help assess the hardship experienced by workers who are willing to work and are available for work but are unable to find jobs. But whether the unemployment rate indicates hardship or need as precisely as one would like has come to be questioned. Its accuracy is impaired in several ways. The measured rate can be considered too low because it fails to include "discouraged workers", that is, the people who do not seek work if they do not believe they are likely to obtain jobs and thus leave the labor force temporarily or remain outside it. Similarly, the rate fails to include those who want to work full time but are forced to work part time because of economic conditions. In-

---

[1] The civilian labor force refers to all noninstitutionalized individuals 16 years of age and over who are employed or are without a job and seeking work.

[2] If the employment ratio were defined as the proportion of civilian labor force that is employed, it would simply be the mirror image of the unemployment rate. In that case, it could be obtained by subtracting the unemployment rate from 100. But then, any statistical or institutional factors that caused defects in the unemployment rate would cause the same defects in an employment ratio based on the civilian labor force. That is why the employment ratio uses the relevant population rather than the labor force in the denominator.

stead, all part-time workers with jobs are treated as employed whether or not they would prefer full-time work.[3] The measured rate can be considered too high because of the expansion in the coverage of such programs as unemployment insurance as well as the rise in benefit levels. Applicants must remain in the labor force to receive these benefits even though they may not be seriously looking for jobs. Such behavior imparts an upward thrust to the unemployment rate. And the increases in these programs have also served to weaken the tie between the unemployment rate and "hardship".
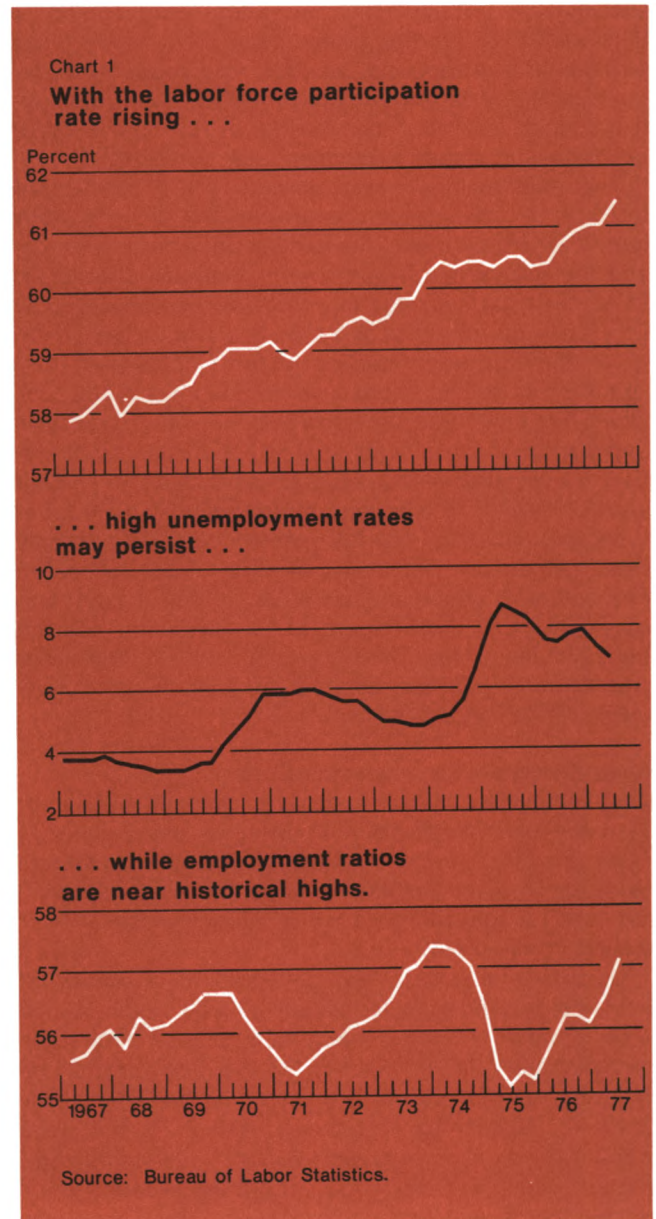
Changing participation rates and their impact

The employment ratio avoids to a greater degree than the unemployment rate a statistical problem that is caused by changing labor force participation rates, *i.e.,* the proportion of the population 16 years of age and over who are at work or are looking for work. Changes in these participation rates have altered the composition of the labor force in recent years. The changes suggest that a basic structural alteration in the pattern of choice among work in the market, work at home, and the amount of leisure desired is under way, particularly in certain demographic groups. As a result of these changes, a larger proportion of the labor force now consists of women and teenagers. Indeed, the secular increase in labor force participation rates (see top panel, Chart 1) is attributable largely to this change in behavior by women and teenagers. And these groups in the labor force are among those that traditionally have experienced higher than average rates of unemployment. It is now recognized that for this reason alone a given rate of aggregate demand will be associated with a higher level of unemployment than in the past.[4]

Experience shows that rates of labor force participation respond to a host of influences. In the short term, the rate of business activity may have the most effect. On the one hand, the rate of participation in the labor force typically increases during upswings in economic activity because individuals perceive increased job opportunities. If, as sometimes happens, the growth of the labor force is faster than that of employment, the resultant increase in the unemployment rate should

not be construed as a sign of weakening economic conditions. On the other hand, if during an economic decline workers become discouraged and leave the labor force, the resulting tendency toward a lower unemployment rate should not be construed as a sign of improving economic conditions.

Changes in the long-term trend of labor force participation rates also affect the interpretation of the two measures. Should the rate of participation in the labor force and the age-sex composition of the population

Chart 1

With the labor force participation rate rising . . .

. . . high unemployment rates may persist . . .

. . . while employment ratios are near historical highs.

Source: Bureau of Labor Statistics.

---

[3] It should be noted that this treatment of part-time workers impairs both the unemployment rate and the employment ratio, and also creates difficulties of interpretation with respect to both.

[4] While it can be shown that an increasing proportion of the unemployment rate stems from the changing composition of the labor force, this by no means is the only or even the principal explanation for today's high unemployment rates. For further discussion of this point, see "The Changing Composition of the Labor Force" by Sharon P. Smith in this Bank's *Quarterly Review* (Winter 1976), pages 24-30.

remain constant for a considerable period, the unemployment rate and the employment ratio would suggest similar assessments of labor market conditions. However, if the labor force participation rate changes, the unemployment rate and the employment ratio can yield different assessments. Among all the possible scenarios, here are two. If the labor force participation rate is rising, then the employment ratio may suggest stable labor market conditions although the unemployment rate would be increasing. If the labor force participation rate is falling, the unemployment rate may suggest a strengthening of labor market conditions although the employment ratio would be declining. It thus seems clear that when changes in labor force participation rates occur, whether for cyclical or secular reasons, *both* the unemployment rate and employment ratio ought to be looked at to obtain more accurate appraisals of labor market conditions.

The relationships being discussed are highlighted in Chart 1, which shows quarterly data for the labor force participation rate, the civilian unemployment rate, and the employment ratio. During periods when labor force participation rates are more or less constant, as they were during most of 1970-72, a rise in the unemployment rate and a decline in the employment ratio suggest worsening labor market conditions. In fact, whenever these statistics move in opposite directions and participation rates are roughly the same, both statistics yield similar labor market appraisals. In recent years, however, it has been more typical for the labor force participation rate to rise—it went up strongly from 59.8 percent at the end of 1973 to 62.3 percent in September of this year. Consequently, the present employment ratio of 57.3 percent is associated with an unemployment rate of 6.9 percent; in 1973, the same employment ratio was accompanied by an unemployment rate of only 4.8 percent.

Characteristics of the two measures
The employment ratio is in general less subject to error than the unemployment rate. Because the impact of measurement error on the unemployment rate appears to be increasing, the unemployment rate is becoming the less reliable measure with which to assess labor market conditions.

Unemployment data are collected in a survey of households, and one individual usually responds for all members of the household. As a result, the recorded employment rate is affected by the accuracy of replies by the individuals who report on the labor force status of all members of the household. It has been observed that reports given by most households show higher unemployment when they have recently been added to the survey sample than in later interviews.

This is documented in a study by Robert E. Hall.[5]

Because of the difficulty of determining whether individuals actually are looking for and are available for work, a count of the employed is likely to be much more accurate than a count of the unemployed.[6] Moreover, because the employment figure is much larger than the unemployment figure, sampling errors that are to be expected in either statistic introduce a smaller possibility of error into the employment ratio than the unemployment rate. Seasonal fluctuations also are much smaller in employment than they are in unemployment.

In addition to these statistical problems, the unemployment rate is affected by institutional influences. Among the most publicized are those that occur as a consequence of unemployment compensation and of work registration requirements in certain welfare programs. To be eligible to receive benefits under the above programs, individuals are required to register as unemployed with the United States Employment Service or to register for manpower training.[7] These individuals are defined by the BLS to be unemployed, since registration with a public employment service is viewed as a means of actively seeking employment. However, these programs, like any income-maintenance plan, also create disincentives to seek employment in a more active fashion than by merely registering for employment to obtain benefits. As a result, it is likely that some recipients of benefits under these plans are voluntarily unemployed—that is, they basically choose not to work—and so would not be counted in a more precise measure of unemployment.

A number of analysts have attributed much of the present high rate of unemployment to Government benefits programs. Ehrenberg and Oaxaca, as well as Feldstein,[8] have suggested that a large portion of un-

---

[5] "Why is the Unemployment Rate So High at Full Employment?" *Brookings Papers on Economic Activity* (3, 1970), page 375.

[6] The BLS defines the employed as those who, during the survey week, worked either as paid employees or in their own profession or business, worked without pay for fifteen hours or more on a farm or a family-operated business, and those with jobs but not at work because of a labor-management dispute, illness, vacation, etc. The unemployed are defined as those who did not have a job during the survey week but were available for work and (according to the survey respondent) actively looked for a job at some time during the four-week period immediately prior to the survey.

[7] Some welfare recipients are exempt from these work registration requirements. These include certain categories such as the ill or incapacitated (with medical verification) and mothers or other members of the household charged with the care of children under age 18.

[8] See Ronald Ehrenberg and Ronald L. Oaxaca, "Do Benefits Cause Unemployed to Hold Out for Better Jobs?" and Martin Feldstein, "Unemployment Compensation: Its Effect on Unemployment", both in the *Monthly Labor Review* (March 1976).

employment is voluntary, because the high levels of unemployment compensation enable unemployed workers to engage in a longer period of search before taking another job or simply to enjoy leisure-time activities. Moreover, Feldstein believes that the present system of unemployment compensation costs some employers less in contributions to unemployment programs than the benefits that are paid to the employees they lay off. He concludes that this system thereby encourages employers to organize production so as to exaggerate seasonal and cyclical variations in unemployment and to create more temporary jobs than would otherwise exist.

Clarkson and Meiners maintain that the single most important factor contributing to the high level of unemployment is the change in certain welfare eligibility requirements.[9] They argue that the current overall unemployment rate has been inflated by as much as 2.1 percentage points because of the work registration eligibility requirements that were introduced in 1971 into the Aid to Families with Dependent Children (AFDC) program and into the food stamp program. In their view, these registrants represent a group of individuals who either are largely unemployable or have no need or desire to work but are counted as unemployed because they have to register to obtain benefits.

Clarkson and Meiners estimate a "corrected" unemployment rate by omitting from both the unemployment and the civilian labor force figures all those work registrants who have been required to register to be eligible for AFDC or food stamp benefits. This is undoubtedly an overadjustment since many welfare recipients actually do want a job. Indeed, nearly a fourth of all the AFDC recipients who register for work with the public employment service are exempt from registering. Moreover, a study of AFDC recipients indicates that nearly half of them have recent labor market experience.[10] These facts cast doubt on the assumption that none of the welfare recipients are employable or seeking a job. In sum, while it appears that the work registration requirements of the welfare programs inflate the unemployment rate, the extent of overstatement is likely to be considerably less than the 2.1 percentage points suggested by Clarkson and Meiners.

An increasing awareness of the foregoing sorts of problems is reflected in the new unemployment insurance benefits bill signed into law on April 12, 1977.

[9] Kenneth W. Clarkson and Roger E. Meiners, "Government Statistics as a Guide to Economic Policy: Food Stamps and the Spurious Increase in the Unemployment Rates", *Policy Review* (Summer 1977).

[10] Robert George Williams, *Public Assistance and Work Effort* (Research Report Series No. 119, Industrial Relations Section, Princeton University, Princeton, N.J., 1975).

Under this legislation, individuals may be denied unemployment compensation if they do not actively seek work, do not apply for suitable work to which they are referred, or do not accept an offer of suitable work. Contrary to past practice, under the new law individuals may be required to accept positions that are significantly different in tasks and pay from their past jobs if the position is within the individual's "capabilities", if the individual is offered either the Federal minimum wage or more than the unemployment benefit, if the job does not entail unreasonable travel, and if it does not endanger the individual's "morals, health, or safety". It is too early to ascertain the extent to which the law may affect labor market statistics.
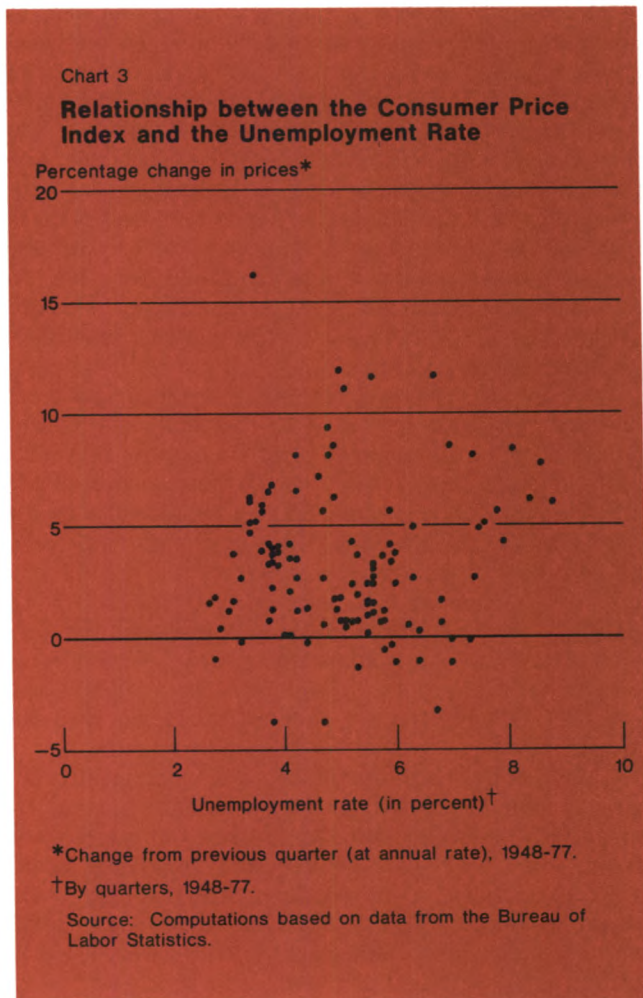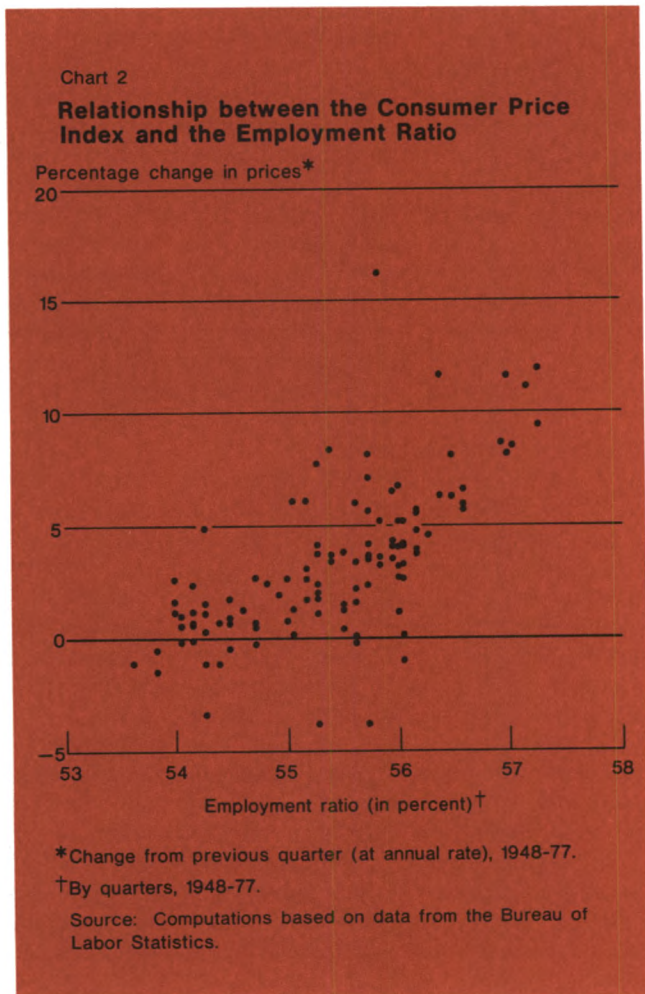
The need for further study

All in all, the unemployment rate tends to be inaccurate for both statistical and institutional—including legislative—reasons. In addition, the possible size of any error seems greater than for any associated with the employment ratio. In large part, this is because it is simply easier to identify clearly those who are working than to identify clearly those who want to work and are seeking work, since it is difficult to determine how many of the latter are in fact available for work. Further study of labor supply behavior under various income maintenance programs is necessary to formulate techniques that will eliminate from the unemployment numbers those who are really voluntarily unemployed.

Although at present the unemployment rate is a less accurate measurement than the employment ratio, this does not imply that the unemployment rate should be abandoned as a means of assessing labor market conditions. Instead, it calls for action to correct the shortcomings in all statistics relating to the labor market. For this reason, the Emergency Jobs Programs Extension Act of 1976 (Public Law 94-444) established a new National Commission on Employment and Unemployment Statistics. (The last major evaluation of employment and unemployment statistics was made fourteen years ago.) The new commission is charged with the responsibility of evaluating the present statistics as well as with making recommendations for their improvement.

In seeking the proper statistics to assess labor market conditions, the measure chosen should depend on the question being posed. For example, the Employment Act of 1946 calls for the Federal Government to take all feasible action to encourage the "conditions under which there will be afforded useful employment opportunities, including self-employment for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power". To find out whether maximum—or full—

Chart 2

Relationship between the Consumer Price Index and the Employment Ratio

Percentage change in prices*

*Change from previous quarter (at annual rate), 1948-77.

†By quarters, 1948-77.

Source: Computations based on data from the Bureau of Labor Statistics.

Chart 3

Relationship between the Consumer Price Index and the Unemployment Rate

Percentage change in prices*

*Change from previous quarter (at annual rate), 1948-77.

†By quarters, 1948-77.

Source: Computations based on data from the Bureau of Labor Statistics.

employment has been achieved, the unemployment rate is conceptually the more appropriate measure, although its inaccuracies seriously compromise its relevance at the present time.

If, however, the primary interest is the relation between wage changes or inflation and the condition of the labor market, the employment ratio may be the better statistic to use because increasing inaccuracy of the unemployment rate has weakened the relationship between that statistic and excess demand. This has been pointed out by Geoffrey Moore[11] and is illustrated in Charts 2 and 3, which show a much stronger association between the percentage change in the consumer price index and the employment ratio than between the percentage change in the consumer price index

[11] "Employment, Unemployment, and the Inflation-Recession Dilemma", *AEI Studies on Contemporary Economic Problems* (1976).

and the unemployment rate. Of course, the observation of correlation between these statistical series does not prove the existence of any causal relationship between them.

If the unemployment rate included only the involuntarily unemployed, the rate could be interpreted as an indirect measure of the inflationary pressures resulting from excess demand. This, in fact, is the interpretation that underlies the Phillips curve relation. In that relation, wages are expected to rise when there is excess demand—which is taken to be indicated by a low unemployment rate—and the rate of wage increase is expected to be the faster the greater the excess demand. However, if the unemployment rate is increasingly affected by the inclusion of the voluntarily unemployed, this relationship becomes blurred and the employment ratio may provide a better indication of demand pressures.

Sharon P. Smith

The financial markets
Current developments

Recent Changes in Interest Rates

Percent

Aaa-rated seasoned corporate bonds

20-year Government securities *

5-year Government securities *

Aaa-rated seasoned municipal bonds

Discount rate FRBNY

Federal funds

J F M A M J J A S O N D J F M A M J J A S
1976   1977

*These yields are adjusted to five- and twenty-year maturities and exclude bonds with special estate tax privileges.

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

Although short-term interest rates rose further during the summer, long-term yields continued to decline. Rates on short-term instruments moved upward in late July, when the Federal Reserve boosted its target range for rates on Federal funds in response to indications of rapid expansion in the monetary aggregates. The System moved cautiously, since it was not clear whether the monetary bulge that emerged in July reflected only temporary phenomena and would soon be reversed. When the monetary aggregates continued to rise above the Federal Reserve's longer run objectives, the System sought a further tightening of money market conditions in August and September. By the second half of September, the funds rate had risen to around 6¼ percent, compared with June's level of 5⅜ percent and the 4⅝ to 4¾ percent range that had prevailed in the early months of the year (see chart). Rates on other short- and intermediate-term instruments increased along with the funds rate, but the rise did not extend to the longer term sectors of the debt markets. Indeed, most long-term yields moved several basis points lower over the summer, after declining 10 to 15 basis points in the spring.

The advance in short-term market rates brought them to levels substantially above the Federal Reserve discount rate by August for the first time in nearly three years. The result was a surge in member bank borrowing at the discount window, which reached a daily average level of nearly $1.7 billion in the statement week of August 24. To reduce the incentive for member banks to borrow at the window, the Board of Governors of the Federal Reserve System approved actions by the Federal Reserve Banks that raised the discount rate from 5¼ to 5¾ percent in late August

and early September. The Board emphasized that the increase did not signal a change in monetary policy; rather, it was intended as a technical move to bring the discount rate into better alignment with other short-term rates. The action had been widely anticipated, and market effects were minimal. Following the discount rate increase, member bank borrowing receded considerably from its August level.

Both the strength and the pattern of growth of the monetary aggregates during the July-September period closely resembled that of the second quarter. M_1 again surged in the opening month of the period; July's increase came to over 18 percent at an annual rate, nearly matching the extraordinary gain registered in April. Growth slowed over the succeeding weeks, as it had following April's bulge, but picked up again beginning in late August. As a result, it appears likely that the expansion of M_1 over the July-September period as a whole will prove to be even higher than the 8½ percent gain recorded in the second quarter.

Special factors may have contributed to sharp increases in M_1 during certain weeks in July, but they do not account for the sustained growth in this aggregate. An early disbursement of social security checks appears to have played a role in the sizable advance registered in the first statement week of the month. A similar timing for social security payments occurred in October 1976 and April 1977, periods when the money stock also displayed unusually large gains. However, the biggest increase took place in the third statement week. Deposit balances may have been boosted during that time, when normal check clearings were disrupted somewhat by the New York City power failure. But together these transitory influences probably can explain no more than 4 or 5 percentage points of the growth of M_1 for July as a whole. Moreover, they do not account for the fact that M_1 levels remained high and even expanded further in August and September.

So far, the rise in short-term interest rates has had only a modest effect on the ability of banks and thrift institutions to attract savings and consumer-type time deposits. Consequently, the broader monetary aggregates have also increased at fairly high rates in recent months, although their growth has not accelerated sharply as in the case of M_1. Both groups of financial institutions have been maintaining their offering rates on savings and short-term time deposits at regulatory ceilings and have recently boosted rates on longer term deposits to such levels. At the same time, they have been advertising heavily and actively promoting long-term certificates in an effort to retain or attract funds from maturing "wild card" deposits. These are certificates with maturities of four years or more that were issued during a brief period in 1973, when rate

ceilings on them were temporarily suspended.

The expansion of the monetary aggregates—particularly M_1—since the spring has clearly exceeded the Federal Reserve's longer run objectives. In fact, the Federal Open Market Committee (FOMC) voted to reduce the lower boundary of its M_1 growth range by ½ percentage point at its July meeting, when it set ranges applying to the second quarter of 1977 through the second quarter of 1978. This brought the M_1 range to 4 to 6½ percent. At the same time, the FOMC left the M_2 and M_3 ranges at 7 to 9½ percent and 8½ to 11 percent, respectively.

While short-term interest rates were rising over the spring and summer, yields in the capital markets fluctuated within a very narrow range and moved slightly lower, on balance. Yields on high quality corporate securities as measured by Moody's Aaa bond yield index, for example, have hovered near 8 percent during the past six months. In the first three weeks of September, they averaged 7.90 percent, about 20 basis points below March's level. Yields on Government and high quality municipal securities behaved similarly. At the same time, lower quality corporate and municipal securities experienced further sizable yield declines, a reflection of increasing investor confidence as the recovery has proceeded. As a result, spreads between yields on low and high quality securities in both sectors have continued to drop in recent months and are now far below their 1976 peaks and close to their pre-recession levels.

The general stability of long-term yields in the face of sharply rising short-term rates appears to have stemmed from a variety of factors. In the first place, the restructuring of corporate balance sheets toward longer term debt that characterized much of the 1975-76 period seems to have abated considerably since the beginning of the year. Corporations have been borrowing more heavily in the short-term markets, while their offerings of long-term securities have fallen below the levels of the past two years. At the same time, the municipal sector has received strong buying support from fire and casualty insurance companies as well as from individuals, both directly and through tax-exempt bond funds. This support has enabled state and local governments to borrow record amounts of funds in the bond markets, partly to refund in advance securities that were issued when rates were relatively high. Finally, the Federal Reserve's policy of announcing long-term targets for the monetary aggregates and its resolve to bring money stock growth down eventually to levels consistent with general price stability have helped to temper inflationary expectations. In this respect, the Federal Reserve's actions to restrain monetary growth in the spring and summer appear to have

had a calming effect on investors in long-term securities by indicating that the System will act to prevent the monetary aggregates from expanding at excessive rates for too long a time.

In recent months, there have been a number of signs indicating a slowdown in the pace of the economic recovery from the unsustainably rapid advance registered in the first half of 1977. While such a development would not be surprising and indeed would be expected judging from past experience, a minority of analysts on the basis of this evidence are predicting an extended period of little or no economic growth. A few are even forecasting a recession.

Overall, recent financial developments do not support such pessimistic views. Previous slowdowns in economic activity, for example, were generally preceded by substantial declines in the rate of monetary expansion or else by dramatic shocks, such as the fourfold increase in petroleum prices imposed by the major oil-exporting nations in 1973. Clearly, the recent behavior of the money stock is not consistent with the view that the economy is likely to experience little growth, let alone head into a recession. To be sure, stock prices have dropped sharply in recent months, but the behavior of stock prices has not always been a reliable economic barometer.

Moreover, other financial indicators have been pointing to increasing confidence and underlying economic strength. The continued drop in spreads between yields on low and high quality securities in the bond markets is certainly an important sign that investors are more confident of the ability of firms and municipalities to service their debt obligations. In addition, consumers have shown a great willingness to take on substantial sums of mortgage and consumer debt. While this has generated some concern that households are becoming financially overextended, various debt measures relative to income are currently not out of line with the experience of the past decade (see the following article). Finally, businesses, governmental units, and financial institutions have greatly improved their liquidity positions in the past year or so and are now in excellent financial shape to sustain and support continued economic expansion.

Are households financially overextended?

American households have played a key role in the course of the current economic expansion. Their expenditures on consumption and residential construction have contributed more to the growth of demand than at similar stages in most earlier postwar upturns. However, the strong gains in household spending have been accompanied by sizable increases in household indebtedness. Consumer instalment debt grew particularly rapidly in the first half of this year. Households have also taken on a considerable amount of mortgage debt. Their purchases of new homes have jumped sharply at a time when home prices and the average value per mortgage have continued to rise markedly. While this willingness to undertake debt is a sign of consumer confidence, it has also raised concern that households might become financially overextended. If they did, that would act to slow the growth of consumption in the near term as well as raise delinquency rates on outstanding consumer debts.

It is difficult, though, to identify excessive debt levels with any precision. A household's ability to service debt depends on a number of factors such as family size and stability of income. The trend to smaller families, the greater number of women and teenagers at work in recent years, and relatively more household heads in the ages during which income gains have traditionally been the greatest may have increased the amount of debt which households in the aggregate can service. Yet, with sharply rising housing prices and interest rates still high by historical standards, households that purchase their first homes are initially committing a somewhat larger proportion of income to service their mortgages than families in earlier postwar years did. As to consumer instalment debt, relative to income it is not out of line with experience in the past decade. Moreover, delinquency and bankruptcy data, while somewhat difficult to interpret over time, do not currently indicate excessive debt burdens. However, maturities on auto loans have increased markedly, and this development could be troublesome since auto repayments will be a charge on household budgets for a longer time than before.

Recent changes in consumer debt

As the recovery got under way, consumer instalment credit appeared to be expanding somewhat more slowly than in most previous postwar upturns. Beginning in late 1976, however, it speeded up markedly and posted a record gain in March 1977. Since that time, the increases have remained sizable, although below the March rate. All major categories of instalment credit with the exception of credit to finance mobile homes have expanded notably: automobile, home improvement, bank credit card, and bank check credit loans, personal loans at commercial banks and finance companies as well as loans in the "all other" category.[1] And, according to annual data, substantial gains have occurred in noninstalment credit (single-payment loans, charge accounts, and service credit). The total in recent years has been about one-fifth as large as instalment credit and has exhibited fairly similar movements.

There has not been any recent major change in the market shares of the main sources of credit: banks, finance companies, credit unions, and retail stores. However, over the last ten years the market shares of banks, credit unions, and the "other" group have risen at the expense of finance companies and retailers (see table).

The burden of debt

One common way to gauge the burden of consumer debt is to divide various measures of debt by disposable income. Two such ratios—the instalment credit-to-
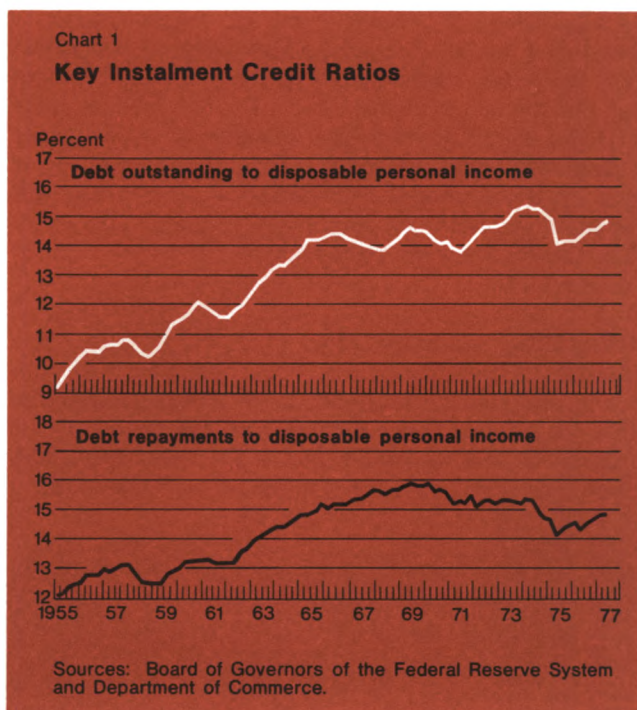
---

[1] The "all other" category consists chiefly of retail store credit, personal loans at credit unions, and loans for other consumer goods.

income ratio and the instalment credit repayment-to-income ratio—appear in Chart 1.

The repayment-income ratio may be a better measure of the current financial vulnerability of consumers than the debt-income ratio because the former measures ability to pay. But the debt-income ratio is a better measure with which to judge whether the debt burden may impair a household's future ability to buy. The reason is that increases in the maturity of debt (longer terms) are more directly reflected in outstanding debt than in repayments.

At present, both measures are somewhat below their respective peaks in the previous business expansion even though they have been rising in the current recovery largely as a result of increasing expenditures on durable goods. This, however, is typical behavior during an economic upturn. Compared with the past, the debt-income ratio is above the cyclical peaks it reached prior to the 1970's, while the repayment-income ratio remains below the peaks prevailing in the latter half of the 1960's.

One reason why it is hard to determine whether debt burdens are nearing a level that might trigger delinquencies or cause consumption to weaken is that, when more closely inspected, the two ratios seem to be giving off somewhat different signals. For example, relative to the experience of the past ten years, the debt-income ratio looks somewhat higher than the repayment-income ratio. In part, this reflects

Chart 1

Key Instalment Credit Ratios

Sources: Board of Governors of the Federal Reserve System and Department of Commerce.

the impact of inflation. Given the dependence of repayments on past extensions, the percentage rise in repayments will be less than the percentage rise in disposable income when accelerating inflation causes current disposable income to grow faster than extensions granted in a previous period. This process helped depress the repayment-income ratio in the early 1970's, a period when the debt-income ratio was rising. Instalment debt has also grown somewhat faster than repayments, partly because the average maturity of total outstandings has risen owing to the longer maturity of auto loans granted in recent years.

There is some concern that debt relative to income is getting too high because the ratio is nearing its previous peak. However, the particular level that might signal a slowdown in consumption is difficult to determine since in postwar business cycles the debt-income ratio has peaked at successively higher levels.

Another problem in interpreting the two instalment debt ratios is a lack of information about how debt is distributed among households. For example, it is uncertain whether an increase in outstandings reflects more consumers taking on higher but still prudent amounts of debt or whether some borrowers are getting overextended. We know that through the mid-1960's the ratios registered strong secular increases, reflecting the wider acceptance and availability of consumer credit, and at that time neither

Consumer Instalment Credit Outstanding
In percentage of total

Category	Year-end 1965	Year-end 1970	Year-end 1975	Year-end 1976	End-June 1977
By holder					
Commercial banks	40.9	44.5	47.7	48.3	48.6
Finance companies	33.6	27.0	21.8	20.8	20.8
Credit unions	10.3	12.7	15.6	16.5	17.2
Retailers	13.4	13.4	10.9	10.3	9.2
Others	1.8	2.3	4.0	4.2	4.3
By type					
Automobile	40.1	34.5	33.9	35.6	36.9
Personal*	†	21.6	19.3	18.5	18.4
Mobile home	†	2.4‡	8.7	7.9	7.4
Home improvement	5.3	4.9	5.7	5.9	6.0
Bank credit card	†	3.7	5.8	6.1	5.8
Bank check credit	†	1.3	1.7	1.6	1.6
All other	54.6	31.6	24.9	24.4	23.8

* At commercial banks and finance companies.

† Not available.

‡ At finance companies.

Source: Board of Governors of the Federal Reserve System.

delinquencies nor general economic instability was increasing. The difficulty of identifying a dangerous level of debt is intensified by lack of information about the effects on consumer vulnerability resulting from changes in family size, the number of workers per household, and earnings prospects. Moreover, it is hard to tell whether consumer debt as a whole is burdensome without also examining mortgage debt liabilities and here, as will be discussed below, the difficulties multiply.

Delinquency and bankruptcy

There are other gauges of the consumer debt burden in addition to the measures that relate aspects of debt to income. Among them are the ratios of the number of delinquencies to total consumer instalment loans at banks and to loans at finance com-

Chart 2

The Credit and Bankruptcy Records of Consumers

Sources: American Bankers Association, National Consumer Finance Association, United States League of Savings Associations, Administrative Office of the United States Courts, Board of Governors of the Federal Reserve System, and Department of Commerce.

panies, as well as the number of personal bankruptcies per capita (Chart 2). All three measures are below their recession highs, and in 1976 delinquency rates at finance companies were at their lowest level in the ten-year history of the series.
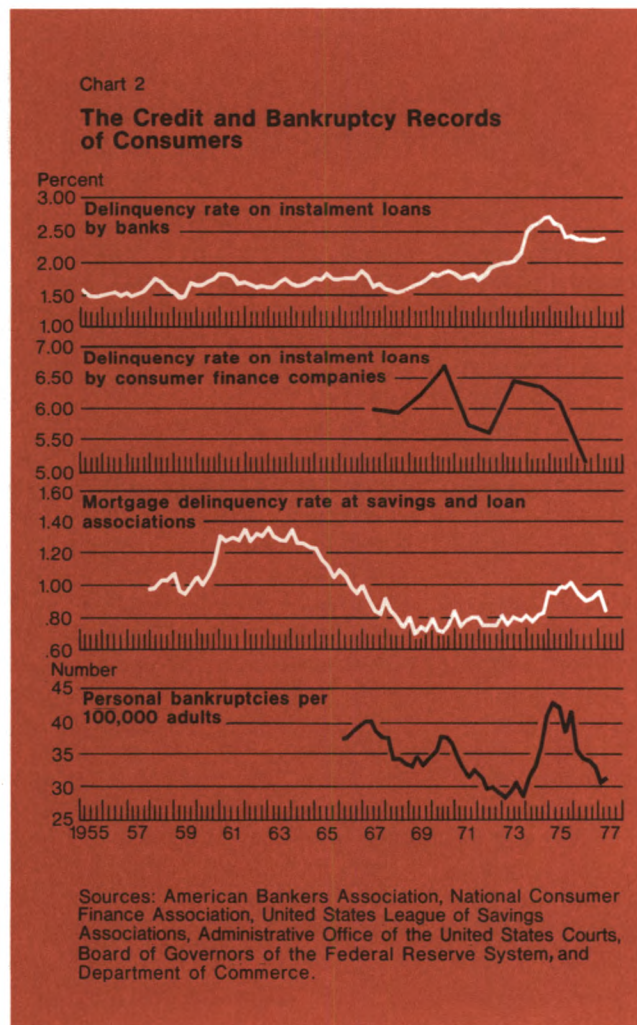
Comparisons of delinquency rates with earlier periods reflect changes in various institutional practices as well as in debt burdens. For example, while the delinquency rate on bank instalment loans is below its previous recession high, some analysts emphasize that it is still above the levels reached in the 1971-73 recovery and in the 1950's and 1960's. However, the higher rates of 1972-77 relative to earlier postwar years follow a period when commercial banks successfully gained market share, mostly at the expense of consumer finance companies; the customers of finance companies traditionally experience higher delinquency rates than the customers of commercial banks. Consequently, during the past five years the bank delinquency rate has risen relative to the finance company rate. Even so, the bank loan delinquency rate is now only about one half of the rate at finance companies.

Bankruptcy data are also shown in Chart 2. The recent level of bankruptcies appears to be on the low side. However, it is difficult to draw very firm conclusions from this, particularly because state laws and judicial practices vary over time.

The longer maturities on auto loans

Even though debt-income and delinquency ratios do not now depict an overextended consumer, the recent trend toward longer maturities and lower monthly payments on automobile loans raises some potentially troublesome questions. In May 1977, 38.9 percent of new auto loans at commercial banks were for more than thirty-six months, compared with 22.4 percent in May 1976 and 12.9 percent two years earlier. At finance companies, this percentage amounted to 44.9 percent in May, 32.0 percent a year earlier, and 22.8 percent two years earlier. This trend has made auto loans affordable to more families and thus contributed to the strong auto sales in the current recovery.

If consumers continue to spend the same proportion of their income, then the lower monthly repayments on auto loans will leave more room for other expenditures. However, the repayments will remain in household budgets for a longer period than before, and whether this will cause households to keep their cars longer before replacing them depends on a number of considerations. Should the repayment period for some households become longer than the desired period of owning a car, some of the proceeds from the car sale may be used to repay the existing car note. In that case, house-
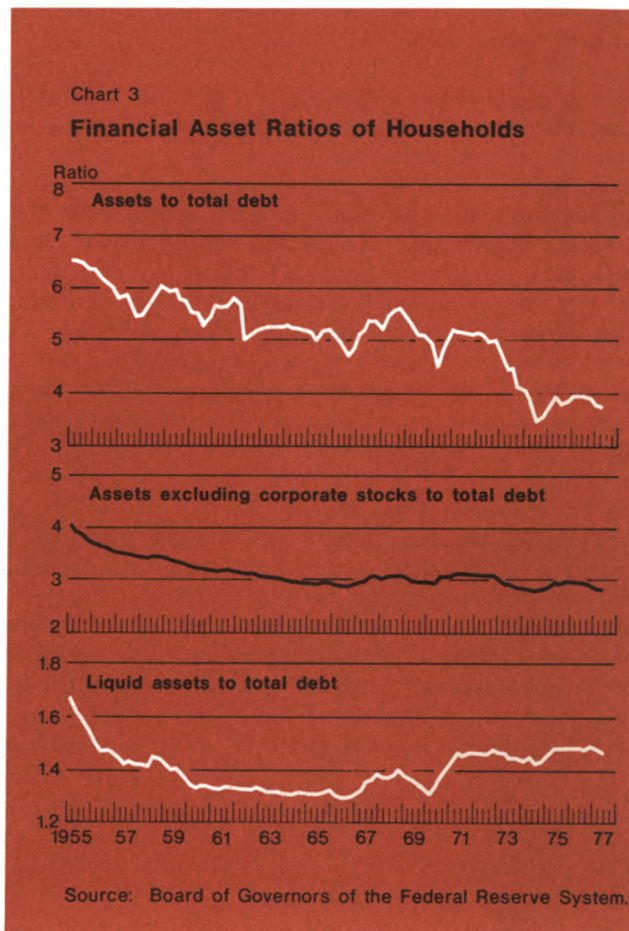
holds would have less money to make a downpayment on another car. If securing enough downpayment became a problem, households might have to hold on to their old cars until the existing note was paid out on the original terms. The result would be a temporary drag on the total demand for autos. While this example illustrates only one of many possible sets of assumption about such factors as holding periods, repayment practices, and savings rates, it does demonstrate some of the concerns about the effects of longer maturities.

Mortgage debt

The burden of consumer instalment debt cannot be judged without also considering the claims mortgage debt service makes on household budgets. However, the burden of mortgage service payments is particularly difficult to evaluate because of the variety of possible financial positions homeowners may be in after the rapid rise in home prices and the relatively high mortgage interest rates in recent years. A family that purchased an average price new home with a conventional mortgage in July 1965 paid $24,700 and took out an average $18,525 mortgage of 25.0 years bearing an interest rate of around 5.75 percent. It then faced monthly amortization payments (principal and interest) of $117. A family that purchased an average price new home with a conventional mortgage in July 1977 paid $53,700 and took out an average $40,000 mortgage of 27.9 years bearing an interest rate of around 9.00 percent. It then faced total monthly payments of $327. While the average monthly payment almost tripled over the period, the size of median family income only about doubled. The average conventional mortgage payments on purchases of existing homes have also about tripled over the same period. Thus, compared with homeowners who purchased their properties in the 1960's and earlier, recent home buyers who had no equity in older homes to use for large downpayments have taken on a higher repayment-income ratio.

Families buying their first home in the 1970's are still a reasonably small minority of all homeowners, however. And the above comparisons somewhat exaggerate the burden even on such families. With higher interest rates, tax deductible interest payments are now a larger portion of debt service payments in the early years of a mortgage than they were previously. For example, on average price homes purchased with average conventional mortgage terms, interest payments as a percentage of total monthly debt service in the first year of the mortgage were about 75 percent in 1965 but rose to 90 percent in 1977. Moreover, if inflation continues, a family's mortgage debt repayments as a percentage of nominal income will diminish substantially over time. Should inflation slow consid-

Chart 3

Financial Asset Ratios of Households

Ratio

Assets to total debt

Assets excluding corporate stocks to total debt

Liquid assets to total debt

1955 57 59 61 63 65 67 69 71 73 75 77

Source: Board of Governors of the Federal Reserve System.

erably, long-term yields would undoubtedly fall and homeowners may then be able to refinance mortgages at lower rates.

In addition, newly assumed mortgage burdens will seem less onerous the more homes are viewed as a relatively attractive investment. Prices of single-family homes have, of course, risen strongly in recent years and, if the associated increases in homeowners' equity are realized, the gains are not taxable when reinvested in another home; if another home is not purchased, the increases receive the favorable tax treatment given to capital gains with additional tax advantages for individuals sixty-five years of age and older. Another tax advantage is that part of the return on housing is a rent saving which, unlike most other investment income, is not taxable. Homeowners can also use the rising equity on their homes as a source of funds by refinancing or by taking out second mortgages. For many reasons, therefore, home buying, almost irrespective of the size of mortgage outlays, is looked

upon as a good investment as well as a purchase of housing services.

While recent home buyers have been initially committing a somewhat larger fraction of their incomes to mortgage repayments, mortgage loan delinquency data do not indicate that the resulting debt burden has become excessive. The percentage of loans that are delinquent at savings and loan associations has recently fallen back to near the pre-recession level (see Chart 2). To be sure, the mortgage loan delinquency ratio was much higher in the past recession than in the far milder 1969-70 downturn, but even so it never went much above 1 percent. (Savings and loan associations hold roughly 50 percent of total home mortgages, which makes them by far the largest mortgage lending institutions.)

Debt and financial assets
Debt should also be compared with household financial assets in addition to income. An increase in debt is naturally less burdensome if there is an accompanying increase in financial assets that can provide a cushion of liquidity in times of financial distress. Selected ratios of household assets to instalment plus mortgage debt are depicted in Chart 3. In these comparisons, total financial assets (deposits at banks and other financial institutions, short- and long-term securities, equities, and contractual retirement and savings plans) cover a far smaller fraction of indebtedness now than they did in the 1950's and 1960's.

The picture improves somewhat if corporate stocks are deducted from total financial assets, since equity values have dropped quite precipitously in the 1970's. Stocks probably do not constitute an important source of wealth for lower and middle-income families. Therefore, their financial asset position relative to debt has probably not deteriorated much since the mid-1960's. This conclusion is reinforced by a look at household deposits at commercial banks and thrift institutions. These would seem to be a very important source of liquidity for lower and middle-income families, and at present they are not unusually low relative to debt. Also, the debt-financial asset ratios understate the wealth of a substantial number of households whose homes are mounting in value.

Household debt can undoubtedly become too large, thereby curbing consumption and raising delinquency rates. However, analysis of various measures of consumer debt burdens—notwithstanding their imperfections—indicates that they are generally not out of line. Nevertheless, the whole consumer debt situation warrants continued close attention.

Maury Harris and Karen Bradley

The Market for Corporate Bonds

The market for corporate bonds has undergone a number of major changes over the past fifteen years. Perhaps the most striking has been the increased purchase of corporate bonds by households. During the 1950's and early 1960's, households invested heavily in corporate equities. Then, as the bull market in equities ended in the mid-1960's and interest rates began rising sharply, households increased their corporate bond holdings relative to those of equities. Pension funds also began to channel large amounts of funds into the corporate bond market because of the large inflows they were receiving as well as a broadening of the authority of many public pension funds (state and local government retirement funds) to include investments in corporate bonds. The increase in household and pension fund holdings of corporate bonds has meant that these investor groups now rival life insurance companies as major suppliers of funds to the corporate bond market.

On the issuer side of the market, corporations have made large adjustments in their approach to financing. From 1960 through the early 1970's, corporations increased the debt portion of their capital structures. Financial leverage—or the ratio of debt to total financing—of nonfinancial corporations rose by about one fifth, and the ratio of bonds to total financing rose somewhat more moderately. A lower level of uncertainty or expected variability of corporations' income before interest and taxes may have encouraged corporations to increase debt financing during the early and mid-1960's. From 1968 through 1974, a new factor was at work: higher rates of inflation encouraged firms to issue debt as the real or inflation-adjusted cost of debt financing declined. In 1975, however, financial leverage declined for the first time in fifteen years. The decline occurred in part because of the reduction of short-term debt as inventories were liquidated and may also have reflected the response of corporations to greater economic uncertainty.

Borrowing and lending decisions in the corporate bond market have resulted in an 8½ percent annual growth rate since 1960 in the outstanding stock of corporate bonds. At the end of 1976, the total outstanding amounted to $323 billion, about one third more than that of state and local government securities and about half as much as that of home mortgages and United States Treasury securities. Borrowing and lending decisions—particularly those involving substitution between corporate bonds and other instruments by both issuers and purchasers of corporate bonds—affect not only the size and rate of growth of the corporate bond market but also the effectiveness of selective credit and other public policies designed to alter the price and quantity of particular financial securities, such as home mortgages or state and local government obligations.

Purchasers of corporate bonds, 1960-76

The major purchasers of corporate bonds are life insurance companies, households, private pension funds, public pension funds, and mutual savings banks. Data on the distribution of holdings among these purchasers are presented in Table 1. The largest and steadiest buyers of corporate bonds have been life insurance companies. The bulk of these companies' investments are confined to bonds and real estate mortgages. Inflows of life insurance premiums create actuarially determined outflows, most of which are expected to occur far in the future, and these inflows must be invested to insure that those distant liabilities are covered. Corporate bonds are attractive instruments, because they insure a specific cash flow over a long

Holdings of Corporate Bonds Outstanding

In billions of dollars

Sector	1950	1960	1970	1976
Households*	5	10	36	72
Life insurance companies†	25	48	74	122
Private pension funds	3	16	30	39
Public pension funds‡	1	7	35	67
Mutual savings banks	2	4	8	20
Other	4	5	19	34
Total	40	90	202	354

Table 2

Importance of Corporate Bonds in Purchasers' Portfolios

Corporate bonds as a percentage of total financial assets of purchasers

Sector	1950	1960	1970	1976
Households*	1.0	1.0	1.9	2.5
Life insurance companies† ...	40.0	41.0	37.0	39.0
Private pension funds	40.0	42.0	27.0	22.0
Public pension funds‡	10.0	37.0	58.0	54.0
Mutual savings banks	9.0	9.0	10.0	15.0

Corporate bond holdings include dollar-denominated bonds issued by foreign corporations in the United States market. The volume of these "Yankee bonds" increased from $6 billion in 1960 to $31 billion in 1976.

* "Households" includes funds held by commercial banks in trust accounts and funds held by nonprofit organizations.

† Includes private pension funds managed by life insurance companies.

‡ State and local government retirement funds.

Source: Board of Governors of the Federal Reserve System.

period and their yields are higher than on government bonds. Insurance companies can accept the lower marketability of most corporate bonds, compared with government bonds, since they generally expect to hold them until maturity regardless of interim movements in interest rates and bond prices. Not all corporate bonds are acceptable to life insurance companies, however. These companies are extremely averse to the provisions in many corporate bonds for redemption and refunding prior to the scheduled maturity date, for such provisions create uncertainty about investment income during the period from the refunding to maturity. (Refunding provisions and other investment characteristics of corporate bonds are described in the box on page 30.)

While life insurance companies have remained the largest holder of corporate bonds, the amount they held relative to the total outstanding fell from 53 percent in 1960 to 35 percent in 1976. This occurred mainly because growth in the assets of life insurance companies was slower than the growth in the outstanding volume of corporate bonds. However, as revealed in Table 2, where each sector's corporate bond holdings are expressed as a percentage of the purchaser's portfolio of financial assets, a shift in life insurance company assets from corporate bonds to other assets also made a minor contribution to the reduction of their share of the amount outstanding.

Household investment portfolios are more diversified than those of life insurance companies and include large amounts of short-term securities, equities, and municipal bonds, as well as corporate bonds. Since households have greater flexibility in making portfolio choices, their participation in the corporate bond market has varied a great deal over the post-World War II period. Their holdings have shown a marked increase since 1960, both as a percentage of total corporate bonds outstanding and of total household assets. The increase in long-term rates and the weak performance of the equity market contributed to this shift.

The corporate bond holdings of private and public pension funds have grown even more in value since the 1960's, almost reaching the level of life insurance company holdings. This development primarily reflects the rapid growth in total assets of pension funds. For public pension funds, corporate bonds also rose as a percentage of their total assets over the period, as the broadening in their investment authority enabled them to buy corporate bonds and so obtain the higher returns available on them in comparison with those on government bonds. By contrast, corporate bonds declined as a percentage of the total assets of private pension funds after 1960 as these funds increased the equity or variable income portion of their portfolios.

Still, the corporate bond portion of both public and private pension fund assets greatly exceeds that of households. Pension funds are exempt from taxes on all forms of investment income—interest payments, dividends, and capital gains. Households are taxed at the full personal income tax rate on interest and dividends, while the tax rate on capital gains is, of course, lower. Households are, therefore, sensitive to whether income arises from interest or capital gains, whereas pension funds are not. The differential tax treatment is thus a major reason for the difference in investment choices of the two groups.

Mutual savings banks also purchase sizable amounts of corporate bonds. Their holdings have risen sharply since the 1960's, reflecting both an increase in the corporate bond portion of mutual savings bank assets (Table 2) and growth in the total assets of these banks. The increase in the corporate bond portion was matched by a decrease in mortgage holdings relative to total assets. Savings and loan associations, the other major group of thrift institutions, hold almost all of their assets in home mortgages.

How corporate bonds are marketed

New corporate bonds are sold in one of two ways. Issues are sold in the public market or they are placed directly with particular lenders. Private placements are often made by less highly regarded or less widely known companies. Over the 1953-64 period, about one half of new corporate bond funds was raised through public offerings. Subsequently, the proportion of funds raised through public offerings rose to about two thirds. The decline in private placements reflects the reduced share of life insurance companies in bond acquisitions, since they do most of the purchasing by this method. Apart from the long-term trend, the ratio of publicly offered to total corporate bond borrowing moves up and down with the business cycle. Public utilities are better able to pass on higher borrowing costs to their customers than are industrial firms. So during periods of high and rising interest rates, the volume of publicly offered utility issues remains fairly high while the volume of industrial issues—particularly those of weaker firms that are generally placed privately—is cut back because of the increase in borrowing costs.

During the 1920's, most public issues were handled by commercial banks. There was much concern that commercial bank underwriting and dealing in corporate securities increased financial instability, concentrated economic power, and led to conflicts of interest for banks. Therefore, bank underwriting of corporate bond issues was terminated in 1933 by passage of the Glass-Steagall Act. This legislation was passed during an era in which several important measures affecting financial markets were enacted, including the bill that created the Securities and Exchange Commission (SEC).

Since Glass-Steagall, investment banking firms have been the major underwriters of corporate bond issues. As underwriters, investment bankers purchase an issue themselves or guarantee the issuer a specific price for the bonds. Investment bankers thus bear the risk of gain or loss when the bonds are sold in the open market. In some cases, bonds are sold through competitive bidding to the particular underwriter that offers the issuer the highest price for the bonds, which of course means the lowest interest cost to the issuer. The winning underwriter then sells the bonds to the public at a price calculated to cover all costs and to provide an adequate return on the capital funds tied up in the transaction.

A large issue requires the participation of many investment banking firms, who combine under the leadership of a particular underwriter or group of underwriters to form a syndicate. The syndicate leaders must have good information about the marketability of an issue to bid aggressively for it. This information is difficult and costly to obtain if the leaders do not have close contact with the retail market. Because of the importance of accurate information about retail demand in order to bid successfully for an issue, underwriters have a strong incentive to be involved in the final sale of the bonds to retail customers. Accordingly, some large underwriting firms have recently merged with retail brokerage firms, and a number of large retail firms have increased their underwriting activities.

Many corporations maintain long-term relationships with a single underwriting firm and negotiate all of their offerings with it to encourage the underwriter to make a strong effort to sell the company's issues. The designated underwriter—who may organize a syndicate—will typically advise the corporation about the maturities, coupons, and other terms in order to attract the strongest market interest. The choice between competitive and negotiated public offerings is usually determined by the issuer's assessment of whether the benefits of competition for the issue among several groups would be offset by the increased commitment and advice of a particular underwriter. The decision may depend on how well the borrowing firm is known and how specific its borrowing needs are with regard to maturities and other terms. However, many issuers subject to regulatory authorities, such as public utilities, are required to sell their bonds through competitive bidding. In periods of high and rising rates, such as 1974, these authorities sometimes waive this requirement because of concern that strong bids will not be forthcoming.

For both negotiated and competitive offerings, the

The Characteristics of Corporate Bonds

A bond is a debt contract which promises its holder an amount equal to the bond's par value on a stated maturity date as well as specific interest payments at fixed intervals prior to maturity. Holders of corporate bonds that are "unsubordinated" or "senior" debt have a prior claim (relative to holders of equity and "subordinated" or "junior" debt) against the issuer's income, whether generated through normal operations or through liquidation. The payments of some corporate bonds, generally called mortgage bonds, are also secured by liens on particular assets of the issuer. Corporate bonds that are unsecured by specific properties are referred to as debentures. Over the years, investors have lowered their evaluation of mortgage bonds relative to debentures. Many railroad bankruptcies have shown that a mortgage on a property is of little value unless the property produces a good flow of income. Debentures, on the other hand, have come to be very acceptable when issued by companies with good earning power. While many utilities continue to offer mortgage bonds, large and well-regarded industrial firms typically use debenture financing to avoid encumbering fixed property with liens.

Almost all bonds, whether based on a mortgage or on the general earning power of the issuing corporation, have their terms spelled out in a detailed contract called an indenture. This agreement describes the rights and obligations of both parties, mainly the rights of lenders and the obligations of the debtor. The enforcement of this indenture is usually left to a trustee who acts for the bondholders collectively. The terms of the agreement are described in the Trust Indenture Act of 1939.

To insure that bond liabilities do not exceed the value of assets financed by these liabilities, corporate bonds usually are issued with sinking fund provisions. The schedule of sinking fund payments is directly related to the estimated depreciation of the assets financed by the bonds. These provisions also name a trustee, frequently a commercial bank, who insures that funds are set aside by the issuer in a reserve account or sinking fund. The funds placed in the sinking fund generally are used to retire a portion of the outstanding bonds, and that portion of bonds scheduled for retirement can be retired or called by the trustee on behalf of the issuer, at par, even if market yields have fallen and the price of the bonds has risen above par. Most sinking fund arrangements permit the trustee to "double" or to call at par twice as many bonds as are scheduled for retirement in any particular year under the sinking fund provisions. However, this ability to double cannot be carried over and cumulated but applies only on a year-to-year basis.

For most utility bonds, the sinking fund requirement has until recently been met by applying some minimum percentage of revenues to capital improvements or to the maintenance of the assets financed by the bonds. In recent years, however, as the sharp cost increases in energy and raw materials were passed on in price increases and as maintenance expenditures declined as a percentage of total revenues, a part of the sinking fund requirements of utilities, as well as industrials, has been met by the retirement of a portion of outstanding bonds.

In addition to the call of bonds before maturity through sinking fund provisions, special call or "refunding" provisions have been introduced into most corporate bond issues during the past decade. These refunding provisions provide issuers an opportunity, otherwise precluded by the protection of investors against refunding, to retire bonds before maturity with funds obtained by issuing other securities at a lower rate. Refundability generally occurs after five years for utility bonds and after ten years for industrial issues, frequently at a price of 5 to 10 percent above par. Since bonds with refunding provisions will be called only if interest rates decline, the initial investors require a higher yield when purchasing securities that include refunding provisions. Issuers have been increasingly willing to offer the higher yields necessary to obtain these provisions on account of the greater uncertainty about future interest rates and capital costs due to high and variable rates of inflation.

The length of bonds, or the average period that principal is outstanding, is reduced by sinking fund or other provisions to call bonds before the final maturity date. The increased use of refunding provisions, which introduce a probability that the entire principal will be repaid before maturity, has shortened the expected length of most recently issued corporate bonds. The length of bonds may be shortened further if the increased uncertainty about future taxes makes investors as well as issuers more reluctant to commit themselves over a long period. Apart from a shortening of the length of bonds because of either call provisions or earlier final maturity dates, the length of most recently issued bonds—when the average timing of all payments, interest and principal, is taken into account—has been shortened as higher market rates in recent years have resulted in higher coupon rates. The investor recoups a given proportion of the purchase price of recently issued bonds with their higher coupons earlier than on bonds with similar terms to maturity issued, say, in the mid-1960's.

underwriter normally seeks to obtain commitments from potential buyers prior to obtaining them from the issuer. The retail purchasers will have had an opportunity to review a prospectus on the issue, prepared according to the regulations of the SEC, as well as a more detailed registration statement that must be filed with the Commission.[1] Since the actual price of the issue is not set by the syndicate until the syndicate takes ownership of the bonds, the prospectus is in "red herring" form, *i.e.*, some red printing is substituted for final prices and other details that are not known until receipt from the issuer.

Upon receipt of the bonds from the issuer, the underwriting syndicate announces the sale of bonds by advertisement at a price reached by mutual agreement within the syndicate. Because of the prior arrangements with customers, usually most of the bonds have been sold before this announcement, particularly in the case of negotiated issues. In cases where the price set by the syndicate on the bonds is too high, the syndicate will sometimes be forced to disband. The price of the unsold bonds will then be sold by individual members of the syndicate at prices determined by the market rather than by the initial agreement of the syndicate.

The underwriter hopes that the price of the bonds will rise by a small amount after the sale so as to satisfy the investors that they have gotten a good buy. However, too large a premium may cause issuers to believe that the interest rates they have agreed to pay are too high. On many high-quality industrial issues, the flotation cost or the spread between the public price of the bonds and the proceeds to the issuer is ⅞ percent. An underwriting commission of .2 percent is shared on a pro rata basis by all members of the underwriting syndicate, while the managers receive an additional fee of .175 percent. The remaining ½ percent, or $5 per $1,000 bond, is typically paid out as a selling "concession" to salesmen. On utility issues, the total spread is usually between .45 percent and .75 percent. The lower underwriting spread on utility issues is due to their greater marketability. In the case of both industrial and utility issues, the total underwriting spread does not include other flotation costs, such as legal, printing, and other costs necessary to satisfy the registration requirement of the SEC, which can run from about 1 percent of total proceeds for issues of under $10 million to about ¼ percent for issues over $100 million.

The most consistent purchasers of corporate bonds through private placement are life insurance companies, who frequently purchase the bonds of small, lesser known companies. This method of placement saves the borrowers most of the marketing costs of a public issue, including the costs of registration with the SEC. More importantly, private placement allows these small borrowers, whose financing needs are often unusual or specialized, to sell issues that probably would meet with a poor reception in the public market. In private placements, highly complex indentures or contracts (see box) can be included to aid the issuer and to protect the investor. Companies unable to enter the public market because the quality of their obligations is inadequate to attract large-scale public interest pay a substantially higher rate than do public offerers, and they typically agree not to redeem their securities prior to maturity. The terms usually allow some prepayment of principal through retained earnings, though often with severe penalties. Prepayment to refinance at lower rates is generally prohibited.

Risk and corporate bond yields

The yields on particular bonds are partly determined by default and marketability risk. Default, or business risk, refers to the risk that payments guaranteed in the bond contract will not be made. This is not a measurable quantity, and qualitative factors—such as the quality and experience of management, the competitive position of a firm within its industry and the prospects for the industry as a whole—affect assessments of default risk. A number of quantitative financial variables, including financial leverage (the ratio of debt to total capitalization), operating leverage (the ratio of fixed to variable operating costs), and the variability of revenues, also affect default risk. Corporations that borrow sizable amounts through public offerings frequently pay one or both of the major rating agencies—Moody's or Standard & Poor's—to rate their bonds with respect to default risk. In the publication of bond ratings, the convention is that a rating by Moody's (Aaa, for example) precedes one by Standard & Poor's (AAA), *viz.*, Aaa/AAA. The agencies' rating categories differ somewhat, but in general the meaning of their ratings is similar. The first four categories—Aaa/AAA through Baa/BBB—are all of "investment grade", meaning that interest and principal are considered secure. The Baa/BBB category is said by Moody's to have some "speculative characteristics", while Standard & Poor's terms such issues as on the "borderline" between sound obligations and speculations. Ba/BB issues are far more speculative and B/Bs are even riskier. Moody's then continues through Caa, Ca, and C for highly speculative issues, some of which are in default. Standard & Poor's goes down as far as

---

[1] Issues of a number of firms regulated by the Interstate Commerce Commission are exempt from registration with the SEC.

**Ratings of Corporate Bonds
and Selected Financial Ratios**

Rating*	Ratio of earnings to interest plus sinking fund obligations	Ratio of cash flow to senior debt (percent)	Ratio of long-term debt to total capitalization (percent)
Aaa/AAA	At least 5	Above 65	Below 25
Aa/AA	At least 4	45 to 65	Below 30
A/A	At least 3	35 to 45	Below 35
Baa/BBB	At least 2½	25 to 35	Below 40

* In the publication of bond ratings, the convention is that the Moody's rating comes first and Standard & Poor's uses capital letters exclusively.

Source: Irwin Ross, "Higher Stakes in the Bond Rating Game", *Fortune* (April 1976), page 136.

DDD, DD, and D, all of which are for bonds in default but with differences in relative salvage value.

Neither Moody's nor Standard & Poor's publishes information about the actual quantitative measures they use in their evaluations. However, variations in the financial condition of companies whose issues are rated by the agencies tend to be related to the ratings they receive, as summarized in Table 3. The rating of issues is also influenced, of course, by a number of qualitative factors affecting the outlook of individual firms. In the postwar period, no industrial or utility issue has gone into default while rated "investment grade". However, several investment-grade railroad issues went into default in the Penn Central and other railroad bankruptcies. During the Depression, 11 percent (in dollar volume) of investment-grade issues went into default.

Almost all newly issued and rated bonds carry ratings of Baa/BBB or above. Of the 1970-76 dollar volume of corporate bond offerings rated Baa or above by Moody's, about one third carried their Aaa rating, while about 30 percent were rated Aa, another 30 percent rated A, and about 7 percent rated Baa. About two thirds of the dollar volume of bonds in these four highest rating categories were issued by utilities, and industrial offerings accounted for the rest. In the Aaa category, more than 75 percent of the dollar volume was offered by utilities, and telephone bonds accounted for the bulk.

The marketability risk of an issue concerns the possibility that, if a holder wants to sell that issue, his inability to find a buyer may force him to take a loss unrelated to any deterioration in the corporation's financial position. Marketability (or liquidity) depends on the breadth of ownership of a corporation's securities—and frequently on how many securities are outstanding. The presence of a large number of potential purchasers and sellers causes dealers to become willing to buy and sell them and thus to make a secondary market. The default risk of a bond also affects marketability, insofar as issues with low ratings do not attract a wide variety of buyers.

The liquidity or marketability of corporate issues is reflected in the difference—or spread—between the bid and offered prices that dealers quote (for certain minimum amounts of bonds) when they make a market in an issue. The dealer spread in a $500,000 to $1 million transaction for a highly marketable corporate bond is typically about ⅛ point. Spreads for less marketable issues range from about ¼ point to ½ point. (The smallest spreads in the bond market are for actively traded Government securities, and these range from 1/32 point to 1/16 point.)

Since trading is generally more active immediately after new issues are brought to the market, new issues are typically quoted at narrower spreads than issues that are firmly held in investors' portfolios. The amount of uncertainty about future interest rates may also affect spreads. An increase in the degree of uncertainty or in the expected variability of rates will cause spreads to widen.

Substitution in the corporate bond market

The amount of corporate bonds on the balance sheets of both issuers and purchasers of corporates reflects a variety of portfolio constraints. For example, because of the pattern of their inflows and outflows, pension funds and life insurance companies are generally limited to long-term investments. On the issuer side, corporations tend to match the maturities of their liabilities with those of their assets. Nevertheless, these constraints typically permit some substitution or alteration in the bond portions of both issuer and purchaser balance sheets in response to changes in relative yields and other factors.

Bonds are issued by corporations to finance the acquisition of assets. It is convenient to look at the corporate financing process, first, as a decision about the distribution of total financing between debt and equity and, second, as a decision about the distribution of debt financing between bonds and short-term debt obligations. A number of factors affect corporations' choice between debt and equity financing, including the levels of corporate and personal income tax rates, the rate of inflation, and the level of corporations' asset risk, *i.e.*, the amount of uncertainty or expected variability of their earnings before interest and taxes.

The current tax system favors debt financing by corporations, because interest payments made by corporations are deductible from their taxable income while any dividend payments they make are not. However, the ownership of corporations resides in a collection of individuals, and the tax advantage of debt financing accruing to the owners of corporations because of taxation at the corporate level may be offset in the taxation of the owners' personal incomes. This offset may occur because interest and dividend income to the owners is taxed at the ordinary personal income tax rate, while income in the form of capital gains is taxed at half the personal tax rate—up to a maximum rate of 25 percent. The tax benefits to corporations from debt financing exceed those from equity financing except when securities are held by the small number of individuals whose personal tax rates are very high relative to the corporate tax rate.

Inflation also encourages corporations to favor debt relative to equity financing if the real or inflation-adjusted cost of borrowing declines. The effects of inflation on the real costs of financing are discussed in the opening article in this *Review*.

While the tax structure and inflation encourage firms to use debt rather than equity financing, the greater use of debt increases a firm's fixed commitments. In the case of debt financing—given the amount of asset risk—the resulting rise in fixed commitments increases the risk of bankruptcy, and bankruptcy creates two general categories of costs. The first category—direct costs—includes lawyers' and accountants' fees, other professional fees, and the value of the managerial time spent in administering the bankruptcy. Evidence in the bankruptcies of eleven large railroad firms between 1930 and 1955 suggests that these costs were small relative to the value of the firms. However, the second category—indirect costs—may be much larger. These costs include lost sales, lost profits, and possibly the inability of firms to obtain credit or to issue securities except under especially onerous terms. Unless the direct and indirect costs of bankruptcy are negligible, debt financing or any other factor increasing the probability of bankruptcy may be expected to increase a firm's cost of financing or the yield required by holders of the firm's securities. The positive relation of asset risk—and the greater possibility of bankruptcy as more debt is issued—to the cost of debt relative to equity financing explains why public utilities and other firms with low asset risk maintain high debt ratios while firms with higher asset risk limit their use of financial leverage.

The inverse relation between the asset risk of individual firms and the debt ratios of the same firms should also apply over time for the corporate sector as a whole. An increase in asset risk for the corporate sector—because of an increase in the general amount of fluctuation or instability in the economy—should cause firms to reduce their debt ratios and their fixed commitments in order to reduce the risk of bankruptcy.

From 1948 through the 1950's, the debt portion of the financing of nonfinancial corporations remained stable. Subsequently, from 1960 to 1974, the ratio of debt to total financing or total assets underwent a steady and sizable increase (Chart 1).[2] When the balance sheet is expressed in terms of historical costs, the ratio rose from .47 in 1960 to .50 in 1967 to an average of .55 during the 1972-74 period. However, the ratio of debt to assets tends to be overstated during periods of inflation. During inflationary periods, the historical costs of physical assets as reported in balance sheets fall below the current value or replacement costs of these assets. There is no corresponding understatement of debt, because inflation does not increase the value of liabilities which represent dollars not physical units.[3] When the historical costs of physical assets are replaced by the current or replacement costs of assets, the debt ratio rose from .40 in 1960 to .44 in 1967 to an average of .47 over the 1972-74 period. In 1975, the debt ratio experienced its first decline in fifteen years, as firms reduced their short-term debt. Because some of the short-term debt was replaced by bonds as well as equity, the bond proportion of total financing increased slightly during this period.[4]

The rising debt ratios in 1960-74 should be separated into two roughly equal subperiods because of the different factors affecting debt ratios in each. Inflation
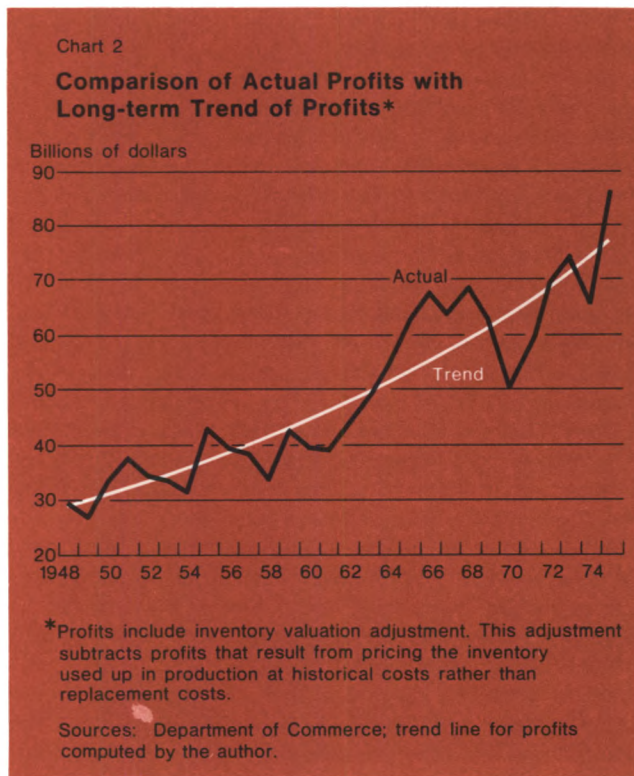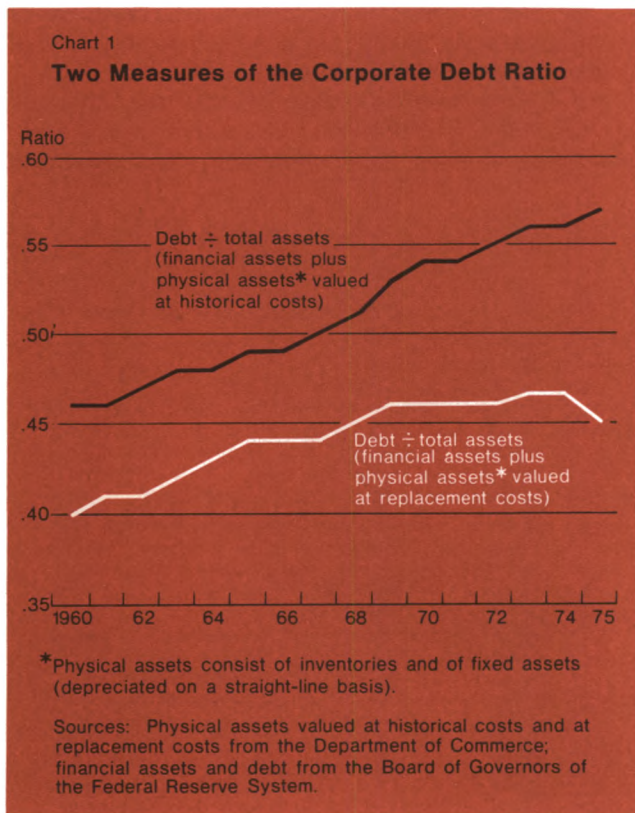
[2] In the article on pages 1-10, market values of debt and equity are analyzed. Here, book rather than market values of debt and equity are used. The purpose is to examine the financing decisions of corporations, and market values reflect not only financing decisions but also unexpected changes in the value of securities in the market.

[3] During inflationary periods, the par value of debt in balance sheets overstates the market value of that portion of debt issued with low coupons before the rise in nominal interest rates. Since virtually all short-term debt and most long-term debt now outstanding have been issued in the period of high interest rates that began in about 1970, the degree of overstatement of total corporate debt by using par values is small.

[4] To determine the financial condition of a firm, it is necessary to value assets and liabilities in terms of current rather than historical costs. This valuation adds to physical assets, as reported in balance sheets, the capital gains on physical assets because of inflation. The increase in value on the asset side of the balance sheet implies an equivalent increase in net worth and may tend to suggest that these gains are part of the firm's income. However, as noted in the article on page 2 of this *Review*, these gains from inflation are necessary to maintain a given level of claims on resources and should not be added to the income from normal or continuing operations in the measurement of a firm's income performance, even though the cumulation of these gains must be incorporated in the balance sheet to obtain an up-to-date description of the firm's financial condition.

remained fairly moderate until 1968 except for brief inflation episodes in the late 1940's and during the Korean war. The corporate tax burden declined slightly during the early and mid-1960's because of the investment tax credit. This behavior of inflation and the tax burden suggests that the increase in debt ratios from 1960 through 1967—after fifteen years of little change—occurred because of a decrease in asset risk rather than an increase in taxes or inflation. The decrease in asset risk after 1960—or the perception that it was higher before 1960—may reflect a dimming of early postwar memories of the Great Depression during the 1930's. In contrast to the early and mid-1960's, inflation rates from 1968 on were substantially higher than during most of the 1940's and 1950's. The increase in debt ratios after 1967 seems to have resulted from this increase in inflation and a decline in the inflation-adjusted cost of debt financing.

The decrease in debt ratios during 1975 was related to the decline in short-term debt as inventories were liquidated; the moderation of inflation may also have contributed. The decline also may reflect the perceptions of both issuers and investors that corporation asset risk had increased. An increase in asset risk be-

Chart 2

Comparison of Actual Profits with Long-term Trend of Profits*

*Profits include inventory valuation adjustment. This adjustment subtracts profits that result from pricing the inventory used up in production at historical costs rather than replacement costs.

Sources: Department of Commerce; trend line for profits computed by the author.

Chart 1

Two Measures of the Corporate Debt Ratio

*Physical assets consist of inventories and of fixed assets (depreciated on a straight-line basis).

Sources: Physical assets valued at historical costs and at replacement costs from the Department of Commerce; financial assets and debt from the Board of Governors of the Federal Reserve System.

ginning in the mid-1960's is suggested by the deviations of corporate profits from their long-term trend, as depicted in Chart 2. Larger deviations from trend occurred in the 1965-75 period than in the 1948-65 period, even if the 1965-75 deviations are divided by the larger values of profits in the later years. The relatively and absolutely larger deviations in the 1965-75 period indicate a higher level of profit variability—a close proxy for asset risk.

Choosing between short- and long-term debt financing is much more closely related to the business cycle and the behavior of interest rates, including short-term rates, than is the choice between debt and equity financing. During 1960-76, the ratio of long-term debt to total debt maintained a consistent and inverse relation with short-term rates (Chart 3). At least part of the decline in bond financing relative to short-term debt financing during periods of rising short-term rates presumably reflects large increases in inventories, which firms typically finance with short-term debt. However, the relative decline in bond financing during these intervals may also have reflected firms' efforts to substitute between short-term and long-term debt in order to reduce financing costs. This happened despite high short-term rates, both in absolute terms and rela-

tive to long term rates. Firms may have used short-term rather than long-term financing because they expected a decline in both short- and long-term rates and they wanted to defer long-term financing until the decline in rates had occurred. Bond financing then increased relative to total debt financing, as inventories were liquidated and firms took advantage of declines in long-term rates to issue long-term debt.

Substitution by investors

The degree of substitution between corporate bonds and other instruments differs substantially among the major groups of holders. Households substitute freely among corporate bonds, equities, and short-term securities. During the 1920's, households owned about two thirds of the corporate bonds outstanding. After World War II, their holdings dropped sharply while their investments in equities rose substantially. As bond yields increased in the 1960's and the performance of equity investments worsened, households again became large holders of corporate bonds.

Although life insurance companies have in recent years been devoting somewhat less of their investments to obligations with very long maturities, their unique time pattern of inflows and outflows inevitably reduces their ability to substitute between corporate bonds and other instruments, particularly short-term securities. Pension funds also tend to hold most of their assets in long-term investments. The principal difference between pension funds and other corporate bondholders, however, is that all forms of investment income of pension funds are free of Federal income taxes. Since households are taxed more heavily on investment income than on capital gains and income from municipal bonds, household investment as compared with pension fund investment is more heavily concentrated in municipal bonds and growth-oriented equity issues. Pension funds invest more heavily in corporate bonds and income-oriented equity issues.

Although the differences in the tax status of households and pension funds cause their relative holdings of various financial instruments to differ, these differences do not reduce their incentive or ability to substitute between different instruments in order to maximize the aftertax return on their investment portfolio. Both households and pension funds—life insurance companies do so to a lesser degree—substitute between assets on the basis of alternative aftertax yields, and this substitution does not exclude assets that are typically held by others.
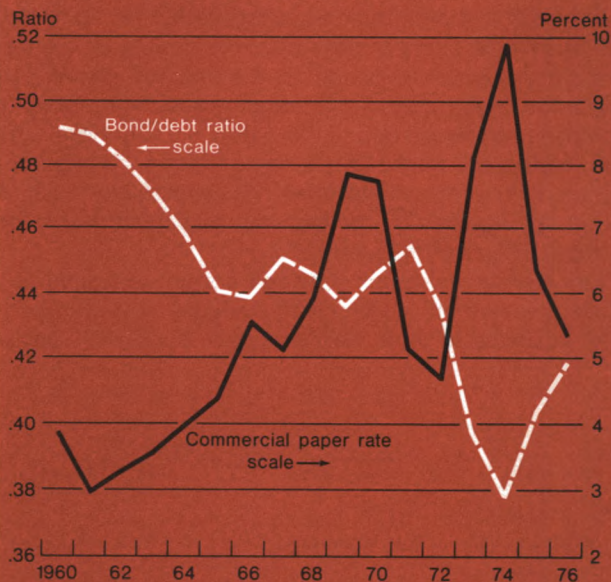
There is considerable evidence that suggests such substitution by financial market participants over a wide range of financial assets including corporate bonds. Also indicative of extensive substitution is the broad similarity of interest rate movements over the 1960-76 period, as illustrated in Chart 4. Yields on corporate and government bonds moved very similarly over these years. And, although yields on commercial paper fluctuate much more than those on corporate bonds, the yields on commercial paper and corporate bonds also tended to behave alike. Parallel movements of corporate bond and stock yields also took place, though the parallelism in yield patterns of these yields was somewhat less than in the other comparisons.

Apart from the different cash flow patterns of various financial market participants, the volume and the distribution of corporate bond holdings in the economy reflect a variety of public policies. In the area of taxation, these policies include the differential treatment of interest and dividend payments in the taxation of corporate income, the differential treatment of capital gains and other investment income in the taxation of personal income, and the exemption of pension funds from taxes on all of their investment income. Statutory factors, such as prohibiting commercial banks from underwriting corporate bonds, also affect the pattern of ownership and the marketing of these bonds. However, the extensive substitution between corporate

Chart 3

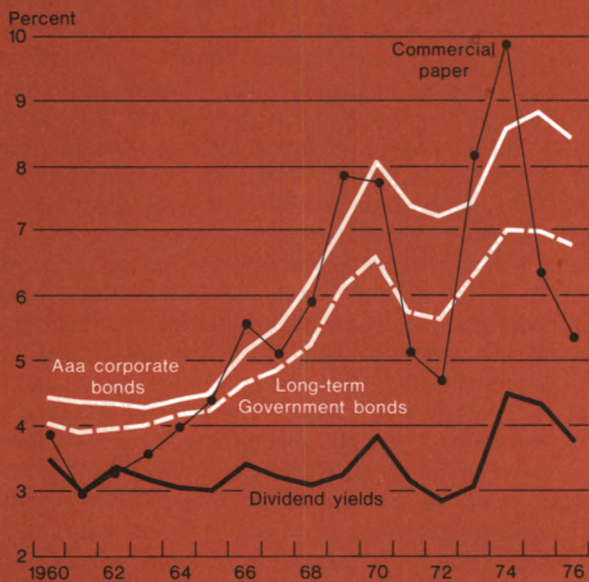**Ratio of Bonds to Total Debt* of Nonfinancial Corporations, Compared with Commercial Paper Rate**

*Excludes mainly accrued tax liabilities and trade debt.
Source: Board of Governors of the Federal Reserve System.

Percent

Commercial paper

Aaa corporate bonds

Long-term Government bonds

Dividend yields

1960 62 64 66 68 70 72 74 76

Source: Board of Governors of the Federal Reserve System.

ties that are substitutes for corporate bonds. For example, the most comprehensive attempt to alter the supply of securities in a financial market has been the variety of policies designed to increase the supply or availability of mortgages in order to sustain housing expenditures. These policies include interest rate ceilings on deposits to protect mortgage lending institutions from excessive competition for funds and the creation of Federal Government agencies to raise funds in the capital markets for reinvestment in mortgages. The impact of those policies on the mortgage market was partly offset as other mortgage holders have responded to the increased purchase of mortgages by Federal agencies and mortgage lending institutions by selling mortgages and purchasing other assets. The other assets include corporate bonds, since mortgages and corporate bonds are substitutes in the portfolios of mutual savings banks, households, life insurance companies, and other investment groups. Perhaps more importantly, the moderate increase in the supply of mortgage credit that did result from selective credit policies in the mortgage market caused an even smaller reduction in yields on mortgages. Mortgage yields changed very little because the total demand for mortgage credit increased as households substituted mortgage credit for other credit in their financing of both housing and nonhousing expenditures.

This example of substitution illustrates the difficulty policymakers may have in attempting to alter supplies in particular financial markets. Financial assets are fungible, and investors in a relatively free market move their funds from one market to another on the basis of relative yields. Indeed, substitution because of yield or cost differentials—an increase in corporate bond purchases by households and pension funds on the investor side and an increase in debt financing relative to equity financing on the issuer side—has accounted for the major changes in the corporate bond market over the past fifteen years. As investors and issuers of securities shift between securities and markets on the basis of relative yields, policies to steer financing into particular channels will be offset even if elaborate measures are taken to do so.

Burton Zwick

bonds and other financial instruments—by both issuers and purchasers of corporate bonds—tends to offset a part of the effects of these tax and statutory factors on the volume and distribution of corporate bond holdings. As tax and statutory factors alter the supply or the demand for corporate bonds in the market and cause prices on these bonds to change, market participants purchase corporate bonds if the new price is lower and sell them if the new price is higher. Although the substitution between assets does not reverse the desired effect of the policy on the market, the substitution does reduce the size of the effect.

Similarly, substitution between corporate bonds and other investments weakens the effects of public policies designed to alter the demand or supply of securi-

A Nationwide Test of Early Warning Research in Banking

Three years ago the United States banking and financial system faced the severest test of its stability and capacity to endure heavy financial strain since the 1930's. The nation's financial institutions came through that test with far less damage than might have been expected during a period of economic and financial trauma. That the rampant inflation of the early 1970's, compounded by a sharp recession and an energy crisis, did not do more damage than it might have probably reflects a far stronger financial base than is commonly recognized. At the same time, the difficulties of the early and mid-1970's disclosed some areas of financial weakness that will occupy the attention of bank managements and bank supervisors for some time to come.

In view of the responsibility of the bank regulatory agencies[1] to maintain a safe and sound banking system that meets the nation's credit needs, the Banking Studies Department of this Bank has for several years pursued a project to discover through statistical techniques banks that appear to be vulnerable to financial deterioration. Statistical early warning procedures are intended to supplement the investigative and analytic tools already used by bank supervisors. The most important tool is the on-site examination, which provides comprehensive and reliable information on the condition of a bank or bank holding company. In aiding bank supervision, statistical early warning can help identify and monitor significant changes that may be taking place in a bank's financial condition between scheduled examinations. Thus, supervisors can be alerted to emerging conditions that indicate more detailed investigation and analysis are needed at particular banks.

In this article, we report on a nationwide test of the early warning concepts and procedures that were developed from information on member banks in the Second Federal Reserve District. This test became possible when nationwide historical data on the bank supervisory ratings of member banks were made available to us by the Board of Governors of the Federal Reserve System.[2] The results strongly suggest that these early warning procedures can provide insight into the degree of bank risk and also can help

[1] Commercial banks in the United States come under the jurisdiction of three Federal regulatory bodies. The Federal Reserve regulates state-chartered member banks and bank holding companies, the Comptroller of the Currency regulates national banks, the Federal Deposit Insurance Corporation regulates state-chartered commercial banks that carry FDIC deposit insurance and are not members of the Federal Reserve. Further, each of the fifty states has regulatory jurisdiction over the commercial banks they charter.

[2] There are four possible supervisory ratings that can be accorded a member bank. A rating of "1" is the highest indication of soundness and safety. A rating of "2" is considered intermediate, but nonetheless quite satisfactory. Ratings of "3" and "4" indicate financial difficulty and represent the range referred to in this paper as a "low supervisory rating". All these ratings are awarded banks on the basis of information obtained in on-site examinations as well as other relevant information.

improve the efficiency of bank supervision. The statistical screening procedures we have developed facilitate the deployment of resources for the examination of banks that have a measurable potential for weakness, while minimizing supervisory outlays on banking institutions that are strong and likely to remain so. These screening methods have been under discussion within the Federal Reserve System for some time in a joint effort of Federal Reserve personnel to develop improved and more cost-effective methods of detecting actual and potential bank weakness. Those discussions have contributed significantly to the refinement of the early warning techniques reported here. This year a bank surveillance program based on that joint effort and using the methods described in this report was added to Federal Reserve supervisory procedures.

The results of that early warning research were reported in a series of articles published in this Bank's *Monthly Review,* dating back to September 1974. The most recent of these papers was published in July 1976.[3] That report showed that several important measures of bank financial condition—namely, capital in relation to risk assets, operating expenses and revenues, loss provisions, and certain indicators of portfolio risk, all obtained from the data filed regularly in financial reports to the bank regulatory agencies—can be combined to provide an index of bank vulnerability. Research conducted on member banks in the Second Federal Reserve District indicated a strong tendency for member banks that appear most vulnerable on the basis of our bank score index to receive low supervisory ratings subsequent to their receiving weak bank scores on the basis of reported data. A low supervisory rating reflects the judgment of bank supervisors, based on information obtained in an on-site examination, that the bank in question has sustained marked financial deterioration.

The nationwide results reported in this article indicate a remarkable degree of consistency in the extent to which bank vulnerability can be detected through statistical techniques that employ regularly reported financial data. The analysis is effective either for regional groupings of banks or for selected nationwide size classes. This is an important finding, since it suggests that bank supervisors have wide latitude in using

regional and national data to conduct early warning analysis. Since banking data usually are available first at the regional offices of the Federal bank regulatory agencies, while national tabulations are ready somewhat later, regional analyses can be conducted without delay. Furthermore, regional groupings may, in some circumstances, provide the most appropriate basis for comparison of the performance of individual banks. National samples, when available, can be useful in the study and surveillance of the practices of institutions engaged in similar types of banking activities.

On bank vulnerability

An empirical investigation of the concept of bank vulnerability must use measures that accurately reflect the ability of a bank to withstand economic and financial strain. This problem might be approached by developing a comprehensive econometric model of bank operations. Such a model would focus on the factors that may stimulate high-risk lending and borrowing as well as those that result in losses leading eventually to closure or supervisory mergers. However, the information required for such an approach would be massive and largely unattainable. Alternatively, the investigation could focus on broader economic and financial factors which have been found to be important leading indicators of financial strength or weakness. From a practical point of view, supervisory judgments necessarily must come into play in the selection of specific measures that could be used as early warning indicators of financial strength or weakness, since it is essential for these measures to have operational significance.

Before turning to the specific variables and procedures this report uses to measure and test vulnerability in banking, a brief word is in order concerning the inherent problems in such an investigation and the nature of certain solutions adopted in this report. To begin with, it is possible to construct a variety of indicators whose ostensible purpose is to measure bank vulnerability on the basis of performance in several financial areas considered important to the investigator. In prior research, we have reported on a specific indicator of bank vulnerability, that is, a bank score or index developed from several financial ratios that are considered important from a supervisory point of view. An objective test of this indicator, and others like it, requires some independent information on the consequences of bank vulnerability—such as the incidence of bank failure, the market discipline imposed by creditors, the behavior of stock prices, the difficulty in attracting capable management, and similar information.

The objective test employed in this and prior reports

[3] See David P. Stuhr and Robert Van Wicklen, "Rating the Financial Condition of Banks: A Statistical Approach to Aid Bank Supervision", *Monthly Review* (Federal Reserve Bank of New York, September 1974), pages 233-38; Leon Korobow and David P. Stuhr, "Toward Early Warning of Changes in Banks' Financial Condition: A Progress Report", *Monthly Review* (July 1975), pages 157-65; Leon Korobow, David P. Stuhr, and Daniel Martin, "A Probabilistic Approach to Early Warning of Changes in Bank Financial Condition", *Monthly Review* (July 1976), pages 187-94. These papers contain a number of references to early warning research conducted by others in the field.

is the incidence of low supervisory ratings among member banks that have been ranked according to an index of vulnerability which is comprised of a group of key financial indicators. In this test, we expect that a high concentration of banks ranking poorly on the index of vulnerability will tend to receive low supervisory ratings in a subsequent period. There are substantive reasons for using this test. A low supervisory rating is objective evidence of a considerable weakness in a bank, since it is developed from information obtained in an on-site examination. While there may well be instances involving malfeasance or criminal activity where the problem cannot be detected in time even by on-site examination, the evidence of the past few years indicates that a large portion of all the member banks that closed or were merged out of existence for supervisory reasons had been identified by examination personnel as institutions having difficulties.[4] Thus, there is good reason to expect that accurate advance information (early warning) of the likelihood of a bank being awarded a low supervisory rating could help to improve the efficiency and effectiveness of bank supervision by providing additional time in which to forestall more severe difficulty.

The reader should recognize that there is a wider dimension to the testing of vulnerability discussed in this paper. It is evident that many banks ranking poorly in our index of vulnerability do not subsequently receive low supervisory ratings and by far most of the banks awarded low supervisory ratings recover. Also, occasionally, some banks that encounter severe difficulty may seem to be strong prior to a crisis. We believe the apparent inconsistencies are few in number and the reasons for them can at this point be left for future research.

Specific measures of vulnerability

Since our objective is to measure financial vulnerability, we studied a number of financial factors that are generally believed to be closely related to the fundamental causes of bank weakness in cases where outright criminal activity is not the principal factor. These causes are mainly: (1) poor management, (2) erosion of earnings and capital, (3) poor internal control of expenses, and (4) unanticipated loan or investment losses.

In the earliest stages of the study of early warning indicators, data from examination reports were utilized to construct indicators of bank financial condition and to determine whether or not supervisory judgments in the Second Federal Reserve District could be replicated by means of statistical variables.[5] A measure of success was achieved, and this led to a search for early warning variables that could be obtained solely from the financial reports filed by banks with the bank regulatory agencies, without the benefit of information gained from an on-site examination. We predicated this search on the belief that the potential for marked financial deterioration in banks can be discerned from the condition and income reports regularly reported by member banks.[6]

Management caliber is generally considered one of the most important factors affecting bank soundness, and therefore several measures of management ability were studied. One of the first tests of this nature made use of net income in relation to equity capital—that is, the rate of return on investment—since we hypothesized that good management should be reflected in relatively high income. We found, however, that this variable can provide erroneous early warning signals since reported income cannot be adjusted for the riskiness of the underlying loan portfolio that generates the profit. Thus, a bank in the early stages of pursuing high-risk loans may show an impressive profit record only to report marked difficulty at a later date as many of the risky loans default. This was indeed the case when banks receiving low supervisory ratings over the period studied often reported above-average income in the two or three years prior to the emergence of the difficulty.[7] As an alternative, we have employed an efficiency variable—namely, a measure of operating expenses in relation to revenues—which has proved to be a relatively reliable leading indicator of management ability to operate a sound and efficient organization.[8]

Another variable utilized in earlier work involved dividends in relation either to capital or to income. We found that banks paying relatively high dividends tended to be strong. This evidence might be inter-

---

[4] An extensive, but not exhaustive, search of public records of failures or supervisory mergers of member banks during 1970-76 disclosed that in forty-three out of fifty-eight cases the bank in question had been awarded a low supervisory rating at least one year prior to the crisis. Of course, the reader should be aware that the number of these situations is only a very small fraction of the total number of member banks awarded low supervisory ratings in these years.

[5] See footnote 3 (Stuhr and Van Wicklen).

[6] See footnote 3 (Korobow and Stuhr).

[7] Unpublished research—conducted by Joel E. Majors, Examiner, at the Federal Reserve Bank of Atlanta early in 1977—unearthed a similar finding.

[8] The operating expenses/operating revenues variable also has been identified by both Majors and Sinkey as an important leading indicator of impending difficulty for banks. Majors (see footnote 7); Joseph F. Sinkey, Jr., "A Multivariate Statistical Analysis of the Characteristics of Problem Banks", *Journal of Finance* (March 1975), pages 21-38.

preted to indicate that most bank managements reward stockholders only if the underlying financial position is strong. However, the higher the dividend the less the contribution is made to capital through retained earnings which, potentially at least, could weaken the bank. Moreover, the role of holding company affiliations presented a complication that could not readily be explored. Thus, dividend payout is not now being used in our early warning research.

It was expected at an early stage of the research that increased size might be positively related to bank soundness, on the grounds that large organizations are able to attract superior management and diversify loans more widely than small ones. Nevertheless, our empirical work, based on the evidence available in the Second Federal Reserve District, could not isolate size as a significant factor influencing bank vulnerability. It may be that, while large banks have operational and managerial advantages, they also tend to be associated with the more venturesome aspects of banking such as liability management, term lending, and the like.[9]

The effects of branching on bank vulnerability were also investigated, without clear results. The concept of branch banking appears to have complex implications for bank vulnerability, since a broad network of branches adds to a bank's expenses but also expands the opportunities for diversification. This category of variable, therefore, has not been actively investigated in the latest research.

Rates on loans and time and savings deposits were also studied in earlier research. It was felt that these variables would capture some of the risk aspects of the loan portfolio and measure the costs associated with reliance on time deposits. While the loan rate frequently appeared to be significant, it was difficult to separate the risk aspects from the market interest rate factors and, therefore, this variable was dropped. We did not find the rate paid on time deposits to be a consistently significant indicator of vulnerability.[10]

While investigation of many financial variables for member banks in the Second Federal Reserve District resulted in the elimination of a large number of variables, these investigations should not be considered exhaustive. Different results might emerge from

new data available as a result of the recent expansion of the financial information banks are required to report or from the use of a different model than the one tested in this report.

In the refinement of the early warning research reported in previous articles, several of the variables were redefined to incorporate insofar as possible the banking operations conducted at the foreign offices of the nation's banks that engage in worldwide operations. On the basis of such new data for member banks in the Second Federal Reserve District, and limited tests for other Districts, five financial variables proved to be the most useful early warning indicators.[11]

(1) Loans and leases ÷ total sources of funds
(2) Equity capital ÷ adjusted risk assets
(3) Operating expenses ÷ operating revenues
(4) Gross charge-offs ÷ net income + provision for loan losses
(5) Commercial and industrial loans ÷ total loans.

The exact definition of each of these variables is given in the box on page 41.

Data for the five variables above are readily available both currently and on a historical basis and have consistently produced promising results. They have been the subject of intense discussion within the Federal Reserve System in connection with a Systemwide surveillance program. We deemed it useful, therefore, to investigate the early warning value of these particular variables in a nationwide test.

A nationwide framework of analysis
In broadening the investigation to the nationwide universe of member banks, we have taken two directions: (a) several regional groups were established and (b) a number of size classifications were created. Banks were grouped by region to determine whether financial practices, risk factors, and supervisory judgments vary in specific regions across the nation. The particular regional groups selected (see map) were chosen largely on pragmatic grounds. The main constraints were to protect the confidentiality of supervisory data for each Reserve District and to limit the total number of banks under analysis in one sample to a group that could be handled by a computer program. As shown on the map, the nation's member

---

[9] This view does not preclude the possibility that differences in vulnerability may be found through a nationwide study of banks of varying sizes.

[10] See George J. Benston, "Interest Payments on Demand Deposits and Bank Investment Behavior", The Journal of Political Economy (October 1964), pages 431-49, and Albert H. Cox, Jr., Regulation of Interest Rates on Bank Deposits, Michigan Business Studies, Volume XVII, Number 4, (Bureau of Business Research, Graduate School of Business Administration, The University of Michigan, Ann Arbor, Michigan, 1966).

[11] One of the six variables (measuring liquidity) employed in the July 1976 report was dropped because its contribution was found to be insufficient to warrant its continued inclusion. Further, it was found that the use of loss provisions in place of gross charge-offs yielded closely similar results, suggesting that many banks provide for future loan losses on the basis of current loss experience.

main purpose of this investigation, therefore, is to shed light on the question of whether peer-group analysis contributes to accurate and cost-effective early warning measures of bank vulnerability.

We created six nationwide size classifications in terms of the total assets of member banks: zero to $10 million, $10 million to $20 million, $20 million to $50 million, $50 million to $100 million, $100 million to $300 million, and $300 million and over. The classes were chosen so as to have a smooth gradation in size while maintaining in each size class a sufficient number of banks that received low supervisory ratings over the period studied to permit statistical analysis. We chose the largest size class—those banks having $300 million and over in total assets—to correspond to the group of member banks that provide quarterly income reports to the Federal Reserve and the Comptroller of the Currency. These expanded quarterly reports can, in time, be expected to provide useful early warning information.

Estimation of early warning functions

There are two phases in the development of an empirical forecast. The first step is to estimate the relationship in the sample data. Once the estimation is completed and a functional relationship is obtained, that relationship must be tested using separate and distinct data from that employed to estimate the function. No matter how accurately a function may fit past data, the acid test of its usefulness is its ability to provide accurate forecasts for a future period.

The July 1976 report defined and tested a relationship between bank scores developed from key financial ratios for member banks in a given base year versus the incidence of low supervisory ratings among those banks in a subsequent period. Financial ratio data were calculated for member banks in the Second Federal Reserve District. The average value of each of the five financial ratios was computed and the difference of each bank's value from the appropriate average obtained. Measuring the value of each bank's ratio in relation to the group average enables us to determine the extent to which a bank is unusually strong or weak with respect to the five key financial characteristics. The differences from the average for each variable were divided by the standard deviation for the entire group.[13] This step, in effect, weights each bank's deviation from the average to reflect the degree to which bank practices vary in each of the key financial characteristics.

banks are grouped into four regions: Northeast, Midwest, South, and West. These groups were formed from the combination of data for several Federal Reserve Districts. The Northeast region is comprised of the First, Second, Third, and Fourth Districts; the Midwest region the Seventh and Eighth Districts; the South, the Fifth, Sixth, and Eleventh Districts; and the West, the Ninth, Tenth, and Twelfth Districts.[12]

As noted, the prior research did not uncover any significant relationship between bank size and potential strength or weakness. In this report, a fuller investigation of size classification was made possible by the availability of nationwide supervisory data. Moreover, it is a common procedure in the analysis of financial institutions of the same size and character of business to determine whether the particular type of institution under study is performing up to par or meeting standards for its industry or peer group. The

---

[12] An alternative grouping in which all member banks in the nation could be considered together was rejected because it would have been too unwieldy. However, we believe the regional groupings to be a fair indication of how such a nationwide sample would behave.

[13] The standard deviation is a measure of the variability of sample data about the average. The method of computing a standard deviation can be found in most basic statistics textbooks.

Further, these "standardized" deviations about the average can be added together for each bank to form a bank score or index. This procedure captures the combined influence of all the variables and ensures that moderate weakness in several ratios will not be overlooked. In combining the standardized deviations to form the bank score, each deviation from the mean is given an appropriate algebraic sign to indicate whether high or low values of the variables imply vulnerability or strength. For example, larger than average ratios of total loans, expenses, charge-offs, and commercial and industrial loans are indicative of high-risk exposure and, therefore, suggest vulnerability. Similarly, smaller than average values of these ratios are indicative of low-risk exposure and, hence, strength. In the case of the equity capital ratio, for example, above-average values are desirable, since a high ratio indicates a strong capital cushion, whereas a below-average capital ratio indicates a low level of protection. Each of the key variables thus provides an unambiguous indication of strength or weakness, an indication which of course must be tested.

In the current report, the five key financial ratios are combined in a manner equivalent to the procedure used in the July 1976 report, except that rather than bank scores a direct estimate is obtained of the probability that a bank will receive a low supervisory rating under given economic conditions in the future.[14] Moreover, the method used in this report yields separate estimates of the contribution of each of the five key variables to the estimated probability that a particular bank will receive a low supervisory rating.

The actual estimation of the probability function is analogous to a regression analysis in which the observed dependent variable is the occurrence or non-occurrence of a particular event. In this report, the

[14] The data employed are the condition and income reports filed by all member banks from 1975 dating back to 1969, the earliest year for which data are available to us in a consistent and machine-readable form.

Regions Used for Early Warning Research
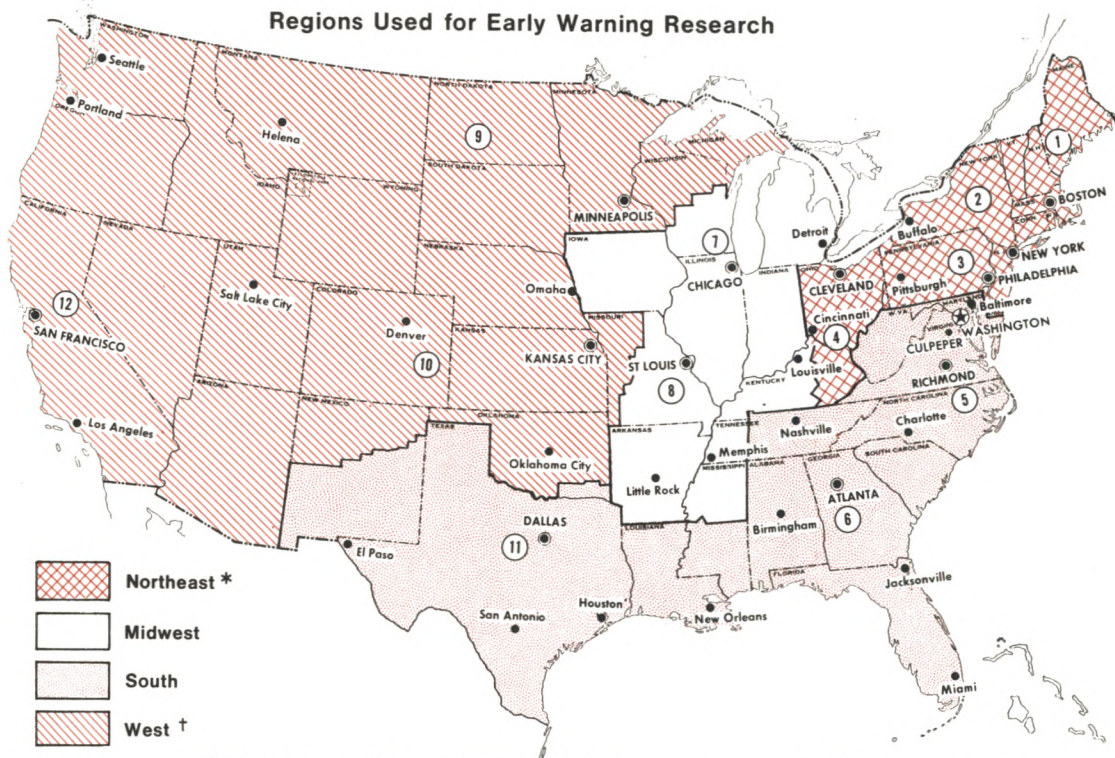
* Includes Puerto Rico and United States Virgin Islands (Second Federal Reserve District).

† Includes Alaska and Hawaii (Twelfth Federal Reserve District).

This map shows the four regions as they appear on the basis of the current boundaries of the twelve Federal Reserve Districts. The boundary between the Eleventh and Twelfth Federal Reserve Districts was altered in January 1977. Thus, the South and West regions used in this study differ very slightly from those shown on the map.

dependent variable is the occurrence or nonoccurrence of a low supervisory rating. The value of one is assigned to those banks that received a low supervisory rating during the relevant estimation period; the value of zero is assigned to those banks that did not receive a low supervisory rating. The independent variables are the five financial ratios. Various earlier tests of the relationship between the bank scores and the incidence of low supervisory ratings suggested a nonlinear function and we have used an equation of the form shown in the accompanying box.

The function we are using reflects our expectation concerning the relationship between the independent variables and the probability of receiving a low rating. As bank vulnerability increases—indicated by the values of the five variables—the probability of financial weakness increases as well, approaching a limit of one. Conversely, as bank vulnerability decreases, the probability of finding weakness approaches zero. The relationship between changes in the variables and changes in the estimated probability of future weakness is relatively complex. Since the function is nonlinear, the exact incremental effect of a change in any one variable on the probability of future weakness depends on the value of all the variables in combination. For example, a change toward strength or weakness in the operating expense ratio will have a large or small effect on the estimated probability of weakness, depending on the extent of the strength or weakness in the other four variables. In general, if a bank is extremely strong or extremely weak in most of the key variables, a change in one variable alone would not contribute greatly to a change in the estimated probability of future weakness.

The coefficients a_0, a_1, a_2, a_3, a_4, a_5 of the function are estimated using a maximum-likelihood technique that assigns high probabilities of weakness to banks that receive low supervisory ratings during the estimation period and low probabilities to those that do not.[15] The "goodness of fit" of the probability estimates can be evaluated by comparing them with (a) the ideal situation in which there is a perfect fit—that is, where each bank that received a low supervisory rating over the estimation period is given a 100 percent probability of receiving a low rating—and (b) the opposite extreme, a situation where high- and low-rated banks are accorded the same probability, indicating that the

---

The Probability Function

$$P = .5 + \frac{1}{\pi} \arctan (a_0 + a_1 LL.TS + a_2 EQ.ARA + a_3 EXP.OP + a_4 GCO.NI + a_5 CI.LN)$$

where

P	= Probability that a bank will receive a low supervisory rating;
LL.TS	= Loans and leases ÷ total sources of funds;
EQ.ARA	= Equity capital ÷ adjusted risk assets;
EXP.OP	= Operating expenses ÷ operating revenues;
GCO.NI	= Gross charge-offs ÷ net income + provision for loan losses;
CI.LN	= Commercial and industrial loans ÷ total loans; and
a_0	= a constant term.

---

five variables have no explanatory power. A statistic known as the likelihood ratio index (LRI) provides a convenient form for this comparison. Similar to the R-square of linear regression analysis, it ranges from zero to one, where values very close to zero show that the probability estimates approach the equal probability assumption and values close to one suggest the case of a perfect prediction.[16] In the results reported here, the estimation procedure was constrained[17] in a manner that parallels the process of generating bank scores, a technique already in use for supervisory

---

[15] In the estimation procedure, the following expression is maximized: $L = \Sigma \log P_i + \Sigma \log (1 - P_i)$
(low-rated banks) (other banks)
This means that the coefficients a_0, a_1, a_2, a_3, a_4, a_5 of the early warning function are chosen so as to maximize the value of L. P_i is the probability of a low supervisory rating.

[16] If $L_{max.}$ is the value of L for the estimated equation, and L_0 the value under the assumption that the five early warning variables have no explanatory power, the LRI is defined as:
$$LRI = (L_0 - L_{max.}) \div L_0.$$
The significance of the LRI can be tested, using the test statistic $-2 (L_{max.} - L_0)$, which under the equal probability (null) hypothesis is distributed as a chi-square with the number of degrees of freedom equal to the number of explanatory variables. High values of the test statistic indicate that the estimated equation is unlikely to have been obtained by chance if "true" probabilities were equal for all the banks.
See D. McFadden, "Conditional Logit Analysis of Qualitative Choice Behavior" in P. Zarembka, ed., *Frontiers of Econometrics* (New York: Academic Press, 1974); pages 105-42.

[17] The coefficients are subject to the following constraints: (a) The appropriate algebraic sign is applied to each coefficient in accordance with its expected contribution to bank vulnerability. (b) The relative importance of each financial ratio in the function is inversely proportional to its respective standard deviation and directly proportional to a coefficient determined by the maximum likelihood estimation. It is possible to fit a nonlinear function without imposing these constraints. In general, the unconstrained functions provide results not greatly different from those of the constrained estimations.

purposes within the Federal Reserve System. It is hoped that the analysis and evidence presented in this report will aid in the further development and refinement of this supervisory use.

Regional early warning functions

The base year of 1969 and the subsequent three years 1970 through 1972 provide a convenient starting point for the estimation of early warning functions. (Since the data cover only 1969-75, the sample periods available for study are limited.) It may be helpful for the reader to consider the general framework in which these early warning functions are estimated before focusing on the specific details of the results. First of all, the total number of member banks that received low supervisory ratings over the 1970-72 estimation period is small in all four regions, ranging from 41 banks or 3 percent of the total number of member banks in the Midwest to 149 member banks or 10 percent in the South (see Table 1). These percentages can be thought of as the overall average probabilities that banks in each of the regions would deteriorate to

the point of receiving a low supervisory rating in an economic environment similar to the one that prevailed over the three years 1970-72.

The job of the early warning function is to estimate more precisely than the overall average the chances for a low supervisory rating for each of the banks in the four regions. The effectiveness of the function is suggested by the probability it accords member banks that received low supervisory ratings over the estimation period versus the probability accorded banks that did not receive low ratings. In the Northeast, Midwest, and South, the low-rated banks have an average estimated probability of weakness about three times that of banks that did not receive low supervisory ratings. In the West the probability accorded low-rated banks is just over twice as large. The function thus provides an information gain that is large in the case of banks that received low supervisory ratings in each region. This gain is especially large in the case of banks that received low supervisory ratings and that are placed by the function in the weakest percentiles. It is these information gains that are responsible for the high statistical significance of the LRI's of the regional functions.

When the banks are arrayed from the lowest to the highest probability of financial deterioration, the weakest percentiles of each region contain a high concentration of those banks that actually received low supervisory ratings over the estimation period. The weakest 20 percent of the banks in each of the four regions contains over 50 percent of all the low-rated member banks observed during 1970-72. The weakest 50 percent contains 82 percent to 95 percent of all these low-rated banks.

The reader may wonder why the function awards a less than 100 percent probability to those banks that, in fact, received low supervisory ratings over the estimation period. The answer is that, while the financial variables employed in this research are indicative of vulnerability, they cannot with perfect accuracy predict whether that vulnerability will in each case be translated into marked financial deterioration. The events under investigation in this report are probabilistic in the sense that intangible management and other factors not captured by the variables can often be the deciding factor in the success of a bank. Thus, it is the difference between the probabilities the function awards strong banks and those the function awards weak banks that is important rather than the levels of the probabilities alone.

Improving supervisory efficiency

The efficiency of bank supervision can be improved by concentrating on banks that are classified as vul-

Table 1

Ability of Regional Early Warning Functions to Identify Low-Rated Banks: 1970-72

Characteristic	Northeast	Midwest	South	West
Total member banks (1969).	1,295	1,406	1,533	1,480
Banks that received low supervisory ratings, 1970-72.	56	41	149	120
Percentage of total	4.3	2.9	9.7	8.1
Average probability of low supervisory rating from function (in percent):				
Banks that received low supervisory ratings	15.7*	8.8*	25.4*	17.6*
Banks that did not receive low supervisory ratings ...	4.5*	3.0*	9.0*	8.1*
Percentage of total low-rated banks placed in weakest percentiles by the function:				
Weakest 10 percent	44.6	46.3	38.3	35.0
Weakest 20 percent	60.7	65.9	56.4	54.2
Weakest 50 percent	85.7	95.1	83.2	81.7
Likelihood ratio index (LRI).	0.097†	0.090†	0.147†	0.106†

* These probabilities are significantly different from those that would be expected if the probability of severe deterioration was uniformly distributed. A chi-square test yielded significant results with confidence of 99.9 percent or better.

† Statistically significant at confidence level of 99.9 percent.

nerable. Member banks considered strong can be subject to on-site examinations at less frequent intervals or may be given a more limited type of examination than banks considered vulnerable. Banks are considered vulnerable or strong in each region on the basis of their position in the bank array. As explained in the July 1976 *Monthly Review,* the computation of the gain in efficiency is based on information concerning the historical distribution of low-rated banks, the size of these banks, and their location in the bank array. Using these data, we can obtain for an estimation period a dividing line between banks that appear strong and those that appear vulnerable.

The procedure employed for this purpose is highly sensitive to classification errors with respect to relatively large banks. The costs of failing to designate as vulnerable relatively large member banks that subsequently receive low supervisory ratings would preclude substantial net savings in the cost of conducting on-site bank examinations. An early warning function yields a large potential gain in efficiency only when a high percentage of banks that receive low supervisory ratings over the estimation period—particularly the largest of those banks—are given relatively high probabilities of weakness by the function.

In each of the bank arrays, there is at some point an optimal cutoff probability separating banks that should have priority in scheduling on-site examinations from banks whose examination can be deferred or reduced in scope. However, this point can be found only after the fact, using a computer program. This program determines the cost of classification errors at every possible cutoff point and selects the highest possible gain in efficiency.[18] The optimal gains are shown in Table 2 and range from 43 percent to 79 percent. Since the optimal cutoff point will never be available at the time a forecast is made, a judgmental rule based on experience is required. One such rule consistent with the findings is to select for a full examination the weakest 50 percent of the array in each region. This might well involve full examinations of more banks than necessary in retrospect. Nonetheless, even using a rough rule of 50 percent, the poten-

Table 2

Characteristics of Regional Early Warning Functions: 1970-72

Characteristic	Northeast	Midwest	South	West
Gain in efficiency (in percent):				
At optimal cutoff	58.3	78.8	42.5	46.8
At 50 percent cutoff* ..	32.6	36.4	28.8	26.2
Function elasticities at 50th percentile:†				
LL.TS	+0.86	+0.55	+0.83	+0.72
EQ.ARA	−0.12	−0.18	−0.33	−0.20
EXP.OP	+1.16	+1.03	+1.26	+1.36
GCO.NI	+0.04	+0.06	+0.10	+0.02
CI.LN	+0.27	+0.14	+0.29	+0.17

* Probability level that divides the array of banks in each region at the 50th percentile.

† A positive elasticity coefficient indicates that an increase in a variable increases the probability of weakness; a negative coefficient indicates that an increase reduces the probability. See box on page 41 for definitions of five early warning variables.

tial gains in efficiency are substantial in the estimation period for each region, ranging from 26 percent to 36 percent. Moreover, this rule can be modified in light of operational experience.

Importance of early warning variables
While all five early warning variables have been found to contribute substantially to the ability to identify banks likely to receive a low supervisory rating, the specific contribution of each is of interest, particularly with respect to banks that are close to a threshold of vulnerability. Where this threshold is located cannot, of course, be determined precisely. Several levels of vulnerability have been studied in this report. One is the 50th percentile of the bank array, which is a working rule to set priorities in the scheduling and format of on-site examinations. Another possible cutoff is the weakest 20th percentile, which should include a higher proportion of banks that subsequently receive low supervisory ratings. The early warning functions are tested for the effect of changes in each of the five variables by obtaining elasticities of each of these variables at the selected thresholds. This measures the percentage change in the probability of weakness resulting from a given percentage change

[18] For details of the cost function, see footnote 3 (Korobow and Stuhr, pages 162-63). In the calculation of these cost savings after the fact, we assumed that the expense incurred in an on-site examination of a bank deemed vulnerable is fully offset by the supervisory benefit of early detection in those cases in which the vulnerable bank does in fact become weak. In those cases in which the vulnerable bank does not deteriorate, the examination costs are charged against any savings that would have resulted from deferring on-site examinations of strong banks that remain strong. Thus, the gain in efficiency is the percentage cost saving exclusive of the costs of examining those vulnerable banks that subsequently deteriorate markedly.

in one of the independent variables. The computation uses the average values of the variables that prevail for a small sample of the member banks that are located in the vicinity of the 50th percentile and a small sample of those close to the weakest 20th percentile of the arrays in each region. Using these average values, we computed elasticity coefficients for each of the five early warning variables when they were changed by 10 percent. The resulting elasticity coefficients at the 50th percentile threshold are shown in Table 2.[19] A positive coefficient indicates that an increase in a variable increases the probability of weakness; a negative coefficient indicates that an increase reduces the probability.

In all four regions the operating expense ratio (EXP.OP) has the highest elasticity, ranging from 1.4 in the West to 1.0 in the Midwest (Table 2). These coefficients mean, for example, that a 10 percent increase in the expense ratio for a bank at the 50th percentile of the array for the West will raise that bank's probability of future weakness by 14 percent; a 5 percent increase will raise the probability by 7 percent, and so forth. The next largest elasticity coefficient is the ratio of loans and leases to total sources of funds (LL.TS), ranging between 0.55 and 0.86 in the four regions. All the other variables have considerably smaller elasticities in every region. Some of these differences in the size of the elasticity may reflect regional variations with respect to business and banking practices, since the elasticities are affected by the variances of the financial ratios.

At the weakest 20th percentile of each of the four regional arrays (not shown in the table), elasticities are generally higher than at the 50th percentile, inasmuch as the function in this range is reflecting the impact of changes that produce marked vulnerability. The expense ratio continues to have the highest elasticity in all regions, ranging in this case from 1.4 to 2.1. The elasticity relating to the ratio of commercial loans to total loans (CI.LN) is raised to 0.70 at the 20th percentile in the South; it is substantially lower in all other regions. In contrast, the elasticity of the equity capital ratio (EQ.ARA) does not change markedly by region at the 20th percentile. Indeed, there is a remarkable degree of consistency among all regions in the relatively high importance of the expense ratio and the three portfolio risk variables in determining the probability of weakness.[20]

Forecasting low-rated banks by region

It is not sufficient to estimate a relationship from past data; the estimated relationship must be tested. To evaluate the accuracy of the early warning function obtained for each region, each of the functions is applied to the financial ratios of member banks for a year subsequent to the one used in the estimation period. The computer program we employ to rank the banks in each region in order, from lowest to highest probability of weakness, provides a numerical estimate of each bank's probability of deterioration over the forecast period—given an assumption as to economic conditions in that period. We expect a high concentration of the low-rated banks in each region to appear in the high vulnerability range of the array. Further, using the function probabilities, we can forecast the number of low-rated banks.[21]

The period 1973-75 provides an opportunity to test whether the financial data filed by member banks in earlier years indicates which banks whose supervisory ratings were satisfactory at the time of the forecast would subsequently deteriorate. During those three years, a total of 525 member banks received low supervisory ratings at one time or another. The vast majority of these low-rated banks (three quarters or more in each region) did not have low supervisory ratings in 1972, which is the base year of the three-year forecast.

In the Northeast region, 117 member banks received low supervisory ratings in 1973-75 (Table 3). Looking first at the ability of the early warning function to array the banks in order of vulnerability, the function places 38 percent of all the banks that received low supervisory ratings in the weakest 10 percent of the array, 62 percent in the weakest 20 percent, and 86 percent in the weakest half.[22] The forecast performance of the early warning functions for the other three regions—Midwest, South, and West—is quite similar. In these three regions, too, high percentages of the banks that actually received low supervisory ratings in the forecast period are in the weakest 10, 20, and 50 percent of the bank rankings.

The average probabilities of future weakness accorded by the functions to banks that actually re-

---

[19] These data are provided to illustrate the relative importance of the early warning variables. The reader does not have sufficient information in this report to compute probabilities for specific banks.

[20] Interested readers can obtain this data from the authors.

[21] This figure is obtained by adding the probabilities assigned to each bank through the particular percentile range which is of interest. The probability estimates can be recomputed as new data become available, thus providing an ongoing measure of a bank's condition.

[22] These percentages are not shown in Table 3, but can be easily obtained by dividing the *actual* number of low-rated banks the function placed in each percentile in the region by the total number of low-rated banks *actually observed* in that region during the forecast period. See also Table 8.

ceived low supervisory ratings in each of the four regions are relatively high—about 15 percent to 21 percent. This compares with 4 percent to 10 percent for member banks that did not receive low supervisory ratings.

With respect to the use of the array to set priorities for on-site examinations, the dividing line between vulnerable and strong banks is set on the basis of the probability accorded the bank at the 50th percentile for the estimation period. The vulnerable group determined in this manner would receive priority in the scheduling of on-site examinations. Since the median probability of marked weakness is higher in the forecast period than in the estimation period, the size of the vulnerable group is larger (see Table 3) than 50 percent of the total number of banks. Nonetheless, this cutoff point yields gains in efficiency of about 20 percent to 27 percent in the four regions.

Out of the 117 member banks that received low supervisory ratings in the Northeast during 1973-75, 107 banks (not in table) are included in the vulnerable group, while 10 of these member banks are classified as strong. The average size by assets of the low-rated banks that are classified as vulnerable is $1.2 billion; the average size of the low-rated banks classified as strong is $28.8 million. In the Midwest, 58 member banks having average assets of $497 million are classified as vulnerable and received low supervisory ratings; three banks having average assets of $5.2 million are classified strong, but also received low ratings. In the South, 158 member banks averaging $137 million in total assets are correctly classified as vulnerable, whereas 31 banks having average assets of $27 million are incorrectly classified as strong. In the West, 135 member banks having average assets of $336 million are correctly classified as vulnerable, while 23 banks averaging $9 million in assets are incorrectly classified as strong. These results reflect the high importance which the formula that computes efficiency places on the classification of relatively large member banks in accord with supervisory ratings.

The regional functions in general come reasonably close to predicting correctly the number of low-rated banks in various selected percentiles of the bank ranking. In the weakest 20 percent of the arrays in the Northeast, South, and West, the function predicts 83 percent to 98 percent of the total number of member banks that actually received low supervisory ratings. In the Midwest, the comparable figure is 65 percent. The function predicts 76 percent to 82 percent of the total number of low-rated member banks that were observed in the poorest half of the arrays in each region. The functions generally tended to underpredict the total number of low-rated banks that were actually

observed during the forecast period, which is not surprising in view of the relatively high incidence of banks that received low supervisory ratings in 1973-75, compared with the incidence in the estimation period of 1970-72.

While a three-year period has proved to be a useful time interval in which to study the relationship between the probability of future weakness and the in-

Table 3
Regional Early Warning Forecast: 1973-75*

Characteristic	Northeast	Midwest	South	West
Total number of low-rated member banks:				
Predicted	96	57	169	144
Actual	117	61	189	158
Actual as percentage of total banks	9.3	4.5	12.4	11.0
Number of low-rated banks placed in weakest percentiles by the function:				
Weakest 10 percent:				
Predicted	51	24	63	50
Actual	45	27	58	50
Weakest 20 percent:				
Predicted	60	30	84	68
Actual	72	46	86	80
Weakest 50 percent:				
Predicted	77	42	126	104
Actual	101	54	153	129
Average probability of a low supervisory rating from function (in percent):				
Banks that received low supervisory ratings	19.7†	14.9†	21.0†	19.2†
Banks that did not receive low supervisory ratings	6.4†	3.7†	9.7†	8.9†
Gain in efficiency (in percent)‡	24.2	26.8	19.7	21.8
Size of vulnerable group (as percentage of total member banks in the region)	60.3	61.9	54.2	57.5

* Sample period: 1970-72.

† Difference from expected probability of a uniform distribution significant at better than 99.9 percent confidence.

‡ Calculated at median probability of the sample period.

Table 4

Regional Early Warning Forecasts: 1974-75

Sample period: 1970-71	Northeast	Midwest	South	West
Total number of low-rated member banks:				
Predicted	93	52	147	108
Actual	110	59	180	140
Number of low-rated banks placed in weakest percentiles by the function:				
Weakest 10 percent:				
Predicted	57	23	63	38
Actual	53	34	56	54
Weakest 20 percent:				
Predicted	65	27	81	51
Actual	75	43	91	77
Weakest 50 percent:				
Predicted	78	39	114	78
Actual	101	55	148	115

Sample period: 1972-73	Northeast	Midwest	South	West
Total number of low-rated member banks:				
Predicted	64	33	103	99
Actual	110	59	180	140
Number of low-rated banks placed in weakest percentiles by the function:				
Weakest 10 percent:				
Predicted	29	14	37	37
Actual	55	34	55	53
Weakest 20 percent:				
Predicted	35	17	50	48
Actual	77	43	91	77
Weakest 50 percent:				
Predicted	49	24	75	72
Actual	102	55	150	115

cidence of low supervisory ratings among member banks, we felt that a two-year period might be a more practical planning horizon from an operational point of view. We therefore selected as a forecast period the two years 1974-75—years in which economic conditions were especially strained.

Forecasts for these years are made using the experience of two alternative historical periods: 1970-71 and 1972-73. (The base year for computation of the five financial ratios is 1969 for the former period and 1971 for the latter.) These two estimation periods differ in an important respect. The 1970-71 period appears to represent a fairly typical one with respect to the incidence of low supervisory ratings among member banks. In contrast, the years 1972-73 were heavily influenced by inflationary factors that may have sustained some weak borrowers and thus delayed the emergence of many problem loans that subsequently resulted in low supervisory ratings for a number of member banks. Thus, the incidence of low supervisory ratings among member banks in 1972-73 was less than might have been expected from the study of financial and supervisory data of other periods.

Comparison of the forecasts yielded by the two estimation periods indicates important similarities as well as differences. In each of the four regions, the two early warning functions ranked the member banks quite similarly (Table 4). In each of the two forecasts, the banks that received low supervisory ratings in 1974-75 are concentrated in the weakest percentiles. About 31 percent to 58 percent of all member banks that actually received low supervisory ratings are in the weakest 10 percent of the bank rankings in each region, 51 percent to 73 percent are in the weakest 20 percent, and 82 percent to 93 percent are in the weakest half of the arrays.[23]

The early warning functions developed from the experience of 1972-73 tended to underpredict the *number* of member banks that would receive low supervisory ratings more substantially than the functions based on the experience of 1970-71. The two forecasts for the West, however, are similar, suggesting that the incidence of problem banks in this region did not change during these alternative estimation periods.

It seems clear from the results that, whatever the eventual number of problem banks may be in a region, a large percentage of these banks is likely to fall in the weakest 10-20 percent of the bank ranking. However, forecasting the exact number of problem banks requires an accurate appraisal of the possible economic

[23] These percentages can be obtained from Table 4 by the same procedure explained in footnote 22. See also Table 8.

environment during the forecast period and the selection of a comparable historical period over which to develop appropriate probability relationships.

Early warning in selected size classes

In general, the early warning functions estimated for size classes of member banks based on data for 1970-72 yielded probability figures not greatly different from those obtained from the regional functions estimated over the same period. As before, banks that received low supervisory ratings during those years were given substantially higher probabilities of weakness than banks that did not receive low ratings (see Table 5). Moreover, the banks that received low supervisory ratings tend to be concentrated in the weakest percentiles of the ranking in each size class. It is notable, however, that the function estimated for member banks having assets of $300 million or more in total assets did a relatively poor job in placing low-rated banks in the weakest 10 percent and 20 percent of the respective bank rankings.

The overall performance of these early warning functions is suggested by the LRIs shown in Table 5. They all indicate a statistically significant information gain over the average probability of marked deterioration in each size class, and they generally exceed the LRIs for each regional functions estimated for the same period. There is a very sharp increase in the LRI of the function estimated for the size class of $50-100 million and then a tapering-down of the index for functions estimated for banks in the $100-300 million and larger size classes. These changes, however, may not be significant because of the relatively small number of low-rated banks in the larger size classes.

As shown in Table 6, all of the functions estimated show high gains in efficiency in retrospect and the gains remained substantial even if a pragmatic decision rule is used—that is, when the vulnerable group is defined as the weakest 50 percent of the banks. The gains in efficiency generally are above those indicated by the early warning functions estimated by region for the same period. It thus seems that, at least in the estimation process, the early warning functions obtained when member banks are grouped by size class have a somewhat improved ability to distinguish high-risk banks in most size classes up to $300 million.

As noted earlier, each of the function coefficients

Table 5

**Ability of Nationwide Early Warning Functions
Based on Size Classes to Identify Low-Rated Banks: 1970-72**

Characteristic	Asset size class of member banks (in millions of dollars)					
	0-10	10-20	20-50	50-100	100-300	300 or more
Total member banks (1969)	2,409	1,385	1,096	358	290	176
Banks that received low supervisory ratings, 1970-72	173	90	60	16	18	10
Percentage of total	7.2	6.5	5.5	4.5	6.2	5.7
Average probability of receiving a low supervisory rating from function (in percent):						
Banks that received low supervisory ratings	19.0*	18.0*	19.6*	35.1*	27.4*	18.6*
Banks that did not receive low supervisory ratings	7.2*	6.5*	5.6*	4.1*	5.7*	4.8*
Percentage of total low-rated banks placed in weakest percentiles by the function:						
Weakest 10 percent	40.5	46.7	51.7	68.8	50.0	20.0
Weakest 20 percent	61.3	66.7	60.0	81.3	66.7	30.0
Weakest 50 percent	88.4	86.7	88.3	100.0	94.4	90.0
Likelihood ratio index (LRI)	0.120†	0.123†	0.127†	0.278†	0.196†	0.132†

* Difference from expected probability of a uniform distribution significant at 99 percent confidence.

† Statistically significant at confidence level of 99.9 percent.

Table 6

Characteristics of Nationwide Early Warning Functions Based on Size Classes: 1970-72

| Characteristic | Asset size class of member banks (in millions of dollars) | | | | | |
	0-10	10-20	20-50	50-100	100-300	300 or more
Gain in efficiency (in percent):						
At optimal cutoff	55.6	60.7	66.0	81.5	65.8	45.9
At 50 percent cutoff*	43.0	43.3	45.9	52.3	49.5	38.1
Function elasticities at 50th percentile:†						
LL.TS	+0.60	+0.77	+0.86	+1.12	+1.45	+1.92
EQ.ARA	−0.18	−0.20	−0.43	−0.52	−0.48	−0.63
EXP.OP	+0.90	+1.38	+1.68	+1.92	+2.23	+2.36
GCO.NI	+0.04	+0.06	+0.11	+0.13	+0.08	+0.18
CI.LN	+0.24	+0.22	+0.20	+0.15	+0.39	+0.58

* Probability level that divides the array of banks in each size class at the 50th percentile.
† A positive elasticity coefficient indicates that an increase in a variable increases the probability of weakness; a negative coefficient indicates that an increase reduces the probability. See box on page 41 for definitions of five early warning variables.

affect the estimated probability of weakness in a complex way. Nonetheless, there are noticeable differences with respect to the impact of the five variables on the probability of future weakness, as illustrated in Table 6. The table shows the elasticities of the five early warning variables at the 50th percentile for each of the six functions estimated on the basis of size classes. The reader will observe that all the elasticities increase markedly with bank size.[24] At the same time, the average probability of weakness estimated by the functions at the 50th percentile (not in table) tends to diminish with bank size. For example, the average probability of weakness at the 50th percentile for the 1970-72 estimation period is 5.7 percent for banks in the $0-10 million size class, 3.1 percent for banks in the $50-100 million size class, and 3.8 percent for banks in the $300 million and over size class. At the 20th percentile, the probabilities decline for banks of up to $100 million in size and then increase somewhat for larger banks. A possible explanation for this result is that the functions are capturing some of the pro-

[24] These changes in part reflect the tendency for the variances of each financial ratio to decline with larger size classifications of member banks. The decline in variances suggest that large banks have more in common with respect to their risk exposure and financial management than the substantial number of small banks that serve local markets all across the nation. To determine whether this effect was influenced by the constraints imposed on the variables, the same functions were estimated using an unconstrained regression equation. Much the same effects were observed.

tective effects inherent in an expanded scale of bank operations. This is the first evidence we have turned up in this project that suggests increased bank size alone has a positive effect on bank soundness. However, for the years 1970-72, the protective effect of bank size appears to reach a plateau quickly and does not show any additional effect for banks above $100 million of total assets.

Looking at the elasticities of each of the five early warning variables at the 50th percentile, the expense ratio (EXP.OP), as in the regional functions, has the largest impact on the probability of weakness in all size classes, followed closely by the ratio of LL.TS. The variables EQ.ARA, CI.LN, and GCO.NI have a substantially lower impact. Further, the relative order of the importance (as measured by elasticity) of the variables in the functions estimated for the selected size classes is similar to that found for the regional functions.

The computation of elasticities at the weakest 20th percentile produced substantially higher elasticities in each class.[25] At the 20th percentile, the order of importance (by size of elasticity) of the equity capital ratio diminishes in the two largest size classes and in almost all other size classes as compared with the elasticities at the 50th percentile. Thus, for this sample, at least, expense and risk factors rather than the

[25] Data not shown but can be obtained from the authors.

Table 7

Nationwide Early Warning Forecast Based on Size Classes: 1973-75

Characteristic	0-10	10-20	20-50	50-100	100-300	300 or more
			Asset size class of member banks (in millions of dollars)			
Total member banks (1972)	1,656	1,514	1,308	512	335	240
Total number of low-rated member banks:						
Predicted	153	120	107	37	30	28
Actual	142	116	124	38	40	65
Actual as percentage of total banks	8.6	7.7	9.5	7.4	11.9	27.1
Number of low-rated banks placed in weakest percentiles by the function:						
Weakest 10 percent:						
Predicted	62	44	51	21	16	17
Actual	52	32	53	15	10	13
Weakest 20 percent:						
Predicted	79	57	62	24	20	20
Actual	80	65	73	23	14	26
Weakest 50 percent:						
Predicted	114	86	83	30	25	25
Actual	124	96	106	32	27	54
Average probability of a low rating from function (in percent):						
Banks that received low supervisory ratings	21.8*	16.9*	21.6*	24.2*	21.9*	18.1*
Banks that did not receive low supervisory ratings	8.1*	7.2*	6.8*	5.8*	7.2*	9.5*
Gain in efficiency (in percent)†	12.5	36.2	33.5	40.2	15.4	33.5
Size of vulnerable group (as percentage of total member banks in the size class)	84.5	54.0	57.1	58.2	60.9	71.3

* Difference from expected probability of a uniform distribution significant at 99.9 percent confidence level.

† Calculated at the median probability of the sample period 1970-72.

Table 8

Ability of Early Warning Forecasts to Identify Low-Rated Banks
Regional versus Nationwide Functions

Characteristic	North-east	Mid-west	South	West	Asset size class (in millions of dollars)					
					0-10	10-20	20-50	50-100	100-300	300 or more
Percentage of all low-rated banks placed in weakest percentiles by the function, 1973-75:*										
Weakest 10 percent	38.5	44.3	30.7	31.6	36.6	27.6	42.7	39.5	25.0	20.0
Weakest 20 percent	61.5	75.4	45.5	50.6	56.3	56.0	58.9	60.5	35.0	40.0
Weakest 50 percent	86.3	88.5	81.0	81.6	87.3	82.8	85.5	84.2	67.5	83.1
Percentage of all low-rated banks placed in weakest percentiles by the function, 1974-75:†										
Weakest 10 percent	48.2	57.6	31.1	38.6	41.9	41.7	40.3	35.7	31.4	23.9
Weakest 20 percent	68.2	72.9	50.6	55.0	64.5	61.7	59.7	51.8	40.0	42.3
Weakest 50 percent	91.8	93.2	82.2	82.1	84.9	90.4	83.2	83.9	71.4	85.9

* Sample period 1970-72.

† Sample period 1970-71.

protective effects of equity capital became increasingly important as vulnerability increased.

The functions for each of the six size classes *forecast* the actual number of low-rated member banks with a degree of accuracy that is comparable to the regional forecasts, except the forecast for the largest of the size classes (see Table 7). The function's forecast of the number of low-rated member banks for the largest size class tends to overpredict the number of these banks in the weakest 10 percent of the array but sharply underpredicts in the weakest 20 percent. And in the weakest 50 percent, it predicts less than half the actual number of low-rated banks that were observed over the forecast period. This is the least accurate forecast obtained from all the functions.

The probabilities that the functions for each of the size classes accord low-rated banks in the forecast period are relatively high. They range from nearly 17 percent to 24 percent, compared with about 6 percent to 10 percent for banks that remained strong. Again, these differences are highly significant.

The size group functions all yield respectable gains in efficiency. For all size classes except the two largest, the functions arrayed the banks so that banks receiving low supervisory ratings during 1973-75 are highly concentrated in the weakest percentiles.

Concluding remarks

The relative performance of regional and size group early warning functions in arraying banks can be readily seen in Table 8. The table shows the ranking of low-rated member banks in three- and two-year forecast periods separately by region and by size class. The results are similar regardless of forecast period and grouping, although the two largest size groups are somewhat of an exception. The forecasts obtained for banks having total assets of $100 million or more tend to yield rankings that are substantially less efficient in isolating low-rated banks in the weakest 10 percent and in the weakest 20 percent of the array than all the other estimated functions.[26]

The foregoing results suggest that the incidence of marked weakness among relatively large banks was unique in 1974-75. The earlier historical experience therefore was not fully adequate to establish a relationship between early warning variables and the probability of weakness during a period of unusually severe economic strain for this group of banks.

The promising results achieved thus far point toward wide possibilties for further investigation. The number of key financial characteristics of strength or vulnerability undoubtedly can be expanded as more comprehensive banking data become available, and this should lead to improved accuracy of early warning functions. We expect, too, that the methodology described here can be applied to screen banks for vulnerability in certain important aspects of banking. These include United States banking abroad, the activities of bank holding companies, and bank internal audit and control capacity. Progress toward early warning capabilities through statistical methods in these fields would be a valuable aid to bank supervision.

---

[26] Space limitations prevented the inclusion of estimation and forecast results employing other regions, size classes, and estimation and forecast periods than those presented here. The authors will attempt to provide additional tabulations to interested readers on request.

Leon Korobow, David P. Stuhr, and Daniel Martin

Treasury and Federal Reserve Foreign Exchange Operations

During the six-month period under review, the exchange markets were faced with a shifting configuration of payments balances at a time when the United States economy was expanding much more rapidly than those of other major industrial countries.

Several countries that had been in serious current account deficit were making clear progress, mainly through stabilization programs, in reducing domestic inflation and restoring international balance. Growing evidence of improvement helped bolster market confidence in their currencies—particularly the pound sterling, the Italian lira, and the French franc—stimulating reversals of earlier capital outflows and previously adverse leads and lags. With these currencies now in demand, the respective central banks took the opportunity to buy dollars in the market and to rebuild their international reserves. The stabilization measures in these countries remained in force into the summer, and domestic growth slowed significantly.

Major countries that had been in current account surplus made little progress, however, toward their stated objective of reducing those surpluses. In particular, Japan's already massive current account surplus widened even further in early 1977 and set the stage for a sharp rise in the yen in the exchanges. Germany's current account surplus, while narrowing

A report by Alan R. Holmes and Scott E. Pardee.
Mr. Holmes is the Executive Vice President in charge of the Foreign Function of the Federal Reserve Bank of New York and Manager, System Open Market Account. Mr. Pardee is Vice President in the Foreign Function and Deputy Manager for Foreign Operations of the System Open Market Account. The Bank acts as agent for both the Treasury and the Federal Reserve System in the conduct of foreign exchange operations.

somewhat, remained large. But, since it was roughly offset by capital outflows, the mark, which had already appreciated by 9 percent since last summer, traded in a narrow range against the dollar through late spring. In general, the authorities of surplus countries faced sluggish demand at home and, although they sought to promote more rapid expansion, they were reluctant to press too hard for fear of refueling inflation.

Meanwhile, the United States economy had moved into high gear in the early months of 1977. Our demand for foreign goods thus rose sharply at a time when foreign demand for American goods was growing only slightly. Consequently, our trade and current account deficits which emerged last year deepened further. Inflationary pressures also picked up in the United States, although this partly reflected temporary factors like the cold weather last winter. Even so, market sentiment toward the dollar remained generally positive. Dealers responded to a continuing flow of favorable news about the underlying expansion of the American economy. In addition, the market came to expect that short-term United States interest rates would be firming while rates elsewhere were flat or easing.

By the spring, however, the magnitude of the United States trade deficit, which reached $30 billion at an annual rate in the first half of 1977, was becoming a matter of broader concern. In part, the deficit reflected the increasing dependence of this country on foreign sources of oil, and the Administration's energy proposals making their way through the Congress were partly designed to slow the growth of oil imports over the longer term. But the deficit also reflected special

Chart 1
Selected Exchange Rates*
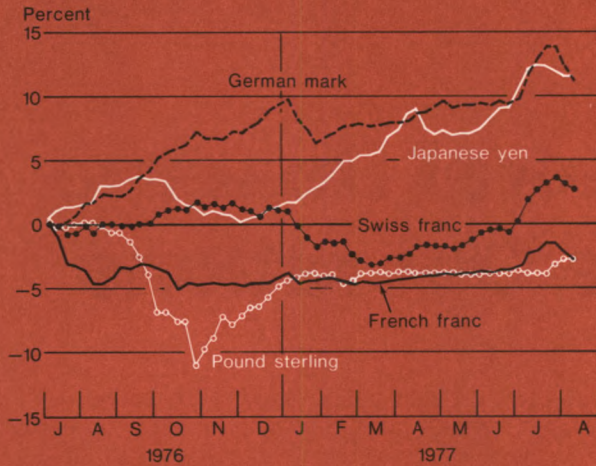
*Percentage deviations of weekly averages of New York noon offered rates from the average rate for the week of July 5-9, 1976.

Table 1
Federal Reserve Reciprocal Currency Arrangements
In millions of dollars

Institution	Amount of facility July 31, 1977
Austrian National Bank	$ 250
National Bank of Belgium	1,000
Bank of Canada	2,000
National Bank of Denmark	250
Bank of England	3,000
Bank of France	2,000
German Federal Bank	2,000
Bank of Italy	3,000
Bank of Japan	2,000
Bank of Mexico	360
Netherlands Bank	500
Bank of Norway	250
Bank of Sweden	300
Swiss National Bank	1,400
Bank for International Settlements:	
Swiss francs-dollars	600
Other authorized European currencies-dollars	1,250
Total	$20,160

circumstances in other goods markets. In the context of a growing tendency toward trade restrictions abroad, the size of the deficit contributed to protectionist sentiment in many United States industries and labor unions. The Administration resisted this approach to curbing the deficit. At the same time, it began to urge countries with large current account surpluses to contribute more to the international adjustment process. In this effort, the Administration put forward a broad range of possible approaches the others could take, including more rapid expansion of their economies, the opening-up of their domestic markets to foreign competition, and the elimination of controls or administrative practices which might distort currency relationships. In these discussions, it was stressed that exchange rate appreciation for the currencies of countries in current account surplus would contribute to international equilibrium. In the context of these discussions, the yen, in particular, staged its advance in the spring.

The markets for European currencies also responded nervously to comments on exchange policy by European or American officials. But these tensions largely subsided following the London economic summit in early May, since exchange rates were not mentioned in the communiqué. In late June, however, senior government officials meeting at the Organization for Economic Cooperation and Development (OECD) stated their agreement that countries with current account surpluses should allow their currencies to ap-

preciate. In subsequent interviews with the press, government officials in various countries were pressed on their interpretation of this agreement and on their views of the appropriateness of the current constellation of exchange rates. The responses of the United States authorities were framed in the context of the broad policy objective to achieve further payments adjustment but, as their remarks were reported, the impression developed among dealers that a concerted effort was under way to lead the market.

By early July, the dollar was coming heavily on offer not only against the currencies of countries in surplus but against nearly all major currencies. As before, the central banks of the United Kingdom, Italy, and France mopped up dollars offered against their currencies, thereby limiting the rise in their exchange rates. Other currencies were bid up sharply, however, and to counter disorderly conditions several central banks, including those of Japan, Germany, and Switzerland, also bought dollars. The Federal Reserve intervened on several occasions in the New York market. After late June, the yen advanced by 3½ percent before leveling off. In Europe, the mark and the currencies linked to it rose by 3-5 percent through late July.

In the highly speculative atmosphere which developed, United States Treasury officials at first sought to avoid further comment on exchange rates but as market participants continued to respond to what had already been said, or was thought to have been said,

it became necessary to dispel the impression that the authorities had been deliberately talking the dollar down. The effort to clear the air began in late July, when Federal Reserve Chairman Burns and Treasury Secretary Blumenthal in several statements stressed their belief in the importance of a strong dollar for the United States and the world generally. These statements sparked a turnaround in market psychology. Moreover, interest rates in the United States began to firm, and by the end of July dollar rates were being bid up from their latest lows against several major currencies.

In market intervention during the February-July period, the Federal Reserve sold a total of $209.1 million of German marks, of which $173.7 million was financed from balances and $35.4 million from swap drawings on the Bundesbank, which were outstanding as of July 31. Total Federal Reserve purchases of marks from correspondents and in the market for balances amounted to $142.2 million equivalent. The System also sold $3.3 million of Dutch guilders out of balances and purchased $8.5 million equivalent from correspondents.

In addition, during the period the Federal Reserve repaid a further $287.1 million equivalent of special swap indebtedness in Swiss francs and the United States Treasury redeemed $171.7 million equivalent of franc-denominated securities. By July 31, the Federal Reserve's special swap debt to the Swiss National Bank had been reduced to $705.4 million equivalent, while the Treasury's Swiss franc-denominated obligations had been lowered to $1,341.5 million equivalent.

Chart 2

Selected Interest Rates
Three-month maturities *

*Weekly averages of daily rates.

As reported in June, from last year's operations, the Bank of Mexico repaid in February a $150 million swap drawing on the Federal Reserve and prepaid in April $150 million drawn under the Exchange Stabilization Agreement with the Treasury.

Finally, in February, the United States Treasury established short-term credit facilities for Portugal totaling $300 million. The Bank of Portugal subsequently drew the full amount of these facilities and repaid $85 million by August 1.

German mark
Early in 1977, prospects for continued expansion of Germany's economy were uncertain. The worldwide lull in demand for capital goods, the deflationary measures taken in several of Germany's principal European markets, and the appreciation of the mark during 1976 had clouded the outlook for a further strong expansion in exports. At home, investment demand remained soft and unemployment remained worrisomely high. Even so, a new round of wage negotiations had paved the way for pay increases above the government's target, and the authorities were reluctant to provide additional economic stimulus lest it be viewed as inflationary.

Meanwhile, with the relaxation of last year's tensions in the exchange markets, a flow of capital out of Germany was well under way, keeping the mark near the bottom of the European Community (EC) snake following the October 1976 realignment and on offer against many other currencies. The market nevertheless remained acutely sensitive to changing interest-rate relationships—especially between Germany and the United States in view of the broader importance of the mark-dollar relationship in the international monetary system. During February, signs of congestion in the German capital market, generating expectations of a rise in German interest rates, coincided with concerns over the economic implications of the harsh winter in the United States. Thus, the mark came into demand and rose from $0.4157 on February 1 to as high as $0.4190 by the month end. To cushion the mark's advance, the Bundesbank bought modest amounts of dollars in Frankfurt, while the Federal Reserve intervened on three days when trading became unsettled in New York, selling a total of $20.9 million equivalent of marks from balances.

In early March, expectations of a further rise in German interest rates receded, after the Bundesbank announced an increase in its commercial bank rediscount quotas. But concern over an unexpectedly sharp rise in the United States trade deficit, compared with Germany's continuing trade surplus, kept dealers cautious. The mark settled around end-February levels
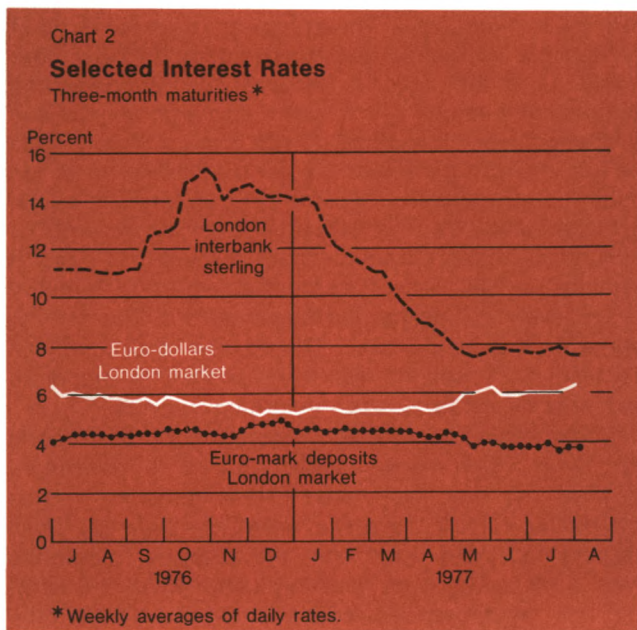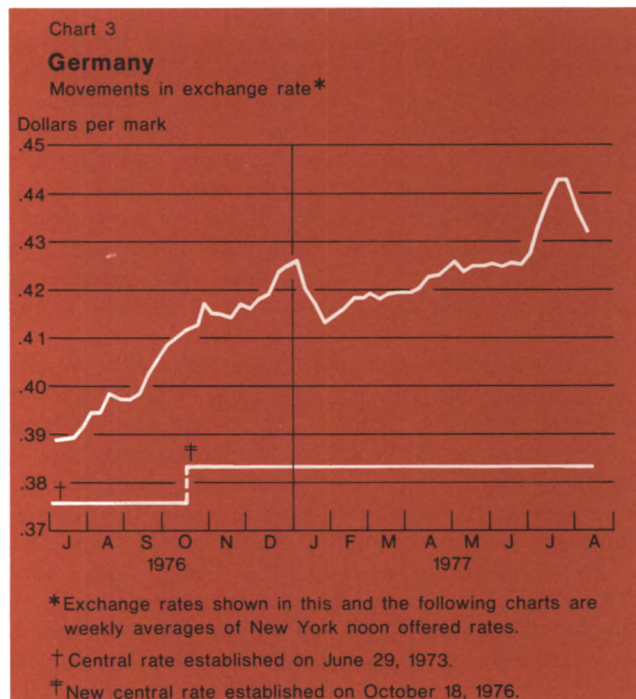
against the dollar and remained near the lower limit of the EC band through end-March. Then, on Friday, April 1, when incomplete reports of an EC snake re-alignment reached the New York market after the Euro-pean close but ahead of the official announcement, trading became confused. The mark was abruptly bid up to as high as $0.4204. The Federal Reserve entered the market with moderate offers of marks, selling $15.3 million equivalent from balances.

While the immediate nervousness surrounding the snake realignment soon passed, the market had been reawakened to the possibility of further exchange-rate adjustments within Europe and elsewhere. In addition, rumors began to circulate in the market that the ques-tion of exchange rates, particularly relating to the mark and the yen, would be pursued at the economic summit meeting in London on May 7-8. With the yen having already advanced in recent weeks, the late-April an-nouncements of a sharp widening of the United States trade deficit in March and an increased German trade surplus for that month reinforced expectations of a near-term rise in the mark rate as well.

Consequently, demand for marks against sales of dollars gathered momentum in late April and car-ried over into early May. Moreover, strong bidding for Dutch guilders at the top of the EC snake exerted an upward pull on the mark. As the Bundesbank and the Netherlands Bank provided substantial support for the mark at its lower intervention limit against the guilder, the spot rate advanced to as high as $0.4266 in Frank-furt on May 5 just ahead of the summit. To counter disorderly conditions in New York, the Federal Reserve intervened on four trading days over April 15-May 4. In all, the System sold $34.8 million equivalent of marks. Since the mark was at the bottom of the EC snake at the time, and the guilder at the top, the Fed-eral Reserve supplemented its operations in marks with offers of guilders, selling $3.3 million equivalent of that currency.

The broad scope of the joint communiqué issued from the London summit meeting, containing no refer-ence to exchange rates, relaxed previous market con-cerns. Consequently, although Germany's trade surplus remained strong reflecting continued strength in Ger-man exports and a slowing of imports, the market's attention shifted back to an assessment of the relative economic performance and interest rate outlook for Germany and the United States. German short-term rates remained soft after the Bundesbank reduced commercial bank reserve requirements and raised re-discount quotas effective June 1 to help tide the money market over a period of anticipated seasonal tightness. By comparison, United States interest rates had firmed following Federal Reserve actions to counter a sharp

Chart 3
Germany
Movements in exchange rate*

Dollars per mark

*Exchange rates shown in this and the following charts are weekly averages of New York noon offered rates.
† Central rate established on June 29, 1973.
‡ New central rate established on October 18, 1976.

rise in the United States monetary aggregates in April.

Thus, the market generally came into better balance during May and June. On May 12, however, the wire services highlighted one aspect of a speech by Inter-national Monetary Fund (IMF) Managing Director Witteveen stating that countries in a strong balance-of-payments position will have to permit their cur-rencies to appreciate. These reports triggered a burst of demand for marks which unsettled the New York market and the Federal Reserve intervened, selling $33.5 million equivalent of marks. Again on May 26, the announcement of another sizable United States trade deficit for April generated an abrupt bidding-up of the mark, and the Federal Reserve sold $6.4 million equiv-alent to steady trading. But, apart from these two brief episodes, the mark traded quietly through mid-June at around $0.4240, some 2 percent above early-February levels, without intervention by either the Federal Re-serve or the Bundesbank. During May and June, the Trading Desk bought from correspondents moderate amounts of marks to add to working balances.

In the weeks that followed, a number of press reports appeared which many market participants interpreted as implying that the United States government was attempting to talk the dollar down. On June 24, when trading had thinned out after the European close, the New York market was suddenly upset when the inter-national news services reported, from the OECD min-

isterial meeting in Paris, that member countries with strong external positions were ready to see a weakening of their current account positions and an appreciation of their currencies in response to underlying market forces. This statement was viewed by the market as going beyond the results of the May summit and sparked an immediate rise in the mark as well as the yen. The demand gathered force once market professionals were free of their quarter-end positioning requirements, and by early July each successive advance of the yen in Tokyo was matched by a strong bidding-up of the mark rate in Europe as traders built up long positions in the German currency. By July 7, the mark had advanced over 2¼ percent to $0.4340, with the Bundesbank returning to the market for the first time since March to buy dollars.

Following these operations and reports of forceful intervention by the Bank of Japan in Tokyo, the mark temporarily eased back. But market participants were soon caught up again in a crossfire of statements over the news services and editorial comment on the worsening of the United States trade deficit, the decline of the dollar, and the Administration's attitudes toward these developments. As this process was unfolding dealers saw little immediate downside risk for the mark rate, with the result that demand for marks progressively intensified. In this speculative atmosphere, the market largely ignored the Bundesbank's announcement on July 14 that it was reducing its Lombard rate by ½ percentage point to 4 percent and that it would be prepared to continue purchasing trade bills on a repurchase basis at a rate of 3¾ percent. Instead, as generalized selling of dollars persisted, the mark was bid up to a four-year high of $0.4455 by July 26 in trading that became increasingly disorderly. In response, the Bundesbank gradually stepped up its intervention, with significant dollar purchases at the daily fixings in Frankfurt. For its part, the Federal Reserve intervened in New York on nine trading days between July 8 and July 26, selling $94.7

million equivalent of marks. The System financed these sales from existing balances and from $35.4 million equivalent of drawings under the swap line with the Bundesbank.

Under these circumstances, senior United States financial officials sought to clarify United States exchange rate policy. On July 26, in answer to questions before the House Banking Committee, Chairman Burns stressed the need "to protect the integrity of our money" and observed that "depreciation of the dollar means higher prices domestically" while having "serious international repercussions". Secretary Blumenthal, in a speech in Louisville, Kentucky, emphasized that "a strong dollar is of major importance not only to the United States but also to the rest of the world". In response, dealers began to cut back their long mark positions. The dollar's recovery continued even after a record $2.8′ billion United States trade deficit was announced for June. At the same time, moreover, United States interest rates had begun to firm as the Federal Reserve reacted to a sharp rise in the monetary aggregates in July. Thus, the mark began to move lower and reached $0.4378 by July 29, down 1¾ percent from its peak three days earlier but still up over 5 percent on balance for the six months. In further operations in the New York market over the last days of July, the Federal Reserve sold $3.5 million equivalent of marks and purchased $14.8 million equivalent, on balance gaining partial cover for the earlier $35.4 million of swap drawings on the Bundesbank. Germany's official reserves rose by $848 million in July, for a net increase of $685 million over the six-month period.

Sterling

Late in 1976, the British government took further steps to curb Britain's inflation rate, which remained among the highest in Europe, to reduce its persistently large current account deficit, and to stabilize sterling following its protracted decline during much of the year. The Bank of England moved to restrict monetary expan-

Table 2

Federal Reserve System Drawings and Repayments under Reciprocal Currency Arrangements

In millions of dollars equivalent; drawings (+) or repayments (−)

Transactions with	System swap commitments, January 1, 1977	1977 I	1977 II	1977 July	System swap commitments July 31, 1977
German Federal Bank	14.9	−14.9	-0-	+35.4	35.4

sion, partly by raising its minimum lending rate to an unprecedented 15 percent and by reimposing an increasing marginal reserve requirement, the so-called "corset". The authorities sealed off a gap in exchange control regulations by prohibiting the use of the pound in financing third-country trade. And, in negotiating a $3.9 billion standby arrangement with the IMF, the government agreed to a package of fiscal restraint. As announced in December, this package included spending cuts, increased taxes, and the sale of part of the British government's holdings in British Petroleum—measures expected to reduce the public sector borrowing requirement as a share of gross domestic product from the existing 9 percent to 6 percent for the 1977-78 fiscal year. Meanwhile, the second, one-year phase of wage restraint, in place since July, was helping to slow the rise in labor costs.
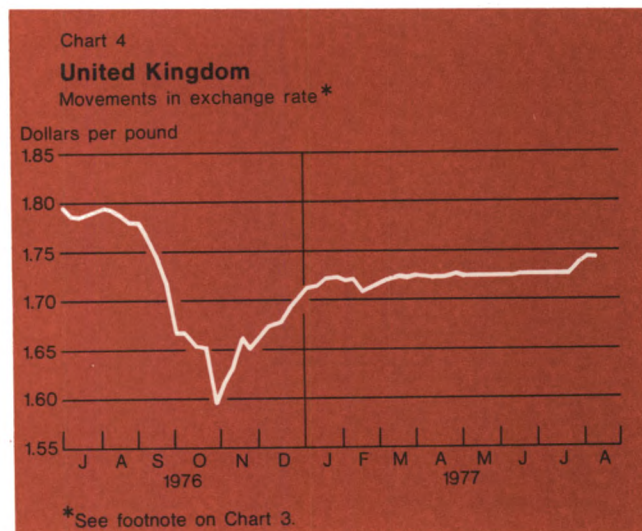
These various measures were combined with a substantial bolstering of Britain's reserve position. The $3.9 billion IMF standby was formally approved in early January 1977. Shortly thereafter, the United Kingdom authorities reached agreement with the main industrial countries over a plan, including a $3 billion backstop facility administered by the Bank for International Settlements (BIS), to alleviate pressures on sterling from sudden shifts out of officially held balances and to reduce those balances over the near term. Late in January, the British government announced a new $1.5 billion Euro-currency loan from a commercial banking syndicate.

Against this background, sterling staged a dramatic turnaround in the exchanges. Beginning in late 1976, the very indications that new fiscal and monetary restraints and international credit facilities were under serious consideration had prompted bidding for pounds. With sterling recovering, the high cost of funds in London began to squeeze out short positions and to encourage the unwinding of adverse leads and lags which had built up during months of demoralization over sterling's prospects. The running-off of outstanding third-country sterling trade credits gave an added impetus to net demand for the pound well into early 1977. The growing reflux of funds into sterling thus propelled the spot rate from its record low of $1.55 in October 1976 to just under $1.72 by early February 1977. By then, the Bank of England was absorbing large amounts of dollars from the market to add to reserves and to prevent sterling from rising to levels which it judged might prove unsustainable once the immediate demand pressures eased.

As trading conditions gradually settled down, dealers began to focus on the positive factors for sterling. By early 1977, the flow of North Sea oil was beginning to reach sizable proportions, giving credence to forecasts

that the oil would provide the basis for a swing of the United Kingdom current account into substantial surplus over the years ahead. Moreover, as the sterling rate stabilized, market participants came to expect an easing of British interest rates away from crisis levels. Each new issue of government debt was met with reports of sizable bidding, from foreign as well as domestic sources, to take advantage of the currently high coupon rates and the potential for capital appreciation. Consequently, the British authorities were able to sell large amounts of government debt at progressively lower rates, and sterling remained in demand in the early spring. Through April, the Bank of England was able to buy large amounts of dollars to replenish official reserves. On balance, United Kingdom reserves rose by some $3 billion between end-January and end-April.

The movement of funds into sterling, while strong and persistent, was nevertheless interrupted by occasional outbursts of selling pressure. Thus, sterling came heavily on offer in mid-February, briefly falling to as low as $1.6920 against the dollar, after news of of a record trade deficit in January and widespread press coverage of trade union opposition to a third year of voluntary pay restraint. In mid-March, another temporary spasm of selling pressure was triggered by political uncertainties that arose before the government narrowly survived a Parliamentary vote of no-confidence. And, in April, signs of a stiffening of trade union opposition to continued wage restraint again spurred some selling of sterling. On each of these occasions, however, the Bank of England stepped in promptly to avoid a significant decline in the sterling rate. In the context of the government's

Chart 4
United Kingdom
Movements in exchange rate*

Dollars per pound

*See footnote on Chart 3.

broader policy commitments, the market quickly stabilized. Consequently, by early May sterling continued to hold firm just below $1.72.

In the meantime, the persistent domestic and foreign demand for British securities had resulted in a progressive decline of interest rates in London. The authorities had acted to slow the decline in view of the continuing high rate of domestic inflation and the government's debt management objectives. Nevertheless, the drop was mirrored in successive reductions in the Bank of England's minimum lending rate to 8 percent by mid-May—fully 7 percentage points below the crisis level of October 1976. With United States interest rates rising at the time, yield differentials favoring sterling placements had narrowed considerably and the market found the scope for further capital gains on investments in British securities substantially reduced. Consequently, dealers became sensitive to the possibility of a sudden unwinding of previous capital inflows. Moreover, the market was also aware that reversals of adverse leads and lags and unwinding of third-country trade finance that had buoyed the pound in previous months were by now largely completed. With sterling more vulnerable to selling pressure, concerns over the outlook for inflation surfaced once again—particularly following news of a sharp rise in retail prices in April and of the trade unions' adverse reaction to the Labor government's proposed formula, stated in the March 29 budget address, for a third year of pay restraint.

In this more bearish atmosphere, the pound came under a burst of largely professional selling after mid-May, particularly on May 24. The Bank of England responded with forceful intervention to limit the decline in sterling, helping to relieve the immediate pressures. Then, when Britain's reserve figures for May were published early the next month, the implied scale of official support impressed the market that the United Kingdom authorities were prepared to use their now ample resources to keep the exchange rate steady over the near term.

Meanwhile, recent statistics had revealed that Britain's current account was improving more rapidly than had been expected. The domestic economy remained depressed, leading to a leveling-off of imports. But also, increased North Sea oil production and sharp rises in tourist receipts and other visible earnings had brought the current account into near balance by the second quarter. Moreover, capital inflows had resumed, as interest yields again looked attractive to foreign investors, compared with placements elsewhere. The British government's June 27 sale of a portion of its British Petroleum holdings, which in the end was nearly five times oversubscribed, also drew in sizable amounts

of funds from abroad. These factors contributed to an increasingly bullish atmosphere for the pound, which remained in demand. Consequently, when the dollar came on offer against other major currencies in late June and early July, market participants began to shift into sterling as well. In meeting this hot money inflow, the Bank of England allowed the spot rate to edge above $1.72 but continued to absorb most of the excess demand through heavy purchases of dollars.

By early July, opposition within the trade unions to a third year of wage restraint had built up to the point where there remained virtually no hope of winning voluntary support for a limit on negotiated wage increases for another year. The Labor government modified its wage restraint strategy to seek union agreement to space out pay negotiations over twelve months, while obtaining moderate wage increases within the public sector. This outcome led to only a brief bout of selling pressure. Instead, as the dollar continued on offer, these concerns receded into the background and the movement of funds into sterling gathered renewed momentum.

As before, the Bank of England resumed purchases of dollars to avoid a rise in sterling, but the effect of this approach was to allow the pound to depreciate along with the dollar against the currencies of other major trading partners. Consequently, on July 27, the Bank of England shifted to an intervention approach keyed to a weighted average of major currencies. As soon as market participants learned that the Bank of England was abandoning its strategy of holding the pound around the $1.72 level, there was an enormous rush to buy sterling, not only out of dollars but out of other currencies as well. The pound advanced to as high as $1.7420 against the dollar, for a net rise of about 1¼ percent over early-1977 levels, and recouped part of its recent depreciation against other curren-

Table 3

Federal Reserve System Repayments under Special Swap Arrangement with the Swiss National Bank

In millions of dollars equivalent

System swap commitments January 1, 1977	1977 I	1977 II	1977 July	System swap commitments July 31, 1977
1,051.0	−148.4	−143.6	−53.6	705.4

Data are on a value-date basis with the exception of the last two columns which include transactions executed in late July for value after the reporting period.

cies. The Bank of England made heavy purchases of dollars to limit the rise. Mainly as a result of these and earlier acquisitions by the central bank, Britain's external reserves rose $3.6 billion during June-July to a record $13.6 billion at end-July, for an overall rise of $6.4 billion over the six-month period.

Swiss franc

Last winter the Swiss economy was pulling out of recession only slowly. The continued weakness of domestic demand was reflected in a further moderation of inflation and a trade surplus—the first in twenty years—which together with large interest earnings from abroad had boosted Switzerland's current account surplus close to $3.5 billion for 1976. To stimulate a revival of business activity while also avoiding any upward pressure on the Swiss franc that might inhibit export demand, the Swiss National Bank had provided a more accommodative monetary policy. Also, to encourage a continuing outflow of capital, the authorities reinforced their capital export conversion program, whereby the proceeds of new foreign bond issues in Switzerland are immediately converted into foreign currencies at the central bank. As Swiss monetary conditions eased, interest rates moved to levels well below those in other major countries, prompting sizable outflows of capital from Switzerland. This process was magnified by a large-scale reversal of much of the hot money inflows of previous months, when funds had been shifted into Swiss francs out of those currencies—sterling, the French franc, and the Italian lira—that had been under pressure during 1976. Consequently, the Swiss franc had begun an across-the-board decline that continued well into early 1977.

In February, the market's view hardened that low interest rates would be maintained after the Swiss National Bank provided support to an undersub-

scribed Swiss government bond issue while releasing commercial bank minimum reserves and sterilized deposits. Foreign investors therefore continued to shift funds out of low-yielding franc assets into other currencies, now more stable and offering significantly greater rates of return. Private forecasts of a sharply lower Swiss franc over the medium term touched off further selling of francs. As a result, the Swiss franc dropped back to as low as $0.3893 by March 1, down by 2½ percent against the dollar since end-January and by 7¼ percent from its record highs of June 1976. In the meantime, the franc also lost further ground against the German mark, for an overall decline of 15 percent since the June 1976 peaks.

In fact, however, the Swiss economy had begun hesitantly to respond to the stimulus of rising Swiss exports and the government's economic policies. Moreover, the Swiss monetary aggregates were growing faster than targeted. To avoid an excessive monetary growth, the National Bank absorbed domestic liquidity through net dollar sales under its capital export conversion program. Early in March, it took the opportunity to sell a small amount of dollars in the exchange market. Then, as the quarter-end approached, the central bank announced that it would provide only limited swap assistance to the commercial banks to satisfy window-dressing needs. In response, interest rates in Switzerland turned around toward the month end, capital outflows tapered off, and the Swiss franc began to firm in the exchanges. As it did, the Swiss National Bank resumed dollar purchases in the market to moderate the rise.

In April, demand for Swiss francs gathered strength as traders reacted to reports that countries, like Switzerland, with large current account surpluses were being urged to let their currencies appreciate in response to market forces. With concern also deepening over the widening trade deficit and potential for renewed inflation in the United States, the franc continued to move up. The rise in the franc was briefly interrupted in an initial reaction to news in mid-April that the Swiss Credit Bank had sustained substantial losses at its Chiasso branch in connection with irregularities in the handling of fiduciary deposits from Italy. Concerned that this news, together with closure of two small private banks in Switzerland, might cloud the reputation of Swiss banking, the authorities and the major banks worked out an agreement by early June on practices for accepting funds and on bank secrecy. In the meantime, the major Swiss commercial banks resumed their bidding for francs to improve their liquidity positions, both in the wake of the Chiasso affair and also in response to further signs of a somewhat more restrictive monetary stance by the Swiss

Chart 5

Switzerland
Movements in exchange rate*

Dollars per franc

*See footnote on Chart 3.
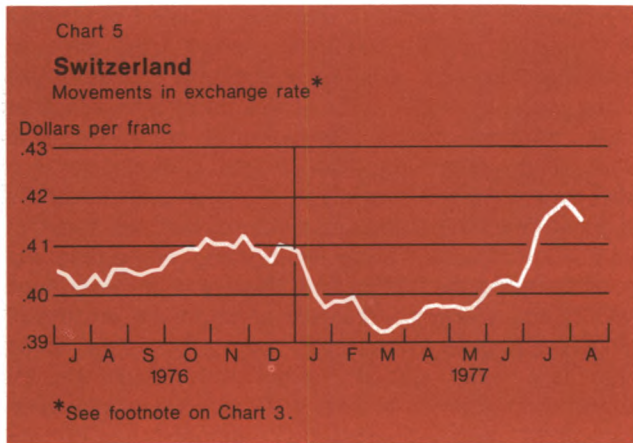
authorities. As Swiss interest rates were bid up and German interest rates drifted lower, dealers covered their long mark-short franc positions. Consequently, the franc advanced against both the mark and the dollar, reaching $0.4029 in Zurich on June 6 before the immediate demand for franc balances began to subside and Swiss money market rates eased.

In late June, the Swiss franc was caught up in the general advance of European currencies against the dollar. Initially, after release of the OECD communiqué on June 24, it moved abruptly higher and then continued to rise during much of July, although at a somewhat slower pace than the mark. As the rate advanced, foreign companies with franc-denominated liabilities moved to acquire francs to prepay existing loans. To moderate the rise in the franc, the Swiss National Bank bought substantial amounts of dollars in the market, more than offsetting dollar sales under the capital export conversion program. Also, on July 14, the Swiss authorities cut both the discount rate and the Lombard rate by ½ percentage point each to 1½ percent and 2½ percent, respectively—a move that was timed to coincide with the Bundesbank's ½ percentage point reduction in its Lombard rate. Even so, the franc advanced to a record high of $0.4207 in European trading on July 26. Then, with the change in market sentiment toward the dollar that emerged and the firming of United States interest rates, the franc began easing back with other European currencies. It closed on July 29 at $0.4162, almost 7 percent above its March low, for a net rise of 4¼ percent since January 31.

Meanwhile, the Federal Reserve and the United States Treasury continued with the program agreed to last October for an orderly repayment of pre-August 1971 franc-denominated liabilities. The Federal Reserve repaid $287.1 million equivalent of special swap indebtedness and the Treasury redeemed $171.7 million of Swiss franc-denominated securities by end-July. Most of the francs for these repayments were acquired directly from the Swiss National Bank against dollars. But the Federal Reserve also bought francs from the National Bank against the sale of $58.9 million equivalent of German marks and $40.3 million equivalent of French francs, which were in turn either acquired in the market or drawn from existing balances. In addition, the System purchased $24.9 million equivalent of Swiss francs in the market or from other correspondents mostly in late February-early March, when the franc was weakening in the exchanges. By end-July, the Federal Reserve's special swap debt to the Swiss National Bank had been reduced to $705.4 million equivalent while the Treasury's Swiss franc-denominated obligations had been lowered to $1,341.5 million equivalent.

French franc

Following recurrent bouts of selling pressure on the French franc through much of last year, the market for francs came into better balance by early 1977.

Last September, the French government introduced a wide-ranging stabilization program to deal with the underlying payments imbalance and with the adverse market psychology that had weighed on the franc. Presented by newly designated Premier Barre, the plan represented a shifting of priorities away from immediate economic stimulus toward a concerted effort to curb inflation and stabilize the exchange rate. Specific measures included a three-month price freeze, a call for wage restraint, curbs on bank lending, and a 1 percentage point hike in the Bank of France's discount rate to 10½ percent.

The market's initial response was hesitant in view of the controversial nature of some of the measures. But by early winter the pace of price and wage increases in France had slowed markedly and the trade deficit began to narrow. Also, tensions in markets for other major European currencies were easing, and traders became less fearful that a spillover of pressures from other currency markets would disrupt trading in francs. Consequently, as the market's previous extreme pessimism gradually lifted, market participants began bidding for francs to cover short positions or to reverse commercial leads and lags built up against the franc in previous months. The spot franc held firm around $0.2010 against the dollar through mid-February, while strengthening some 1½ percent against the German mark and other currencies in the EC snake. In the meantime, the Bank of France took advantage of the opportunity to buy dollars to add to foreign currency reserves.

Chart 6

France

Movements in exchange rate*

Dollars per franc

*See footnote on Chart 3.
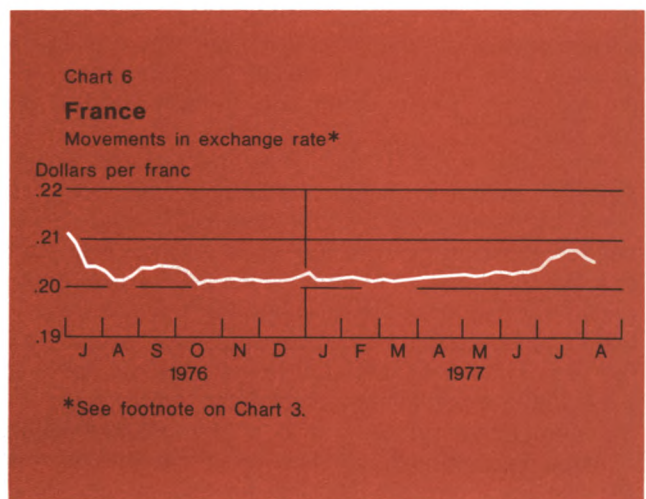
Nevertheless, dealers were sensitive to political developments in France before the general elections in early 1978. With the approach of municipal elections in March, for which public opinion polls projected a swing in favor of the opposition parties of the Left, the market turned cautious and the franc again came on offer. To avoid a buildup of speculative pressures, the Bank of France resumed intervention in support of the franc, selling moderate amounts of both dollars and German marks, and operated to keep French interest rates firm in the domestic money market. Against the dollar, the spot franc eased about ½ percent from mid-February levels almost to $0.2000, while against the German mark and other EC snake currencies it declined about 1 percent. Once the immediate uncertainties surrounding the municipal elections had passed, market nervousness receded and the franc gradually regained its previous buoyancy.

In the spring, France's underlying payments position was clearly improving. Confidence in the country's external position was bolstered by the further favorable swing in the French trade account that nearly halved the late-1976 deficit and by expectations of a further moderation of inflation despite lifting of the price freeze. In this context, the high interest rates in France, compared with lower or declining interest rates elsewhere, attracted sizable inflows of interest-sensitive funds. Also, French public and private corporations continued to borrow abroad. At the same time, however, industrial production leveled off and unemployment rose somewhat. Toward the end of April, the market began to expect some easing of monetary policy and the franc softened somewhat in the exchanges. Although the authorities introduced programs to increase employment in specific areas, these were to be financed by borrowings in the market, and interest rates were kept relatively firm. The franc quickly recovered and remained in strong demand through May and most of June. The spot rate edged up gradually against the dollar to $0.2025 by late June, with the Bank of France continuing to take dollars into reserves.

When the dollar came under generalized selling pressure in the exchange markets beginning in late June, the franc joined in the upswing of major European currencies. It was bid up a further 3 percent to a late-July peak of $0.2086, some 3¾ percent above early-February levels, even as the Bank of France continued to buy sizable amounts of dollars to moderate the rise of the franc rate. But, as the franc did not keep pace with the continued advance of the German mark, the French central bank also sold modest amounts of marks to cushion the decline in the franc rate against the German currency. Toward the end of July, how-

ever, the franc began to settle back against the dollar following statements by United States officials emphasizing the need for a strong dollar and Premier Barre's remarks that the dollar had become undervalued *vis-à-vis* the French franc and other European currencies. As a result, by the month end the franc rate had eased to $0.2050, to close the six-month period up 1⅞ percent on balance against the dollar. Against the German mark, the franc regained some of the ground it had lost but still closed the period some 3½ percent lower on balance.

Italian lira

By early 1977, Italy's minority government had gathered sufficient support to implement many elements of its comprehensive stabilization program. Steps had been taken to bring the public sector deficit under control through spending cuts, tax increases, and higher prices for public services. The Bank of Italy had reinforced its restrictive monetary policy by raising its discount rate to 15 percent and by imposing limits on bank lending. Even so, the authorities' efforts to negotiate modifications in Italy's wage indexation system—wages had risen over 25 percent in 1976, as against price rises of some 21 percent—gained little headway. Consequently, negotiations with the IMF over a new stand-by arrangement, which would provide Italy with $530 million of new IMF credit and assure the availability of a further $500 million from the EC, were delayed until more of the government's anti-inflationary package was in place.

At first the lira had been stabilized by strict exchange controls as well as by a repatriation of funds in response to an amnesty on previous illegal outflows by Italian residents. Gradually the tight credit condi-
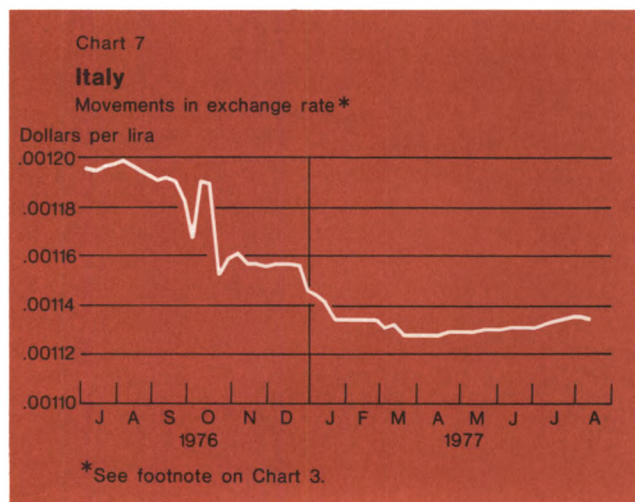
Chart 7
Italy
Movements in exchange rate*
Dollars per lira

*See footnote on Chart 3.

Table 4

Drawings and Repayments by Foreign Central Banks and the Bank for International Settlements Under Reciprocal Currency Arrangements

In millions of dollars; drawings (+) or repayments (−)

Banks drawing on Federal Reserve System	Outstanding January 1, 1977	1977 I	1977 II	1977 July	Outstanding July 31, 1977
Bank of Mexico	150.0	−150.0	-0-	-0-	-0-
Bank for International Settlements (against German marks)	-0-	-0-	{+35.0 −35.0}	-0-	-0-
Total	150.0	−150.0	{+35.0 −35.0}	-0-	-0-

tions in Italy and the greater stability of the rate following the 25 percent depreciation in 1976 also tended to encourage flows into the lira. As demand for lire mounted, the spot rate leveled off around $0.001134 (Lit 882). The Italian authorities took the opportunity to buy dollars in the market to rebuild their foreign exchange reserves to $3.3 billion by end-January.

While many of these demands for lire continued into February and March, the unwinding of a 50 percent import-deposit scheme and dismantling of other exchange controls imposed in 1976 exposed the lira to occasional selling pressures. In late-March, following the outbreak of student rioting over government policies and of workers' strikes over proposed changes in the wage-indexation system, the spot rate declined by about ½ percent to $0.001127 (Lit 887). To contain these pressures the Bank of Italy intervened forcefully. Its official dollar sales were partly reflected in a decline of about $300 million in exchange reserves through end-March.

By this time, the Italian government had come closer to reaching agreement with the IMF on the terms of a letter of intent to support Italy's request for a standby facility. In this connection, the authorities extended commercial bank lending ceilings through March 1978, gained trade union and legislative approval for a compromise proposal for amending the wage indexation system, and raised indirect taxes to finance a reduction in employers' social security contributions. As released on April 14, the IMF letter of intent also projected further cuts in public spending to reduce the budget deficit, a lowering of the inflation rate to 13 percent by March 1978, and a swing into current account surplus next year.

This reinforcement of Italy's stabilization effort was welcomed in the market. In late April and May, reversals of previous outflows resumed. With domestic in-

terest rates remaining high and regulations still in force encouraging Italian exporters to seek foreign sources of finance, Italian banks and companies increased their borrowings abroad. In addition, the net reflux of hot money increased sharply following disclosures by Swiss banks of irregularities in dealings with Italian residents' funds. The passing of the period of seasonal weakness in current payments gave additional buoyancy to the market. Taken together, these forces generated substantial bidding for lire. The spot rate rose only slightly, however, as the Bank of Italy continued on balance to buy substantial amounts of dollars to add to reserves.

By early June, the stabilization measures were clearly taking hold. The rate of inflation had moderated. The current account deficit had narrowed significantly, albeit at the expense of a considerable slowdown in the domestic economy. Moreover, tight controls on bank credit had kept domestic lending in check. Consequently, the Bank of Italy was able to begin easing domestic interest rates from crisis levels by cutting its discount rate by 2 percentage points to 13 percent. Interest differentials nevertheless remained favorable for Italy, and a net inflow of short-term funds continued. By then, the possibility of further declines in Italian interest rates was prompting some Italian residents to repatriate funds in anticipation of capital gains on new issues of Italian Treasury bills and notes.

Beginning in late June, demand for lire swelled further, partly on the seasonal rise in tourist receipts but also in connection with the general strengthening of European currencies against the dollar. The lira rate advanced only to $0.001135 (Lit 881), however, as the Bank of Italy continued to absorb dollars. In all, from April through July, Italian exchange reserves rose by $4.1 billion to $7.1 billion, even with a repayment in July of previous drawings from the IMF.

EC snake

Following recurrent episodes of heavy speculation throughout 1976, the countries participating in the European currency arrangement—Germany, the Benelux countries, Sweden, Denmark, and Norway—agreed in October on a realignment of exchange rate parities whereby the German mark was adjusted upward by 2 percent while the Scandinavian currencies were adjusted downward by 1 to 4 percent. These readjustments to offset disparities in relative inflation rates and economic performance among the participating countries relieved market tensions and triggered a reversal of the earlier speculative flows. As a result, the German mark fell to the bottom of the EC snake and through March 1977 the member currencies traded comfortably within the snake's 2¼ percent limits without any particular strains.

By that time, however, the Swedish krona had eased to near the bottom of the band in response to Sweden's still relatively high inflation rate and deepening current account deficit. As part of a program that the Swedish authorities adopted to reverse the decline in export competitiveness and to avoid an outbreak of speculative selling of Swedish kronor, a new realignment was agreed upon, implying a 6 percent devaluation of the krona within the joint float. The Danish and Norwegian kroner were also devalued, each by 3 percent, as part of the realignment. When reports of this realignment leaked out on Friday afternoon, April 1, ahead of the official announcement, traders in New York were taken by surprise and became reluctant to make markets in these currencies until details of the parity changes were made available. Once trading resumed on Monday, April 4, however, the market easily adjusted to the new rate relationships. The Swedish krona, after depreciating somewhat less than the change in its central rate, began to benefit from inflows of funds and traded firmly near its new upper intervention limit against the mark, which remained at the bottom of the band. The Danish krone and Norwegian krone also stabilized in the upper half of the realigned band, pressing at times on their upper limits against the mark when conversions of external borrowings buoyed their exchange rates.

Market participants nevertheless remained sensitive to further possible changes in exchange rate relationships within the snake. As the May 7-8 London economic summit drew closer, dealers came increasingly to believe that a readjustment might emerge as part of a more comprehensive agreement to allow currencies bolstered by strong current accounts to appreciate. Market attention focused on the Dutch guilder which had traded near the top of the joint float since the previous autumn and was generally expected to

firm in the exchanges. The guilder came into increasingly intense demand, frequently reinforced by foreign purchases of Dutch securities which offered yields that were relatively favorable in comparison with those available in Germany. By late April, the guilder was being pressed at its upper intervention limit against the mark, even as the mark itself was rising against the dollar. To maintain the EC snake limits, the Netherlands Bank and the German Bundesbank bought sizable amounts of marks against sales of guilders in their respective markets. The Dutch central bank also bought a large amount of dollars in Amsterdam. Trading in New York became unsettled at times and, on May 4, the Federal Reserve supplemented its intervention in marks by selling $3.3 million equivalent of guilders from balances.

On the following day, the Netherlands Bank responded to the buildup of speculative demand for guilders by announcing a 1 percentage point cut in its discount rate to 3½ percent, a move immediately interpreted in the market as a signal of Dutch commitment to present snake currency relationships. Consequently, the pressures within the band began to recede. When the London summit meeting ended without any changes in exchange rate relationships, the guilder backed away from its upper intervention limit against the mark. Later on, figures were released showing that the Netherlands' large current account surplus had virtually disappeared during the first quarter of 1977. Signs of some acceleration of Dutch inflation also diminished bullish market sentiment toward the guilder. Thus, as short-term interest rates in the Netherlands continued to decline to levels well below comparable rates in Germany, the guilder eased against the mark and the entire band contracted.

Tensions reemerged within the snake during June

Table 5

**United States Treasury Securities
Foreign Currency Series
Issued to the Swiss National Bank**

In millions of dollars equivalent; issues (+) or redemptions (−)

| Amount of commitments January 1, 1977	1977 I	1977 II	1977 July	Amount of commitments July 31, 1977
1,545.7	−84.6	−85.8	−33.7	1,341.5

Because of rounding figures do not add to totals.

Data are on a value date basis with the exception of the last two columns which include transactions executed in late July for value after the reporting period.

and July, however. Following the outcome of protracted wage negotiations in Sweden, talk intensified of a further devaluation of the krona to offset the impact of rising unit labor costs on price competitiveness. Fairly heavy selling of the Swedish krona and other Scandinavian currencies built up, especially before each weekend. The sharp rise in the German mark against the dollar that quickly gathered momentum in late June and early July exceeded that of the other joint float currencies, and the mark soon moved up to the top of the band. The guilder and the commercial Belgian franc, pulled up by the mark's rise, traded comfortably within the EC snake. But the Scandinavian currencies, while still rising against the dollar, lagged behind. To keep their currencies above the lower limit of the snake, the central banks of Sweden, Denmark, and Norway therefore continued to intervene, principally through sales of dollars in the market. Nevertheless, these pressures persisted, leading ultimately to Sweden's withdrawal from the snake and a further realignment of the remaining currencies late in August.

Japanese yen

By early 1977, Japanese exports were again rising strongly as a result of the reacceleration of economic growth in the United States and buoyant demand elsewhere for Japanese products. However, demand within Japan remained generally weak. Business investment was particularly sluggish as Japanese industrialists, still trying to come to grips with the severe dislocations of recent years, viewed the longer term outlook for economic growth with unusual caution. The actual and expected weakness in domestic demand, in turn, exerted a powerful drag on Japanese imports. The combination of strong exports and stagnant imports produced a further widening of Japan's trade and current account surpluses, already at record levels last year.

The Japanese authorities had moved to stimulate the economy, through some easing of fiscal policies, but they had proceeded with caution in view of the continuing high rate of domestic inflation, and the Bank of Japan had kept its discount rate at 6½ percent. Once uncertainties in December over Japanese elections and the magnitude of a new OPEC oil price rise passed, market sentiment in the exchanges turned increasingly bullish toward the yen. Bolstered by the large current account surplus and inflows of interest-sensitive funds from abroad, the yen rebounded sharply from its December lows. After having intervened forcefully to support the yen in its previous decline, the Japanese authorities refrained from intervention as the rate rose by about 3 percent against the dollar to $0.003470 (¥288) by end-January.

Chart 8
Japan
Movements in exchange rate*

Dollars per yen

*See footnote on Chart 3.
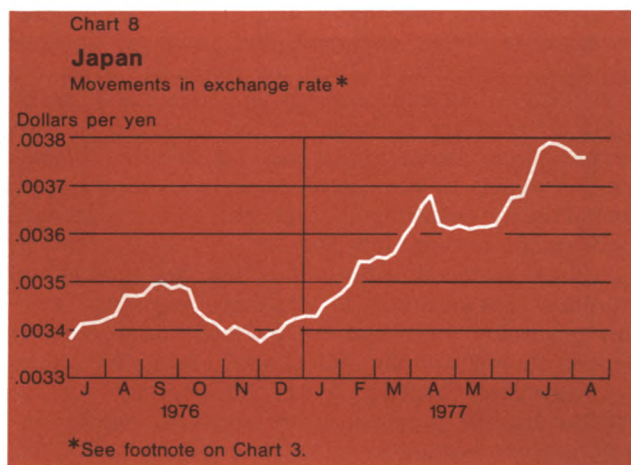
By early February, the magnitude of Japan's current account surplus was attracting international attention. Statements by Japanese government officials, as well as by economists and officials abroad, had already focused on the need for global adjustment of current account imbalances. In addition, the press reported that some countries were taking steps to limit imports of specific Japanese products. In this environment, dealers moved to lengthen yen positions and commercial leads and lags shifted more heavily in Japan's favor on expectation of a further rise in the yen. As a result, the yen advanced strongly, breaking through the ¥280 level following the March 19-20 weekend meeting between Prime Minister Fukuda and President Carter. Further public statements by Japanese officials assured the market that the authorities would continue to intervene only to counter erratic fluctuations in the exchange rate. Consequently, the yen was bid up further, to as high as $0.003700 (¥270.3) by April 12, even as the Bank of Japan intervened increasingly forcefully.

With the yen now at a three-year high, dealers became increasingly cautious. At that time, the United States Customs Court ordered the Treasury to impose import duties on Japanese electronic products (a decision which was appealed) and the British government imposed a provisional tariff on certain types of steel from Japan. Moreover, the boost of the Japanese economy provided during the first quarter by the buoyant export sector had failed to spark a broadly based and self-sustaining recovery. Consequently, when the Bank of Japan acted to provide further impetus to the economy by cutting the discount rate for the second time in two months to 5 percent, effective April 19, dealers began to take profits on their yen positions. The subsequent lowering of short-term money market rates and commercial bank prime rates reduced incentives

for further short-term flows into Japan. Commercial leads and lags were reversed, and Japanese borrowings abroad tapered off. Thus, the yen eased to as low as $0.003593 (¥278.3) on April 26, while the Bank of Japan sold dollars to moderate the decline. The yen firmed slightly ahead of the May 7-8 London summit. Thereafter, with United States money market rates now having risen somewhat, the yen settled back in subdued trading through late May.

In June the Japanese Finance Ministry announced a gradual liberalization of Japanese exchange controls governing flows both in and out of Japan. With respect to inflows, the authorities eased limitations on conversions of foreign funds and increased the accessibility of the Japanese money market to foreign investors. With respect to outflows, controls were lifted on short-term overseas lending by Japanese banks and Japanese resident purchases of foreign-currency bonds. The amount of foreign currency Japanese tourists may take abroad was raised. Also, regulations governing foreign bond issues in Tokyo were liberalized. Initially, the market's response to the changes in capital controls was muted. But, by mid-June, Japanese interest rates had begun edging back up from the lows reached in May while United States short-term interest rates had leveled off. Thus, as the yen began to move up again, the market came to the view that the liberalization of exchange restrictions would permit larger inflows of capital to Japan.

Against this background, the OECD meeting and subsequent communiqué on June 24 provided the catalyst for a renewed surge in the yen rate. Reports that the finance ministers had agreed that countries with current account surpluses were ready to see an appreciation of their currencies in response to underlying market forces triggered immediate demand for yen. Subsequent statements by government officials in the United States and Japan were interpreted as confirming this view. In addition, rumors circulated in the Tokyo market that Japan might accept the United States Treasury's suggestion at the OECD meeting and sell its interest earnings on existing reserves in the exchanges. Propelled by professional and commercial demand from around the world, the yen continued to advance through late June and early July to as high as $0.003800 (¥263) on July 11. By that time, however, Japanese businessmen were expressing concern over the rise in the rate. Moreover, the Bank of Japan had reentered the market to purchase a substantial amount of dollars to check a further sharp appreciation of the yen. Thereafter, the yen rate settled back in quieter trading to $0.003754 (¥266.4) by the month end, for a net rise of 8 percent over the six-month period and 11¾ percent from its lows of last

December. Japanese official reserves rose by some $1¼ billion to a level of nearly $18 billion between end-January and end-July.

Canadian dollar

Throughout 1976, Canadian economic policy had been directed at curbing inflationary pressures, while permitting expansionary forces to work through the economy gradually. By early 1977, broad monetary and fiscal restraint, together with a wage-price control program, had helped to bring the underlying rate of inflation down toward the declared target of 6 percent. But opposition to the government's wage-price program was gathering strength in both business and labor circles, and the immediate prospects for a further reduction in the inflation rate were clouded by sharply rising food prices. At the same time, economic recovery in Canada had come to a virtual standstill. As a result, the rate of unemployment had begun to edge up again, particularly in areas like Quebec and the Maritime Provinces. Moreover, the growth in monetary aggregates had fallen below the Bank of Canada's targets and short-term interest rates were progressively lowered, narrowing the favorable interest rate differential relative to the United States. Successive cuts in the Bank of Canada's discount rate to 8 percent by February 1 were viewed as confirming the downtrend in Canadian short-term interest rates.

In addition, the election last November of a separatist party government in Quebec, committed to establishing independence for the province, raised doubts about the receptiveness of new Canadian, particularly

Chart 9

Canada
Movements in exchange rate*

Dollars per Can. dollar

*See footnote on Chart 3.
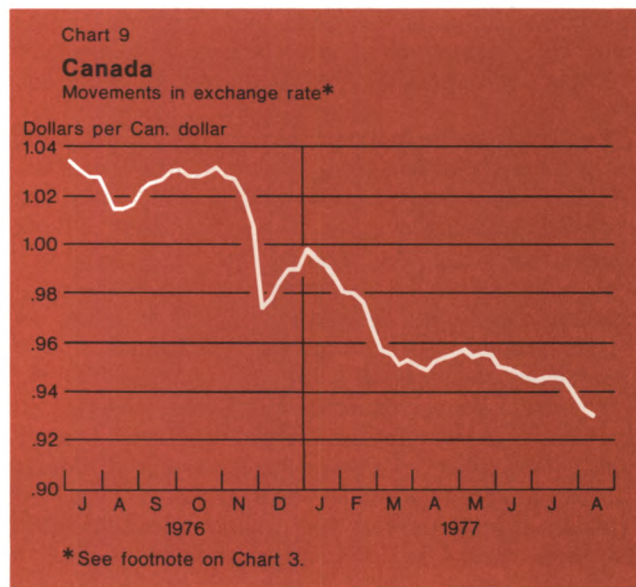
Quebec, issues in international capital markets. Foreign placements had been expected to reach levels that would more than offset Canada's continuing current account deficit of some $4 billion per annum. But, in early 1977, the two major bond-rating agencies in the United States were reassessing their evaluations of certain Quebec borrowers. In the interim, some scheduled Canadian issues in the New York bond market were either withdrawn or postponed. With the prospects for conversions of borrowing proceeds correspondingly scaled down, the Canadian dollar became vulnerable to adverse swings in market sentiment.

In this unsettled market atmosphere, the Canadian dollar, which had already dropped some 4¼ percent in just three months, again came on offer in late January and then fell off sharply during February. In the absence of any sizable conversions of foreign issues by Canadian borrowers, the decline met little resistance in the market. Thus, the downslide quickly accelerated as commercial leads and lags gradually shifted against the Canadian dollar, and market professionals built up substantial short positions against the currency. Concern that the government's April 1 budget would be expansionary to address the unemployment problem and publication of private forecasts suggesting a sharply lower Canadian dollar rate magnified the selling pressure even more. Consequently, the Canadian dollar dropped 4 percent, from $0.9825 at the end of January to as low as $0.9430 by April 1. The Bank of Canada intervened on both sides of the market to maintain orderly trading conditions, with official reserves declining by $585 million during February and March.

In April, market pessimism lifted somewhat as it became clear from the Federal budget that the government was not significantly loosening the restrictive tone of fiscal policy. By this time, too, Moody's Investors Service had announced that it was maintaining its current rating on Quebec bonds. In the wake of that announcement, indications of a pickup in foreign borrowings by Canadian provinces and public authorities began to emerge, including a $300 million credit raised by the Province of Quebec in the Euro-currency market. In addition, figures were released showing a strong trade surplus for Canada in the first quarter, as Canadian exports benefited from the vigorous expansion of the United States economy. Thus, the Canadian dollar market gradually came into better balance. The spot rate edged up to trade narrowly around $0.9535 through mid-May. The Bank of Canada therefore operated less heavily than before, taking in dollars on balance as reflected in the $137 million reserve increase during April-May.

Chart 10

Interest Rates in the United States, Canada, and the Euro-dollar Market
Three-month maturities *
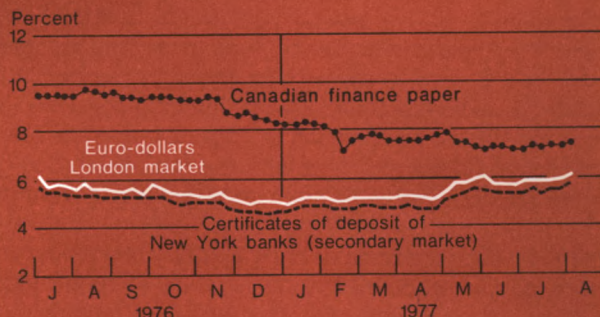
*Weekly averages of daily rates.

During the remainder of the period, however, underlying concerns over Canada's political outlook and economic performance dominated market psychology. Market participants followed closely the debate over the issue of Quebec separatism. At the same time, with the unemployment rate still hovering around 8 percent, the market expected the Canadian authorities to adopt more stimulative policies even though inflation was starting to pick up again. Interest differentials favoring Canada had by then narrowed significantly following another ½ percentage point Canadian discount rate cut and the run-up of short-term United States interest rates in early May. Moreover, estimates of the volume of new Canadian issues abroad were scaled down.

In this atmosphere, a gradual buildup of professional selling, combined with the end-June clustering of royalty and debt service payments to nonresidents, pushed the spot rate down to $0.9425 where it traded somewhat unsteadily through mid-July. In late July, the Canadian dollar again came on offer. By that time, United States short-term interest rates were beginning to rise. Moreover, on July 25, the Canadian government indicated that it now appeared that its 6 percent per annum target for inflation would not be met. In a renewed burst of commercial and professional selling, the spot rate fell to just above $0.9350. On balance, the Canadian dollar declined by some 4¾ percent between end-January and end-July, thereby extending the decline that had begun late in 1976 to 9 percent. Over the six months, Canadian reserves, declined by a net $670 million.

Mexican peso

By early 1977, Mexico was beginning to recover from the financial crisis of the previous autumn, which had resulted in a precipitous drop of the peso in the exchange markets. Following the inauguration of President López Portillo in December, the new administration sought to revive public confidence, pledging to reduce the government deficit and to encourage the growth of the private sector. An important agreement was struck with the trade unions, limiting the rise in wages in 1977. The Mexican authorities also ratified the October 1976 agreement with the IMF which could provide Mexico with more than $600 million in credits over a three-year period. These initial efforts were welcomed by the business and financial community in Mexico and abroad, leading to a reflux of funds into the peso. Nevertheless, the reversal was incomplete as many market participants awaited firmer evidence of improvement in the underlying situation. By early February the peso had settled at around $0.0450 in New York, some 44 percent below the prefloat level.

Coming into the spring, Mexico's economic indicators showed that the painful process of adjustment was under way. The burst of inflation of late last year, reflecting in part the sharp decline of the peso, was tapering down. Imports were at a lower level than before the peso depreciation, largely reflecting a contraction of industrial production and a slowdown in public investment spending. At the same time, export receipts were rising in response to the speedup of growth in the United States, the increasing flow of Mexican oil production into world markets, and higher coffee and other agricultural prices abroad. As a result, Mexico's trade and current account deficits narrowed markedly, reducing the need for new international borrowing by Mexican entities. With the market thus in better balance, the peso continued to move narrowly. The Bank of Mexico liquidated at maturity the $150 million drawn under the swap line with the Federal Reserve in November 1976. In April, it repaid the remaining $150 million in drawings under the Exchange Stabilization Agreement with the United States Treasury.

Through the spring and early summer, the Mexican authorities reinforced the stabilization program by means of a series of financial and administrative reforms to improve the efficiency of the banking system and to strengthen monetary control. In April, the structure of differential reserve requirements was simplified, with the effect of lowering the net reserve requirement and providing the commercial banks with increased lending capacity. In May, the previous sys-

Chart 11
Mexico
Movements in exchange rate*

Dollars per peso

*See footnote on Chart 3.
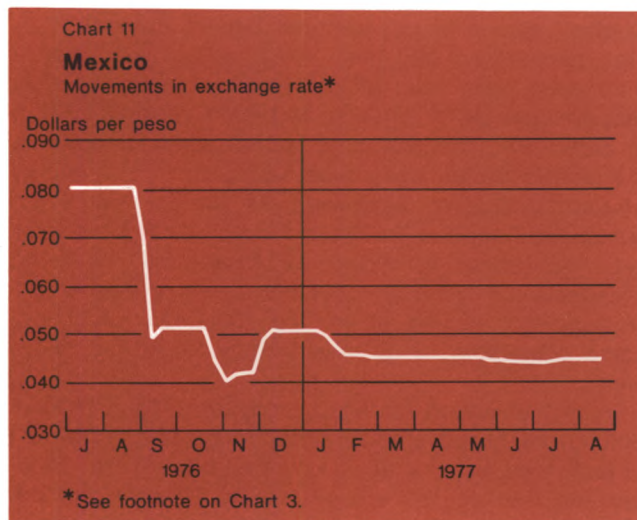
tem of administered interest rates was replaced by rate ceilings, which were set above the earlier levels, and the Bank of Mexico pledged to seek to encourage interest rate levels compatible with underlying economic forces. In July, the authorities began to introduce a program in which companies would be able to borrow pesos from Mexican commercial banks against the collateral of an interest-bearing dollar deposit with the lending bank. The central bank would impose a 100 percent reserve requirement on this deposit while rediscounting the peso loan. This program was thus a means of expanding credit to the private sector while replenishing international reserves.

Meanwhile, although market concerns over the outlook for the peso surfaced from time to time, the exchange rate held fairly steady. By summer, Mexico's economic performance continued to show signs of improvement, as industrial production was beginning to revive and exports remained strong. Moreover, a scaling-up of estimates of Mexico's proven oil reserves strengthened expectations that rising oil exports would substantially improve Mexico's current account position. As investor caution gradually receded, new Mexican foreign borrowings linked to the development of oil resources were well received in international capital markets. Thus by end-July, the peso held at $0.0437 for little net change over the six-month period. Reflecting the improving sentiment for the peso during that time, the discount on three-month forward pesos in New York narrowed from some 37 percent to 20 percent.

Subscriptions to the *Quarterly Review* are free. Multiple copies in reasonable quantities are available to selected organizations for educational purposes. Single and multiple copies for United States and other Westren Hemisphere subscribers are sent via third- and fourth-class mail, respectively. All copies for Eastern Hemisphere subscribers are airlifted to Amsterdam, where they are forwarded via surface mail. Multiple-copy subscriptions are packaged in envelopes containing no more than ten copies each.

Quarterly Review subscribers also receive the Bank's *Annual Report* each year.

Federal Reserve Bank of New York
33 Liberty Street
New York, N.Y. 10045

Return Postage Guaranteed