FEDERAL RESERVE BANK OF NEW YORK

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Contents

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The Business Situation

Evidence continues to accumulate that recessionary forces in the economy are dissipating. Indeed, the end of the worst postwar recession either is close at hand or already has occurred. The new composite index of leading indicators posted a substantial gain in May, following a very large rise in the preceding month and a small advance in March. In the past, this index has typically led upturns in general economic activity by only two months or so. Elimination of the remaining overhang of inventories would lay the groundwork for an economic recovery, and progress on this front also has been made lately. In April the book value of manufacturing and trade inventories plunged by $1.8 billion, exceeding the average decline recorded in the two previous months. Industrial production slipped a bit further in May; however, the output of consumer goods increased for the second consecutive month. New orders for durable goods rose strongly in May, as did retail sales. Housing starts have shown modest improvement, and inroads have been made lately in reducing the backlog of unsold homes. Total employment rose in June for the third successive month, and the unemployment rate declined to 8.6 percent of the civilian labor force, down from 9.2 percent in May. However, the decline in joblessness was probably the result of statistical problems and therefore is an overstatement of the improvement in labor market conditions.

Recent price trends have been generally encouraging. While fuel prices have increased rather sharply in the past few months, other prices seem to be leveling off. Consumer prices rose at only a 4.2 percent annual rate in May, with prices of nonfood commodities edging up at a 2.4 percent rate. This was the smallest such rise in twenty-two months, and it resulted entirely from higher prices for consumer power and fuel. Wholesale prices declined at a 1.7 percent annual rate in June, as prices of farm products and related items decreased at a 16.5 percent annual rate. Prices of industrial commodities rose at a faster rate than in the last several months. Despite this acceleration, underlying inflationary pressures remain moderate since more than half the 4.6 percent rise in industrial commodity prices in June was attributable to higher energy prices.

INDUSTRIAL PRODUCTION, LEADING INDICATORS, ORDERS, AND INVENTORIES

Industrial production declined for the eighth consecutive month in May (see Chart I), leaving output in the nation's factories, mines, and utilities 13 percent below the level attained last September. Including the modest 0.3 percent May slippage, the current slide in production now amounts to the longest sustained drop in seventeen years. Nonetheless, compared with the 8 percent contraction in production averaged in the first quarter of this year, the mildness of the declines in April and May seems to be pointing toward a bottoming-out of the current contraction. The decline in May resulted chiefly from a further fall in the production of business equipment and materials. Output of consumer goods, on the other hand, increased for the second successive month, as production of durable goods advanced sharply. Stepped-up production of automobiles accounted for most of the rise, although output of appliances and furniture also rose during the month. In June the output of passenger cars continued to increase to the highest level since last November.

In May the Government's revised index of leading economic indicators rose 2.1 percent, a somewhat smaller increase than the advance posted in the previous month. The index currently stands at its highest level since last November, but it is still 25 percent below the peak registered in the middle of 1973. Nonetheless, the leading indicators have increased for three consecutive months, the most sustained advance since July 1973. In the past, a three-month rise after a sustained decline has invariably been followed by the end of a recession, so that the most recent increase strongly suggests the current economic downturn is ending. Of the ten indicators available for May, eight rose while the remaining two were unchanged.

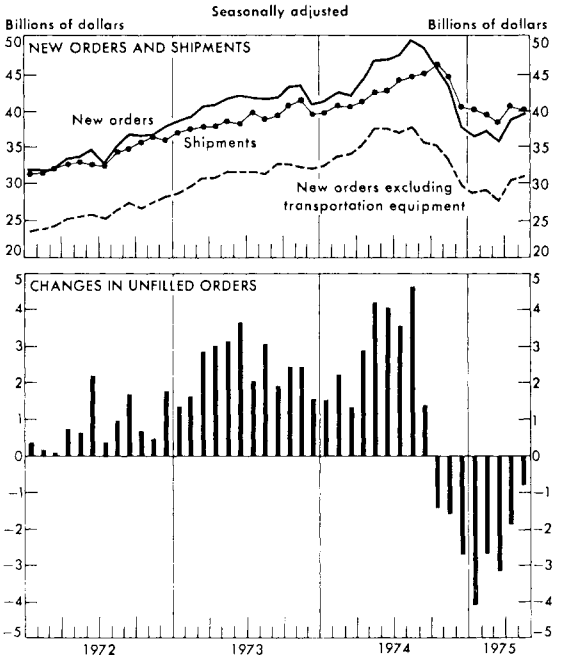
New orders for durable goods rose $498 million in May, continuing an uptrend that initially surfaced last February (see Chart II). However, the rise was neither so large as the surge in April nor so broadly based. Much of the May increase was centered in orders for primary metals, while bookings for machinery and capital goods

rose only moderately. Orders for household durable goods were essentially unchanged during May, as were bookings for transportation equipment. Shipments of durables declined during the month, but they still remained higher than the level of new orders. Consequently, the backlog of unfilled orders dropped for the eighth consecutive month.

The book value of total business inventories fell in April by $1.9 billion. This decline was slightly more than that recorded in the preceding month, and it marks the first time since 1961 that stocks have fallen for three consecutive months. Business sales, meanwhile, climbed 2.1 percent in April, after falling in four of the five previous months. Consequently, the ratio of inventories to sales equaled 1.65 months in April, down from 1.7 months in March. At this level, the stock-sales ratio in April was at its lowest reading since last November though still well above the 1.46 months of sales reached one year ago.

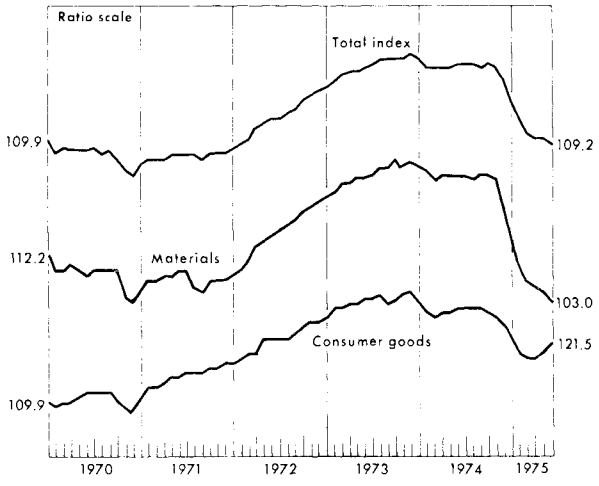
The accelerating pace of inventory liquidation was fairly widespread. In April, inventories held by manufacturers fell $1 billion, and in May the reduction was even larger. At the wholesale level, stocks fell by about $0.5 billion in April, which was well above the decumulation averaged in the previous three months. Retailers, on the other hand, worked off inventories at only a fraction of the rate recorded earlier in the year. Stocks of nondurable goods at retail outlets were liquidated at a rapid rate, but inventories of durable goods, which dropped sharply in the January-March period, were essentially unchanged in April because of a renewed buildup in stocks of unsold automobiles.

Chart II
ORDERS AND SHIPMENTS OF MANUFACTURED DURABLE GOODS
Seasonally adjusted



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

Chart I
INDUSTRIAL PRODUCTION
Seasonally adjusted; 1967=100



Source: Board of Governors of the Federal Reserve System.

PERSONAL INCOME, CONSUMER DEMAND, AND RESIDENTIAL CONSTRUCTION

Personal income rose $9.3 billion in May, as both public and private sector payrolls expanded. The increase was the largest since last September and, coupled with the distribution of tax rebates and lower withholding rates, may provide a boost to consumer spending. Government payrolls rose modestly in May, but private sector wage and salary disbursements increased by a hefty $3.4 billion. Virtually all of this was concentrated in the service and distribution industries. Manufacturing payrolls edged up only slightly in May, remaining well below the level of last January. Moreover, this small increase was centered in expanded payrolls of nondurable goods producers, as wage and salary outlays of durable goods producers continued to contract.

Consumer demand at retail outlets climbed 2.2 percent in May, as expenditures on both durable and nondurable

goods registered impressive gains. Current-dollar sales have increased in five of the last six months, with the most recent advance the largest in percentage terms since January. Spending on durable goods rose $377 million in May primarily because of higher outlays for automobiles. Although passenger car sales are still depressed, demand has slowly but steadily picked up in recent months. Auto sales jumped 8.8 percent to 6.2 million units in May and, in June, sales rose to the highest level since February. Finally, spending on nondurables jumped by more than $600 million in May, the sharpest monthly advance in nearly two years.

The housing picture also appears to have brightened in May. Housing starts rose 14 percent in May to a seasonally adjusted 1.1 million units, the highest level in eight months. Moreover, newly issued building permits rose for the second consecutive month in May and are now higher than at any time since last August. But, while a housing recovery seems to be in progress, residential construction activity has been extremely weak and the number of housing starts in May was 23 percent below the year-earlier level. However, the upturn may strengthen somewhat in coming months, since the volume of unsold homes has been reduced sharply. In April, sales of new single-family homes jumped 25 percent as the recently passed tax credit for new-home purchases went into effect. Combined with a further reduction in the number of homes available for sale, the backlog fell to 8.1 months in April, the lowest level in almost two years.

PRICE DEVELOPMENTS

Consumer prices rose at a 4.2 percent seasonally adjusted annual rate in May, as the rate of price increase of nonfood commodities and services moderated considerably. Over the three months ended in May, retail prices advanced at a 4.9 percent annual rate, the smallest three-month rise since the period ended January 1973. Nonfood commodity prices edged up at only a 2.4 percent annual rate in May, the smallest increase in twenty-two months. Consumer energy prices rose sharply in May, however, and, if these are excluded, nonfood commodity prices were unchanged in the month. Meanwhile, increases in the cost of medical care and rents pushed prices of services up at a 2.9 percent annual rate in May, the smallest advance in nearly two years. Food prices, on the other hand, have started to increase more rapidly. In May, retail food prices rose at a 6.3 percent annual rate, a somewhat more rapid rate than in April. This acceleration, which was attributable to large hikes in prices of meats and poultry, was not surprising in light of recent movements in farm prices at the wholesale level.

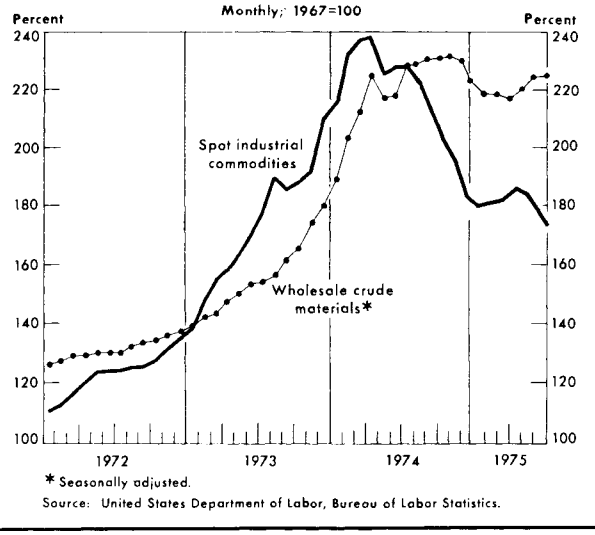
Wholesale prices declined at a seasonally adjusted 1.7 percent annual rate in June, after rising in each of the previous two months. The easing in prices was due entirely to a 16.5 percent annual-rate decline in prices of farm products and processed foods and feeds. Prices of livestock and poultry continued rising in June, but these increases were offset by fairly large declines in prices of the major feed grains. Industrial commodity prices advanced at a 4.6 percent annual rate in June, somewhat faster than in the last few months. Nevertheless, this does not appear to signal a broad resurgence in inflationary pressures since the acceleration mainly reflected higher energy prices. Indeed, industrial commodity prices excluding power and fuel rose at only a 2.2 percent annual rate in June. Increases in energy prices also contributed significantly to a 6.4 percent rise in crude material prices in that month. Since energy prices began rising again rapidly three months ago, wholesale prices of crude materials have jumped at a 14.1 percent annual rate.

Movements in crude material prices typically parallel changes in spot prices of industrial commodities. For example, beginning in 1972 and extending through four months of 1974, the run-up in commodity prices was matched by sharp increases in prices of crude materials (see Chart III). Dramatic increases in scrap metal prices were principally responsible for this commodity price

Chart III

PRICES OF INDUSTRIAL MATERIALS

Monthly; 1967=100



* Seasonally adjusted.

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

spiral. The spot metals index, which accounts for approximately one half of the entire industrial spot price index, rose more than 80 percent from the middle of 1973 to mid-1974. This was characterized by nearly a threefold increase in the price of scrap steel as well as significant increases in the prices of other metals. Prices of textiles and other raw industrial commodities, meanwhile, rose only modestly. By May of last year, market pressures began softening somewhat, and spot prices started falling, while the rise in crude material prices leveled off. Since November both series generally have moved together, but in May and June industrial spot prices fell while prices of crude materials spurted somewhat.

There are several factors which account for much of the discrepancy in these movements. Unlike wholesale prices, spot market prices are not seasonally adjusted. Also, the various commodities included in the spot market index are equally important, while the relative importance of each wholesale crude material commodity varies. Indeed, scrap metal prices amount to only about 20 percent of the wholesale price index for crude materials but nearly one half of the spot price index. Thus, if metal prices are rising or falling very rapidly while other prices are registering small changes, the spot price index will be affected more than wholesale crude materials.

More broadly, it should be emphasized that the composition of the two series differs. In particular, prices of crude petroleum and bituminous coal are excluded from the spot price index but are part of the wholesale crude materials index. Conversely, prices of textiles are included in the spot market index, but they do not appear in the index for wholesale crude materials. These differences became very significant beginning in the summer of 1974, when a huge gap in the two measures opened up. A plunge in metal prices and a moderate drop in prices of textiles pushed spot prices down sharply. However, a similar decline in wholesale crude material prices was prevented by sharp increases in energy prices. More recently, further increases in energy prices have again caused spot and wholesale prices to move in opposite directions. In fact, a rise in energy prices accounts for most of the increase in prices of crude materials during May. If energy prices are excluded, crude material prices barely changed at all in that month. Hence, the rise in prices of crude materials does not alter the fact that inflationary pressures are moderating. Certainly the recent movement in industrial spot prices suggests that the market for most basic commodities is still rather weak.

LABOR MARKET DEVELOPMENTS

Unemployment declined to 8.6 percent of the civilian labor force in June, after reaching 9.2 percent in the preceding month. This was the first drop in more than one year, and the jobless rate is now the lowest since February. Whether this does in fact mark a definite improvement in labor market conditions is questionable, though, since the unemployment rate has been distorted by faulty seasonal adjustment procedures in the last two months. Subsequent revision will probably show that the jobless figures initially reported were too high in May and too low in June. Nevertheless, the total number of employed persons did rise again in June, although not by as much as in May, and most of the major categories of workers experienced lower unemployment in June. On the other hand, the percentage of those unemployed for more than fifteen weeks rose to 3.1 percent of the civilian labor force, the highest since the series began in 1948.

The separate survey of nonfarm establishments suggests that the labor picture was essentially unchanged in June. Total payroll employment edged up slightly during the month, as payrolls in the trade, finance, and services industries all increased. Government payrolls also expanded slightly in June, but this may not persist in light of recent budget cutbacks among states and localities. Meanwhile, the number of employees in construction fell by 52,000 persons in June. Manufacturing employment also declined slightly, after rising in May. The drop in June, however, was not nearly so large as the declines in manufacturing payrolls registered earlier in the year.

The Money and Bond Markets in June

Long-term interest rates declined moderately in June, but virtually all short-term rates and yields on intermediate-term Government securities rose substantially. As the month opened, all sectors of the credit market displayed a hesitant tone, with upward pressure on rates stemming in part from market disappointment that the Federal funds rate did not decline further. A major rally in the Treasury bill market and all the coupon markets emerged upon announcement of a reduction in the volume of Treasury bill financing in June. By midmonth the yields on three- and six-month Treasury bills had fallen to their lowest levels in over two and one-half years. Demand proved disappointing at the lower yield levels, and announcements of the Treasury's plans to borrow considerably in the bill market in July caused a sharp, rapid retracing of previous declines. Market participants also became increasingly concerned about the rapid growth of the money supply and the persistent uptrend in the Federal funds rate. By the end of the month the yield on the three-month Treasury bill was 66 basis points above its level of 5.20 percent at the end of May.

In contrast to the fluctuating movements of Treasury bill yields, virtually all private money market rates moved steadily higher over the course of the month. Notably, the effective rate on Federal funds in June averaged 33 basis points above its average level in May, the first monthly increase in this rate since July of last year. Other money market rates displayed similar increases.

The announcement early in the month projecting less near-term borrowing by the Treasury caused intermediate-term Government yields to fall sharply, but this decline was virtually erased when the Treasury subsequently announced that it would borrow $9.4 billion in the bill market and the intermediate-term coupon sector prior to the August refunding. At the same time, the absence of immediate Treasury plans to offer further long-term bonds permitted that sector of the Government market to sustain the rate decline that had occurred earlier. The long-term Government market and the private long-term debt market also benefited from publication of data on wholesale and consumer prices which suggested an abatement of inflationary pressures. In the corporate market, where the volume of new offerings remained very high, most major issues offered early in the month sold out quickly at yields well below those on comparable securities offered in the preceding month. Resistance to some issues emerged toward the close of June in the wake of the rise in the Federal funds rate and the continuing heavy volume of offerings. The municipal market benefited initially from the favorable impact of the outlook for inflation which was augmented as the market gained confidence that New York City would avoid default on its debt due June 11. The tone of the municipal market deteriorated near the end of the month, however, as the calendar remained heavy.

Preliminary data suggest that the narrow and broad money supply measures grew very rapidly in June. The rapid growth of these monetary aggregates was partially due to the effects of tax rebates by the Treasury and the special social security payments made during the month. Banks continued to allow a large volume of certificates of deposit (CDs) to run off in June as loan demand remained weak. Despite this, the bank credit proxy posted a sizable increase on the strength of demand and consumer-type time deposit growth.

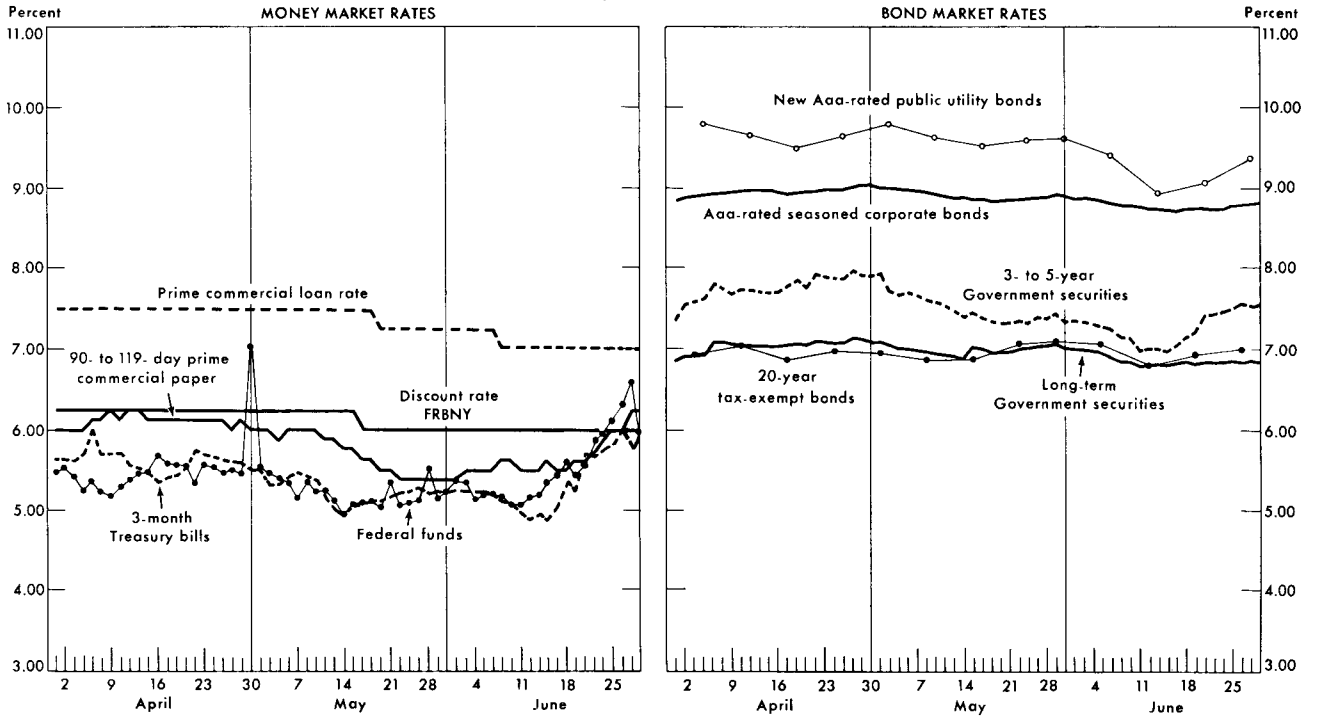
THE MONEY MARKET AND THE MONETARY AGGREGATES

Demand for short-term credit continued to be weak during June, a month typically characterized by strong credit demands. At weekly reporting commercial banks in New York City, business loans rose just $7 million in the four weeks ended June 25. Moreover, business loans (including loans sold to affiliates) at weekly reporting banks in New York City increased only $92 million during the statement week ended June 18, which included the June 15 tax date. By contrast, in the preceding three years, business loan growth had averaged $516 million in the statement week including the June 15 tax date. The volume of nonfinancial commercial paper outstanding

Chart I

SELECTED INTEREST RATES

April-June 1975



Note: Data are shown for business days only.

MONEY MARKET RATES QUOTED: Prime commercial loan rate at most major banks; offering rates (quoted in terms of rate of discount) on 90- to 119-day prime commercial paper quoted by three of the five dealers that report their rates, or the midpoint of the range quoted if no consensus is available; the effective rate on Federal funds (the rate most representative of the transactions executed); closing bid rates (quoted in terms of rate of discount) on newest outstanding three-month Treasury bills.

BOND MARKET YIELDS QUOTED: Yields on new Aaa-rated public utility bonds are based on prices asked by underwriting syndicates, adjusted to make them equivalent to a standard Aaa-rated bond of at least twenty years' maturity; daily averages of yields on seasoned Aaa-rated corporate bonds; daily averages of yields on long-term Government securities (bonds due or callable in ten years or more) and on Government securities due in three to five years, computed on the basis of closing bid prices; Thursday averages of yields on twenty seasoned twenty-year tax-exempt bonds (carrying Moody's ratings of Aaa, Aa, A, and Baa).

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

decreased $673 million in the four weeks ended June 25, after having decreased $913 million in the four weeks ended May 28.

The persistent sluggishness of loan demand prompted reductions in commercial banks' prime lending rates in early June. A major New York City bank, which uses a formula as a guide in determining its prime rate, announced a reduction from 7 percent to 6¾ percent at the end of the initial calendar week of the month. The following Monday, most other major money-center banks lowered their prime rate from 7¼ percent to 7 percent (see Chart I).

Other money market rates generally rose in June, particularly during the last half of the period. The Federal funds rate averaged 5.55 percent during the month, up 33 basis points from its average in May. The rate on 90- to 119-day dealer-placed commercial paper increased from 5.38 percent at the end of May to 6.25 percent at the end of June. Similarly, the yield on 90-day commercial bank CDs in the secondary market closed the month at 5.93 percent, up 37 basis points from its end-of-May level. Most money market rates have fluctuated in a narrow range during the last several months, after dropping sharply from mid-1974 through early spring of this year. The rate on Federal funds, for example, fell from a peak of about 14 percent reached at the beginning of July 1974 to about 5¼ percent in April and has generally fluctuated between 5 percent and 6 percent since that time. Most other money market rates have exhibited a similar pattern.

Preliminary data suggest that the growth of the narrow money supply (M_1)—private demand deposits adjusted plus currency outside commercial banks—accelerated sharply during June. Seasonally adjusted, the average level of M_1 in the four weeks ended June 25 was 18.8 percent, on an annual basis, above the four-week average value four weeks earlier. This rapid growth of M_1 arose, to some extent, from the disbursement by the Treasury of tax rebates and from the special social security payments made during the month. Coupled with the substantial growth in May, the average level of seasonally adjusted M_1 in the four weeks ended June 25 was 10.8 percent, on an annual basis, above its seasonally adjusted average level in the four weeks ended thirteen weeks earlier (see Chart II). The recent expansion of M_1 appears somewhat less rapid when viewed over a longer time frame. Compared with its four-week average in the interval ended twenty-six weeks earlier, M_1 grew at a seasonally adjusted annual rate of 6.5 percent in the four weeks ended June 25.

Depositors continued to find yields on consumer-type time and savings accounts attractive relative to those available on open market instruments, and the outstanding volume of these accounts rose rapidly in June. As a result, M_2—which includes these deposits plus M_1—was 19.4 percent higher on a seasonally adjusted annual basis in the four weeks ended June 25 than it had been in the four-week period ended four weeks earlier. The average level of commercial bank large negotiable CDs outstanding declined at a seasonally adjusted annual rate of 27.3 percent over the same period. Despite this decline, the growth of the adjusted bank credit proxy—all deposits at member banks subject to reserve requirements plus certain nondeposit sources of funds—was also rapid in June. Its seasonally adjusted average level in the four weeks ended June 25 was 17.4 percent higher, on an annual basis, than its average level in the preceding four-week period. Member banks continued to make little use of the discount window, and borrowings equaled $97 million in June (see Table I).

THE GOVERNMENT SECURITIES MARKET

The tone of the Government securities market in June was dominated largely by anticipations and announcements regarding Treasury borrowing plans. An optimistic atmosphere emerged soon after the first regular bill auction, when the Treasury announced plans to reduce its borrowings at the second and third bill auctions of the month, and rates plummeted dramatically in response. The lower rate levels attained proved to be unsustainable, however, and announcements of further borrowing in the bill and

Table I

FACTORS TENDING TO INCREASE OR DECREASE MEMBER BANK RESERVES, JUNE 1975

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

Factors	Changes in daily averages—week ended				Net changes
	June 4	June 11	June 18	June 25	
"Market" factors					
Member bank required reserves	— 146	+ 454	— 841	— 27	—560
Operating transactions (subtotal)	+1,370	+4,023	— 7	—3,063	+2,323
Federal Reserve float	+ 331	— 2	+ 18	— 195	+ 152
Treasury operations*	+1,648	+4,031	+ 337	—2,763	+3,253
Gold and foreign account	— 4	+ 27	— 48	+ 63	+ 38
Currency outside banks	— 233	— 504	— 232	— 292	—1,261
Other Federal Reserve liabilities and capital	— 372	+ 470	— 82	+ 123	+ 139
Total "market" factors	+1,224	+4,477	— 848	—3,090	+1,763
Direct Federal Reserve credit transactions					
Open market operations (subtotal)	—1,364	—4,744	+1,108	+2,677	—2,323
Outright holdings:					
Treasury securities	— 837	—2,680	+ 807	+1,477	—1,233
Bankers' acceptances	— 9	— 27	— 26	— 7	— 69
Federal agency obligations	— 54	— 3	—	—	— 57
Repurchase agreements:					
Treasury securities	— 568	—1,640	+ 307	+1,022	— 879
Bankers' acceptances	+ 53	— 119	+ 3	+ 106	+ 43
Federal agency obligations	+ 51	— 275	+ 17	+ 79	— 128
Member bank borrowings	—	— 46	+ 40	+ 110	+ 104
Seasonal borrowings†	— 1	+ 2	— 1	—	—
Other Federal Reserve assets‡	+ 325	— 48	+ 114	+ 25	+ 416
Total	—1,039	—4,838	+1,262	+2,812	—1,803
Excess reserves‡	+ 185	— 361	+ 414	— 278	— 40

	Daily average levels				Monthly averages§
Member bank:					
Total reserves, including vault cash‡	34,543	33,728	34,978	34,732	34,495
Required reserves	34,197	33,743	34,584	34,611	34,284
Excess reserves	346	— 15	399	121	213
Total borrowings	84	38	78	188	97
Seasonal borrowings†	9	11	10	10	10
Nonborrowed reserves	34,459	33,690	34,900	34,544	34,398
Net carry-over, excess or deficit (—)||	36	42	— 109	124	23

Note: Because of rounding, figures do not necessarily add to totals.

* Includes changes in Treasury currency and cash.

† Included in total member bank borrowings.

‡ Includes assets denominated in foreign currencies.

§ Average for four weeks ended June 25, 1975.

|| Not reflected in data above.

intermediate sectors pressed rates upward quickly. Long-term Government securities yields remained firm at the lower rates attained, as that sector of the market was relieved by the absence of further long-term bond borrowing in the immediate future.

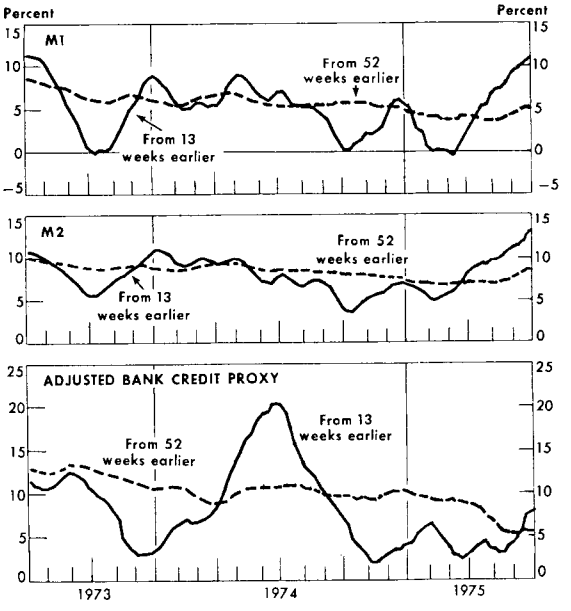
The bill market displayed a hesitant tone initially, and this prompted a slight increase in the average rates on three- and six-month bills at the first regular weekly auction of the month. A firmer tone began to manifest itself subsequent to the auction when it was announced that $300 million less would be raised at the following auction. The market improved even further when it was later announced that the Treasury would offer only $4.5 billion in bills at the June 16 auction in return for $6 billion in bills maturing on June 19. Rates moved down at the June 16 auction, as market participants contemplated this net repayment, and the average issuing rates for the three- and six-month bills were set at 4.77 percent and 5.13 percent, respectively (see Table II), down 44 basis points and 34 basis points from the rates set at the last auction in May. Market participants were disappointed, however, that tenders for bills were spread over an unusually wide range and that post-auction demand was not so strong as anticipated. The market weakened the following day, when interest in the two-year note auction was less enthusiastic than had been expected. It deteriorated even further later that week, when the Treasury announced plans to raise $9.4 billion of new cash between July 1 and August 15. Included in those plans were increases in the volume of offerings at the weekly bill auctions, beginning with the last regular weekly auction in June, and the raising of $600 million in new cash at the auction of 52-week bills in late June. Upward rate pressure also followed System action to absorb reserves on Friday, June 20, through matched sale-purchase agreements at a time when money market participants expected the System to supply reserves. In the wake of these developments, rates rose sharply. Yields on the three-month, six-month, and 52-week bills closed the month up 66, 68, and 65 basis points, respectively, from their end-of-May levels of 5.20 percent, 5.44 percent, and 5.78 percent.

The announcements of the reduction in the supply of bills early in the month had a positive influence upon the coupon sector of the Government securities market. And this sector also benefited from reports suggesting an abatement of inflation. Rates on most issues fell through midmonth, when an upward correction began to take hold. Investors and dealers were disheartened with the wide range of tenders at the June 16 bill auction and the unexpectedly low volume of bids at the two-year note auction on June 17. At that auction, only $2.6 billion in bids was received for the $2 billion in notes offered. Investors were also disappointed that the average issuing rate was not lower than the 6.61 percent set. The concern of participants in the intermediate portion of the market increased when the Treasury announced that included in the $9.4 billion it planned to raise between July 1 and August 15 was a $1.75 billion four-year note issue and a $1.5 billion two-year note issue. At the same time, the long-term sector of the market was encouraged by the absence of any long-term issue in the Treasury's financing plans. In this environment, intermediate rates rose sharply while long-term rates remained stable. The four-year note payable July 9 was auctioned on June 25. Investor interest was keen, and the note was awarded at an average rate of 7.83 percent. At the close of the month, the index of yields on intermediate-term Government securities stood at 7.56 percent, up 23 basis

Chart II

CHANGES IN MONETARY AND CREDIT AGGREGATES

Seasonally adjusted annual rates



Note: Growth rates are computed on the basis of four-week averages of daily figures for periods ended in the statement week plotted, 13 weeks earlier and 52 weeks earlier. The latest statement week plotted is June 25, 1975.

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

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

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

Source: Board of Governors of the Federal Reserve System.

points from its closing level in May. In contrast, the long-term Government bond yield index was down 15 points at 6.86 percent at the end of June.

Developments in the market for Federal agency obligations paralleled those in the intermediate sector of the Government securities market. Rates fell initially in the generally optimistic trading atmosphere, which prevailed early in the month, but then retraced earlier declines when the Government's borrowing plans for the July 1-August 15 period were announced. A further dampening factor in the agency market was the unexpected announcement by the Federal National Mortgage Association (FNMA) of its plans to market $300 million in nine-year notes dated June 26. The notes carried an 8.2 percent coupon and were placed slowly. Earlier in the month, a Banks for Cooperatives offering of $423.7 million of 5.65 percent bonds due January 5, 1976 was very well received when priced at par. A concurrent Federal Intermediate Credit Bank offering of $1.3 billion was also very well received. That offering consisted of $738.5 million of 5.8 percent bonds due April 1, 1976 and $531 million of 7.4 percent bonds due in four and one-half years. A Federal Land Bank $390.5 million offering of 8.10 percent bonds due in ten years was also very well received when priced at par.

Yields declined at the first two FNMA mortgage commitment auctions held in June, but the yield on FNMA commitments to purchase insured mortgages rose at the June 30 auction. At these auctions, held every other Monday, mortgage originators bid for four-month commitments from FNMA to purchase insured and conventional mortgages. Yields at these auctions and the volume of offerings to FNMA rose substantially in March and April, reflecting expectations of higher interest rates over the four-month horizon. These expectations stemmed in turn from the market's impression that the large volume of Federal borrowing would cause a sharp rise in interest rates. Beginning in late May and continuing through June, these expectations were revised in view of the overall stability of interest rate levels. At the last FNMA mortgage auction in June, the yield on four-month commitments on insured mortgages was set at 9.07 percent. Even though this was slightly above the yield set on insured mortgage commitments at the preceding auction, it was still 22 basis points below the 9.29 percent rate on insured mortgages set at the May 5 auction.

Table II

AVERAGE ISSUING RATES AT REGULAR TREASURY BILL AUCTIONS*

In percent

Maturity	Weekly auction dates—June 1975				
	June 2	June 9	June 16	June 23	June 30
Three-month	5.258	5.080	4.767	5.665	6.009
Six-month	5.505	5.283	5.129	5.935	6.262
	Monthly auction dates—April-June 1975				
	April 2	April 30	May 28	June 24	
Fifty-two weeks	6.475	6.400	5.803	6.292	

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

THE OTHER SECURITIES MARKETS

Both the corporate and municipal bond markets improved in June. These markets sustained strong rallies through the middle of the month, largely in response to the near-term decline in the volume of Treasury offerings and the reported reductions in the rate of inflation. In the municipal market, a further impetus to higher prices was provided by the temporary resolution of New York City's liquidity problems. The city had been in danger of defaulting on $792 million in notes and interest due June 11. The possible default on these securities was avoided when the New York State legislature enacted legislation establishing the Municipal Assistance Corporation (MAC). Among its various powers and responsibilities, the corporation is authorized to issue up to $3 billion in long-term debt in order to repay a like amount of the city's short-term debt. Upon enactment of the legislation establishing the MAC, funds were made available to the city to pay off its maturing debt through a combination of rollovers of outstanding loans, advances from New York State, and incoming city revenues. The initial issue by the MAC of a record $1 billion of tax-exempt bonds on June 30 sold slowly despite offering yields ranging from 6.5 percent in 1977 to 9.5 percent in 1990.

With the exception of the MAC offering, the largest tax-exempt issue of the month was a $450 million offering by Massachusetts sold on June 30. The state's credit rating had been lowered to A-1 earlier in the month in view of the recent frequency of its offerings and the state's budget deficit. The issue was comprised of equal $90 million amounts maturing in 1976-80. It was priced to yield from 4.75 percent in 1976 to 5.8 percent in 1980 and was virtually sold out on the day it was offered. Among

the other major municipal bond offerings of the month were $100 million offerings by the State of California and the State of Connecticut. The $100 million Aaa-rated California offering reached the market early in the month and incurred an average issuing cost of 5.84 percent for maturities running from 1976 to 1995. The bonds were reoffered by the underwriters to yield from 3.60 percent to 6.40 percent and were about 70 percent sold by the end of the first day of trading. The Connecticut issue, which was marketed a week later, fared better even though one of the rating agencies had lowered the rating of Connecticut's debt to Aa in view of the state's budget deficit. The issue was awarded at a net interest cost of 5.64 percent for the same maturity range as the California offering. The Connecticut issue was almost entirely sold on the first day of trading after it was reoffered to yield from 3.50 percent to 6.10 percent.

The largest corporate debt offering of the month was a $300 million issue of thirty-year bonds by Standard Oil Co. of Indiana, which came to market on June 12. The Aaa-rated issue carries an 8⅜ percent coupon and is protected for ten years against early redemption. When priced to yield 8.47 percent, the issue sold out quickly. In contrast, during May, Aaa-rated industrial offerings of the same maturity by Texaco Incorporated and Shell Oil Company were priced to yield 8.95 percent and 8.82 percent, respectively. The following week, Monsanto Company, whose debt securities carry an Aa rating, offered a package consisting of $175 million of twenty-five year bonds and $100 million of ten-year notes. The twenty-five year bonds, which carry an 8½ percent coupon and ten-year call protection, were offered to the public at 8.55 percent, just 8 basis points above the yield on the Aaa-rated Standard Oil issue. They were sold out by the end of the first day of the offering. The ten-year notes carry an 8 percent coupon and are protected for seven years against early redemption. They also sold out rapidly when priced at par.

Two Bell System bond issues came to market in June. Early in the month, a New England Telephone & Telegraph Co. offering of $175 million in thirty-five year notes carrying a 9½ percent coupon was marketed at a yield of 9.475 percent, a rate at which they sold out quickly. The relatively high yield on the issue reflected the diverse ratings accorded New England Telephone by the rating agencies. Moody's maintained the company's Aaa rating, but Standard & Poor's gave the company an Aa-1 rating in view of the company's relatively low debt-coverage ratio. The bonds are protected against call for five years. Later in the month, Northwestern Bell Telephone Company, whose debt has an Aaa rating, encountered stiff market resistance to a $150 million offering of 8⅝ percent bonds due in 2012. The issue, which is protected against call for five years, was apparently priced ahead of the market when reoffered by the underwriters to yield 8.65 percent. Only about 50 percent of the issue sold out on the day it was offered, and the supply overhang tempered the market rally.

Overall, the improved tone of the corporate and municipal bond markets brought the Federal Reserve Board's index of yields on recently offered Aaa-rated corporate securities down to 9.41 percent by the end of June, compared with 9.70 percent at the end of May. The weekly Bond Buyer index of twenty bond yields on twenty-year tax-exempt bonds dropped 9 basis points to 7 percent. The Blue List of dealers' advertised inventories fell $54 million from its level of $614 million at the end of the preceding month.

Toward Early Warning of Changes in Banks' Financial Condition: A Progress Report

By LEON KOROBOW AND DAVID P. STUHR*

It has always been the responsibility of bank supervisors to identify and investigate a weakening financial situation at any bank under their jurisdiction and to require bank management to take remedial action. An important supervisory aid in fulfilling this responsibility is the on-site examination, and practically all the nation's banks are subject to on-site examinations at regular intervals. Yet, it is clearly desirable for bank regulatory authorities to have current information on a bank's underlying financial condition in the periods between examinations. To some extent, this need is met by the detailed balance-sheet and operating data that are reported by the banks to regulatory authorities and by other financial information which is available generally. Recently this current financial information has begun to be probed systematically for possible use in developing early warning indicators to assist bank supervisors. The events of the recent past, when a few large banks had to be absorbed by other banks, have reemphasized the need for a continuing effort to improve our techniques for identifying a deteriorating situation at an early stage.

The Banking Studies Department of the Federal Reserve Bank of New York has been engaged in ongoing research to develop a statistical procedure that would aid in the evaluation of the financial soundness or weakness of banks from a specific set of financial variables. The initial results of these efforts, reported elsewhere, are promising.[1] In brief, they show that financial variables obtained from empirical data can be used in a discriminant function to distinguish, with a high degree of accuracy, between banks that were accorded high summary (or composite) ratings by bank supervisory authorities and banks that were given low summary ratings.

The purpose of this paper is to report the results of further research into the use of statistical procedures, including discriminant analysis, to provide bank supervisory authorities with advance warning of possible deterioration in the financial condition of banks under their jurisdiction. The overall thrust of our research has been to identify banks that are potentially vulnerable to financial difficulty, compared with those that can be considered resistant. One of our aims is to provide an indication of a bank's ability to withstand adverse economic or financial developments from data that are regularly available without an on-site examination. Through these approaches, we believe efficiencies can be achieved in the allocation of supervisory resources devoted to preserving and encouraging a sound and competitive banking system. The results thus far indicate that the statistical

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[1] 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. See also Joseph F. Sinkey, Jr., and David A. Walker, "Problem Banks: Identification and Characteristics", *Journal of Bank Research* (Bank Administration Institute, Winter 1975), and Joseph F. Sinkey, Jr., "A Multivariate Statistical Analysis of the Character of Problem Banks", *The Journal of Finance* (American Finance Association, March 1975).

procedures described in this article can make a significant contribution to this objective.

HOW DISCRIMINANT ANALYSIS CAN BE USED TO CLASSIFY BANKS

The latest results of the discriminant project are very much an outgrowth of the work described in the September 1974 *Monthly Review*. It is useful, therefore, to summarize how discriminant analysis was applied in the earlier research. In brief, discriminant analysis is a procedure for studying two or more distinct groups of observations. This process involves the estimation of an equation that simultaneously takes into account the effects of the variables considered to be important in distinguishing between the groups. Once the equation is estimated, it can be used to classify individual observations in a group by multiplying the values of the variables in the equation by their respective coefficients and obtaining a "discriminant score" for the particular observation. The discriminant score determines the group into which the observation is classified.[2]

The coefficients for the variables are determined so as to maximize the squared difference between the mean scores of the groups, relative to the degree of variability of the scores within each group. A small difference in means, relative to this variability, will result in a large overlap between the distributions of the discriminant scores and a relatively high probability that the function will not classify correctly.

In the early phase of the work, banks that received a high summary rating ("1") from Federal Reserve Bank of New York supervisory personnel over a specified period formed a group of banks considered financially sound, and banks that received a low ("3" or "4") summary rating were considered the weak group. A sample of banks from each of these two respective groups was chosen, and various data pertaining to these banks were employed to estimate a discriminant function. (Banks with intermediate ("2") summary ratings were not used to estimate the function.) With the sample data chosen, a discriminant function was estimated by means of a computer program that calculated weights for the given set of financial variables being used in the function. Once the function was computed, it was used to calculate a discriminant score for each member bank in the Second Federal Reserve District. Since the analysis was designed to separate two distinct groupings (*i.e.*, financially sound *vs.* weak), we expected —as proved to be the case—that the discriminant scores of banks given an intermediate summary rating by supervisory personnel (*i.e.*, a rating of "2") would, in general, fall between the scores of the high and low groups.

In this earlier work, the discriminant functions were obtained from data for 1967 and 1968. After studying the discriminating power of many types of variables thought to be important factors in determining financial soundness or weakness as defined by supervisory personnel, we concluded that eight variables yielded superior discrimination with respect to the ability of a discriminant function to distinguish between the two broad groups (*i.e.*, sound and weak) based on the summary ratings given banks by supervisory personnel. Several of these variables were intended to measure each of the factors considered by bank supervisors to be important determinants of bank soundness. For example, certain aspects of general bank management ability were included. Net income before taxes, as a percentage of total capital, and dividends, also as a percentage of total capital, were expected to reflect overall bank performance. Further, bank borrowing (*e.g.*, gross purchases of Federal funds) as a percentage of total capital was designed to capture one type of risk exposure. Asset quality was measured by the ratio of classified loans and securities plus one half of specially mentioned loans to total loans and securities. (This information was obtained from examination reports of state-chartered member and national banks.) Capital adequacy was measured by the ratio of total capital to total assets. Three other variables were introduced to hold constant several major factors that could be expected to affect the financial condition of a bank: (1) total deposits, suggesting that a large bank can benefit from portfolio diversification and, with its greater resources, may be in a position to attract highly qualified personnel; (2) net occupancy expense as a percentage of net income, introduced as a proxy for branch structure as well as the efficiency of that structure; and (3) the loan-asset ratio, to measure the risks inherent in the asset portfolio.

Earlier this year we employed these same discriminant functions, as estimated from data for 1967 and 1968, to obtain discriminant scores for the state-chartered member banks in the Second Federal Reserve District by entering 1974 data for the variables in the function. We had two purposes in mind: first, to test whether the same discriminant functions with coefficients developed from the data for 1967 and 1968 could distinguish the banks that had high summary ratings in 1974 from those that had low summary ratings and, second, to investigate in-

[2] See Stuhr and Van Wicklen, *op. cit.*, pages 235-36, and the references cited therein.

stances in which banks that had received high or intermediate summary ratings from supervisory personnel in 1974 nonetheless received low scores from the discriminant functions. In these latter cases, either the functions were in error or, on the contrary, were suggesting weakness in advance of a change in the banks' respective summary ratings.

With regard to the first objective, we found that the discriminant functions correctly classified all the banks with low summary ratings and virtually all the banks with high summary ratings. With regard to the second objective, we found that several banks having intermediate summary ratings in 1974 received low discriminant scores when 1974 data were entered for these banks in both the 1967 and 1968 functions estimated earlier. On further investigation we found that most of them were being subjected to special scrutiny by supervisory personnel. In general, our analysis indicated that the failure of the discriminant score to confirm a bank's current summary rating was cause for further investigation of the bank's condition, particularly when the discriminant score was suggestive of a weakening situation.

DEVELOPING AN EARLY WARNING PROCEDURE

PROBLEMS IN OBTAINING APPROPRIATE DATA AND SAMPLE BANKS. The experience with the 1967 and 1968 discriminant functions just described clearly showed that certain financial statistics can be used successfully to classify banks according to the summary ratings given by supervisory personnel. Moreover, these functions also demonstrated an ability to anticipate changes in a bank's summary rating. The apparent misclassifications of several banks that had not been given low summary ratings by supervisory personnel were validated when these banks' ratings subsequently were downgraded. Thus, there seemed to be significant evidence to suggest that there are decided differences between banks that are sound financially and likely to remain so for some time in the future and banks that, while enjoying a high or intermediate summary rating in any current period, may be vulnerable to deterioration in the future.

In extending the earlier research, our objective has been to develop a statistical procedure or function that could provide an accurate indication of a bank's "resistance" or "vulnerability" to financial difficulty in the future. The possible use of the earlier discriminant functions to identify banks that are either "resistant" or "vulnerable", however, raised a number of questions. First, it was evident that the quality-of-assets variable based on data from on-site examinations was very important in distinguishing banks with high summary ratings from those with low summary ratings in any current period. It was not clear whether resistance or vulnerability could be determined accurately from the information in an examination report many months old. Data for the quality-of-assets variable would normally be available only after an on-site examination was completed. Thus, it would usually not be possible to obtain discriminant scores more than once annually if such data were needed in the discriminant function.

One approach to remove the dependence on examination data was to investigate proxy variables for the quality-of-assets variable, *i.e.,* to use regularly reported financial data to obtain variables that were sensitive indicators of a potential decline in a bank's asset quality. We expected such variables to contribute to low discriminant scores for those banks that were vulnerable to general economic adversity and likely to be accorded low summary ratings in the future, even though the banks' current summary ratings might indicate high or intermediate appraisals by supervisory personnel. In other words, we reasoned that a good early warning function might be likely to accord low discriminant scores to banks with intermediate or even high summary ratings in the current period, if those banks evidenced vulnerability that could result in low summary ratings in the future.

A second problem in using the functions we estimated earlier deals with the samples that might be used to distinguish between banks that are resistant to financial difficulty and those that are potentially vulnerable. In the earlier work, discriminant functions were estimated from sample banks grouped according to high and low summary ratings awarded by supervisory personnel. A discriminant function based on the data of such sample banks might be expected to emphasize variables that are important in making that distinction. While it is reasonable to expect that banks with high summary ratings can be considered resistant to financial difficulty and banks with low ratings nonresistant, we believed it possible that sample data from such banks might tend to reflect differences that are important in simulating current summary ratings given by supervisory personnel. Since our goal is to detect banks that are vulnerable to a weakening in their financial condition in the future, rather than merely to simulate the current summary ratings determined by supervisory personnel, we decided to explore a method of defining resistant and vulnerable banks independently of these supervisory ratings. We expected that a sampling of banks that are relatively resistant to financial difficulty as distinguished from banks that are potentially vulnerable might yield different information than that obtained from bank samples based on high and low current summary ratings.

DEFINING RESISTANCE AND VULNERABILITY INDEPENDENTLY OF SUPERVISORY RATINGS. We investigated a number of financial variables, excluding data from examination reports, which most bank analysts and bank supervisors would agree are important indicators of bank performance and financial strength. Our initial set of variables included many that were studied at an earlier stage in estimating discriminant functions to classify banks according to their current summary ratings, whether or not these variables had proved useful in making that distinction. These variables were included in this analysis if there was a theoretical basis for believing that high or low values of the variable would be suggestive of resistance to financial difficulty or of potential vulnerability. For example, liquidity variables that had not proved useful in classifying banks in a current year by means of discriminant analysis were investigated on the grounds that bank illiquidity may indicate a willingness of bank management to undertake above-average risk. Further, the return on loans was added as a proxy for the quality-of-assets variable, since the former variable is likely to be correlated with, and possibly be a leading indicator of, actual loan losses. A higher than average nominal return can represent compensation for possible increased losses in the future if economic conditions become adverse. The full set of variables, described below, is intended to be sensitive to a bank's: (a) management quality, as indicated by income earned and dividends paid; (b) efficiency, as indicated by operating expenses in relation to revenues; (c) capital adequacy, as reflected in gross capital to total assets and in gross capital to total loans; (d) risk exposure, as reflected in the bank's use of Federal funds and other such borrowed funds, but exclusive of certificates of deposit, average interest cost of time and savings deposits, the level of total loans in relation to total assets, the rate of return on loans, and the ratio of commercial and industrial loans to total loans; (e) liquidity, as reflected in a bank's holdings of United States Government securities; and (f) size, as measured by total deposits.

The variables described above were employed to define two distinct groups of banks, one that is resistant to adverse economic conditions and one that is vulnerable, without resort to supervisory ratings.[3] In using specific variables for this purpose, we expected that the independent effects of certain of them (those listed below denoted by a plus sign) would be positively associated with resistance to financial difficulty, while others (denoted by a minus sign) would be positively associated with vulnerability.

(1)	Net income before taxes/Total capital	+
(2)	Dividends/Total capital	+
(3)	Gross capital/Total assets	+
(4)	Holdings of Government securities/Total assets	+
(5)	Size, in terms of deposits	+
(6)	Operating expenses/Total revenues	−
(7)	Loans/Gross capital	−
(8)	Gross Federal funds purchased and other such borrowed funds/Total capital	−
(9)	Loans/Total assets	−
(10)	Commercial and industrial loans/Total loans	−
(11)	Rate of return on loans (as a proxy for risk)	−
(12)	Average interest rate paid on time and savings deposits	−

These variables were combined by means of a relatively simple index procedure. First, we calculated the mean and standard deviation of each variable in order to obtain a measure of each bank's performance in relation to a large number of other banks with respect to the particular variable. Then we subtracted from the specific value of each variable for each bank the overall mean of that variable and divided the result by the standard deviation. The resulting standardized deviations were summed for each bank.[4] The sums then were arrayed from highest to lowest, forming a ranking in which we expected the resistant banks to be at the top and the vulnerable banks at the bottom. This ranking was used in two ways, as described further below: (1) to place banks with low rankings in a group designated as vulnerable and to place banks with high rankings in a group designated as resistant and (2) to obtain samples of banks from which a function was estimated for the purpose of dividing banks into these two groups.[5]

[3] The variables just described are not meant to be an exhaustive list of indicators of resistance to financial difficulty or vulnerability. It is likely that other variables may be important discriminators.

[4] This procedure implies an equal weighting of all the variables.

[5] The discussion of these two groups does not include an independent test of resistance or vulnerability, but rather focuses on how this approach can improve the efficiency with which supervisory resources are allocated.

THE PERIOD AND THE DATA. The period studied covered 1969 to early 1975, years in which there were significant financial strains in our economy and a deterioration in the financial condition of some banks that consequently were given low summary ratings. Financial data were obtained from the Reports of Income and Reports of Condition for all banks in the Second Federal Reserve District for 1969-71. Information from examination reports was employed for 1968.[6] In addition, the summary ratings for all the member banks in the Second District were obtained from Federal Reserve Bank of New York supervisory personnel for the period 1969 to early 1975.

SEPARATING BANKS INTO VULNERABLE AND RESISTANT CLASSES. Several alternative procedures were employed to divide all the member banks in the Second Federal Reserve District into two groups—*i.e.,* resistant and vulnerable—in each of the several selected years. The multivariate ranking, based on the twelve variables described earlier, and a function based on that ranking were used to separate banks into resistant and vulnerable groups in each of those years. In addition, for comparative purposes, discriminant functions were estimated from a sample of banks that were given high and low summary ratings by supervisory personnel in the selected years. One function employing examination data was estimated for 1969, and one without such information was estimated for each of the years 1969, 1970, and 1971. All these procedures yielded discriminant or rank scores for all the member banks in each of the years studied.

Once these scores or rankings were obtained, it was necessary to determine a cutoff point that divided the banks into the two groups. Before describing in detail how this cutoff point was determined, it is useful to note that the separation between banks deemed resistant and those considered vulnerable can be expected to be imperfect. Thus, any decision rule establishing a cutoff point between resistant and vulnerable banks will be associated with a particular probability that some banks which are financially resistant will be included in the vulnerable group, and a particular probability that some banks which are vulnerable will be included in the resistant group. Given the probability of error, the decision rule involves some judgment of the relative importance to bank supervisors of avoiding such misclassification errors.

In specifying the relative importance of these misclassification errors, we recognized that the value to bank supervisors of the procedures we investigated had to be based on the ability to identify the banks that received low summary ratings from supervisory personnel over the period studied, including those that had low ratings in the initial year of the period as well as those that received low ratings in subsequent years. In this regard, we expected most of the banks receiving low summary ratings during the period studied would be in the bank group designated vulnerable, along with a number of banks having intermediate summary ratings and perhaps a very small number of banks with high summary ratings. In contrast, we expected the resistant group to consist of very few banks with low summary ratings, most of the banks with high summary ratings, and the remainder comprised of banks with intermediate summary ratings.

In aiming at this objective, we proceeded on the assumption that the cost of failing to classify as vulnerable a bank that subsequently received a low summary rating from supervisory personnel is considerably greater than the cost of misclassifying as vulnerable a bank that will retain a high or intermediate supervisory rating. It is clear that early warning of a weakening situation could facilitate the introduction of timely corrective measures which could help to preserve the institution in question as an ongoing entity. The social costs involved in a bank failure would seem far greater than the costs involved in investigating a potentially vulnerable bank only to find no evident signs of weakness.

Accordingly, we attached a high cost to the failure to identify a vulnerable bank that subsequently received a low summary rating, and these costs were deemed to increase with the size of the bank. These costs were considered substantially higher than the cost of misclassifying as vulnerable a bank that retained a high or intermediate supervisory rating. To help measure these costs, we established a cost function which reflected the estimated dollar costs of examining banks of varying size. That is, the cost function reflected not only the social costs involved in the failure to identify banks that subsequently deteriorated in financial condition, but also recognized that examining a large bank is much more costly than examining a small one. By this means, we ensured that the procedures employed would be likely to identify correctly a large percentage of the banks that received low summary ratings between 1969 and early 1975, although it also meant that the size of the bank group designated vulnerable would be relatively large, depending on the efficiency of the particular procedure.

[6] Examination data for member banks in the Second Federal Reserve District for 1969 instead of 1968 would have been more desirable, but these data were not readily available at the time of publication.

MINIMIZING THE COST OF CLASSIFICATION ERRORS. It is important to remember that no information was available in 1969, or in any of the initial years of the subperiods studied, regarding the probability of a function failing to include in the bank group designated vulnerable those banks that would actually receive low summary ratings in the subsequent years. We, therefore, made use of the distribution of the scores or rankings of the banks that subsequently received low summary ratings during each of the periods studied to establish a cutoff score that minimized the cost of misclassification errors. The use of this information in no way changed any of the scores or relative positions of the banks in the rankings.

The cost-minimizing cutoff score or rank was obtained for each of the procedures employed by calculating the cost of calling a bank vulnerable when, in fact, it subsequently retained a high or intermediate summary rating and the cost of assigning to the resistant group a bank that subsequently received a low summary rating. The cost was calculated for all decision rules, ranging from designating all banks as vulnerable to designating all banks as resistant. Each cost calculation assumed that all banks designated vulnerable would be examined and all banks deemed resistant would not be examined.[7] In each of the calculations the classification errors (*i.e.*, the percentage of banks called vulnerable that did not subsequently receive low summary ratings and the percentage of banks called resistant that did receive low ratings) were weighted by a factor from a cost function and the total cost of all the errors was calculated.[8] The cutoff score that minimized this cost was considered a guide to the efficiency of each of the procedures employed. To avoid possible bias in these calculations, all the sample banks from which functions were estimated were removed from the resistant and vulnerable bank groupings into which all member banks in the Second Federal Reserve District were divided by means of the scores obtained from those functions.[9]

POSSIBILITIES FOR GAINS IN EFFICIENCY IN THE ALLOCATION OF SUPERVISORY RESOURCES. Were supervisory resources allocated only to the bank group designated vulnerable—assuming that an efficient cutoff score could be obtained from past experience—the procedures described in this article could lead to sizable economic efficiencies, compared with examining each member bank once a year. Such annual examinations would be indicated by these procedures, if the discriminant scores or rankings of the banks that received low summary ratings were randomly distributed. The possible gains in efficiency are suggested by a comparison of the total costs of the classification errors from use of the procedures described in this article with once-a-year examinations of all banks,

[7] It is important to note that a bank's presence in the vulnerable group which did not subsequently receive low summary ratings is not necessarily an indication of error, inasmuch as the banks involved may have been vulnerable at the time of estimation of the function but, in the intervening years, improved their condition so that they would no longer be considered vulnerable if the function were reestimated. Further, a vulnerable bank may not manifest the signs of deterioration that would warrant a low summary rating from supervisory personnel as long as general economic or other conditions are favorable. Nonetheless, the vulnerability of banks is a matter of concern to bank supervisors, since any adverse change in the overall economic environment is likely to impact most severely on the banks that are vulnerable.

[8] The total cost of misclassification errors is as follows:

$$TC = \sum_{i=1}^{m} (\text{cost r:w})_i + \sum_{j=1}^{n} (\text{cost v:s})_j$$

Footnote 8 (continued):
where:

TC = Total cost
m = Number of banks receiving low summary ratings classified as resistant
$(\text{cost r:w})_i$ = Cost of classifying as resistant the ith bank when it receives a low summary rating
n = Number of banks with high summary ratings classified as vulnerable
$(\text{cost v:s})_j$ = Cost of classifying as vulnerable the jth bank when it retains a high or intermediate summary rating.

We assumed that the cost of correct classification is zero. This implies that the examination costs associated with correctly classified vulnerable banks are at least matched by the benefits in arresting the deterioration. It is possible that such benefits exceed the cost of examination but, in the absence of a concrete measure of those benefits, we assumed that detection of a deteriorating situation offsets the examination costs. In effect, the v:s error results in conducting an examination when one was not required and the r:w error in the failure to conduct an examination when one was required. The cost of the v:s error for a given bank is based on the cost of examining the bank, and the cost of the r:w error is a multiple of the examination cost for the particular bank to reflect the greater social cost of the r:w error. To find the cost-minimizing cutoff point, the value of TC was computed for every possible decision rule, ranging from classifying all banks as vulnerable to classifying all banks as resistant for each function or procedure.

[9] The ability of each of the functions to identify banks that received low summary ratings was evaluated, in effect, on a "holdout" group. While biased results are likely where the same observations are chosen both to estimate and to test a function, the ranking procedure does not use the same criterion for choosing these two samples. Therefore, it was not theoretically necessary in connection with the function based on our ranking procedure to exclude the estimation sample from the test sample, though we did so nonetheless.

taking into account that examination costs and the cost of misclassification errors both are related to bank size.[10] It should be noted that the gain in efficiency does not represent a comparable percentage reduction in total examination costs; as noted earlier, the costs of examining vulnerable banks that receive low summary ratings are deemed to be offset by the benefits of detection, while the costs of failing to classify correctly a bank that subsequently receives a low summary rating are considered substantially higher than the costs of examining that particular bank.

Much would depend, of course, on reasonable stability in the relationships measured by the functions or bank rankings employed; the results described below suggest that there is such stability. However, the decision rule to examine only banks designated vulnerable is not realistic. It tends to overstate the relative gain in efficiency from adoption of the rule, since there would of necessity be a continuing need for some schedule of on-site examinations —probably less frequently than annually—to obtain firsthand information on the financial condition of other than vulnerable banks and to implement corrective measures where needed. In addition, supervisory authorities might wish to examine certain vulnerable banks more frequently than once a year, so that implicit cost savings would be realized through more effective use of supervisory resources rather than through reductions in actual expenditures. Nonetheless, the standard employed is a useful base for evaluating the efficiency of the approaches discussed in this article.

THE RESULTS OF ALTERNATIVE PROCEDURES

Four functions or procedures, each falling into one of two categories were tested for their ability to identify banks that received low summary ratings in the period 1969 through early 1975. Two functions were estimated from sample data obtained from banks that had either high or low summary ratings as determined by supervisory personnel in 1969 and in the initial years of several subperiods. These we called the Exam functions.[11] Further, a rank index and a function were obtained from our multivariate ranking procedure. While we believe the results are suggestive of the efficiencies that could be realized in the allocation of supervisory resources, we note that the details of the procedures discussed here are by no means exhaustive of the possibilities and that we have not explored fully the ability of each of the functions or procedures to provide early warning over varying periods of time.

Exam-1. Using pooled data for state-chartered member banks and national banks in the Second Federal Reserve District for 1969, we reestimated a discriminant function from bank samples grouped according to high and low summary ratings determined by supervisory personnel for that year. We used the same estimation techniques and eight variables described in connection with the original 1967 and 1968 discriminant functions, but selected the cutoff point as described earlier in this article. The ability of this function to identify banks that received low summary ratings is shown in the accompanying table for the period 1969 through early 1975. As shown in the table, Exam-1 correctly identified about 89 percent of all the banks that received low summary ratings (after excluding the banks from which the function was estimated). The group of banks the function designated as vulnerable (percentage of total member banks not shown) contained a sizable percentage of banks that were accorded low summary ratings during the period under review. The allocation, therefore, of supervisory resources only to a bank group designated as vulnerable by this function could be expected to yield a sizable gain in efficiency, compared with a proportional allocation of these resources to all member banks in the Second Federal Reserve District. Data limitations prevented a meaningful reestimation of this function over any of the subperiods. In any case, the use of this function requires data that are available only from on-site examinations.

Exam-2. This function was estimated from sample banks grouped according to the high and low summary ratings given by supervisory personnel in each of the three years 1969-71. However, no variables requiring data from examination reports were employed. Instead, a number of proxy variables were used in place of the quality-of-assets variable employed in the Exam-1 function. The

[10] When supervisory resources are apportioned to all banks, based on size, all present and future weak banks are detected, but all resistant banks are "unnecessarily" examined. Then the total cost of classification errors is $\sum_{k=1}^{R} (\text{cost v:s})_k$, where R is the total number of banks (from both the groups designated resistant and vulnerable) that did not subsequently receive low summary ratings from supervisory personnel.

[11] The Exam functions were the best performing functions from among several variations in simulating summary ratings given banks by supervisory personnel in selected years.

EFFICIENCY RATIOS WITH RESPECT TO IDENTIFICATION OF BANKS THAT HAD LOW SUMMARY RATINGS IN SELECTED PERIODS, BASED ON SAMPLE DATA FOR INITIAL YEAR OF EACH PERIOD

Functions or procedures employed	1969-early 1975			1970-early 1975			1971-early 1975		
	Percentage of banks			Percentage of banks			Percentage of banks		
	called vulnerable that received low summary ratings	with low summary ratings correctly identified	Percentage gain in efficiency*	called vulnerable that received low summary ratings	with low summary ratings correctly identified	Percentage gain in efficiency*	called vulnerable that received low summary ratings	with low summary ratings correctly identified	Percentage gain in efficiency*
Sample data based on supervisory definitions									
Exam-1: 8 variables, including examination data†	19.0	88.7	28.7	‡	‡	‡	‡	‡	‡
Exam-2: 12 variables†	17.2	94.3	19.3	15.4	95.2	25.7	16.6	95.2	34.0
Sample data based on rank index									
MISR: 11 variables (excludes size)§	34.1	89.7	37.3	31.2	92.2	35.4	33.1	96.7	49.1
MISF: 11 variables (excludes operating expenses)‖	17.4	76.9	41.8	13.8	95.0	20.0	15.6	97.4	33.7

Note: Financial data obtained from Reports of Income and Reports of Condition for all member banks in the Second Federal Reserve District for 1969 through 1971, and from examination reports of state-chartered member and national banks for 1968; summary ratings of all member banks in the Second Federal Reserve District obtained from Federal Reserve Bank of New York supervisory personnel for the period 1969 through early 1975.

* The estimated gain in economic efficiency from the allocation of supervisory resources by the procedures described in this paper, compared with the allocation of supervisory resources to all banks (see pages 162-63).

† The Exam functions were the best performing functions from among several variations in simulating summary ratings given banks by Federal Reserve Bank of New York supervisory personnel in selected years.

‡ Not available at the time of publication.

§ MISR = Multivariate index standard ranking.

‖ MISF = Multivariate index function.

function presented in the table is one of several that showed relatively consistent results over the entire period and in each of the subperiods (after the banks used to estimate the function were excluded). As can be seen in the table, gains in efficiency varied from about 19 percent over the period 1969-early 1975 to 34 percent for the shorter subperiods.

MULTIVARIATE INDEX STANDARD RANKING (MISR). As described earlier, standardized deviations for the twelve variables for each of the member banks in the Second Federal Reserve District in 1969, 1970, and 1971 were added for each bank, and all the banks placed in order according to each bank's value in this multivariate index. The cutoff point to separate the vulnerable banks from those that were resistant was determined, as explained earlier, to minimize the costs of misclassification errors. The MISR shown here omits size from the index, since

the eleven-variable index yielded somewhat more consistent percentage gains in efficiency between 1969 and early 1975 and in the subperiods studied. As can be seen in the table, these efficiencies varied from 35 percent to 49 percent.

THE FUNCTION BASED ON THE MULTIVARIATE RANKING (MISF). The MISR provided reasonably good separation throughout most of the period studied. However, each of the variables influenced the ranking process with equal weight, and it seems reasonable to suppose that some variables may be more important than others in defining resistant and vulnerable banks. Further, the number of variables in the ranking used thus far would not be expected to be the most complete or efficient set for purposes of defining resistant and vulnerable banks. It is likely that other variables in addition to those employed could be useful. Also, it is likely that a smaller subset of the variables used in any initial ranking would be sufficient to achieve the desired separation. To explore these possibilities, we raised the question whether discriminant analysis might be of aid.

To utilize the statistical tests available in discriminant analysis, it is necessary to show that the sample is composed of independent groups. Relating this requirement to our MISR, it means that the presence of independently distributed groups of vulnerable and resistant banks would have to be established. Using the MISR ranking described above as a guide, we attempted to determine if "natural groups" of vulnerable and resistant banks could be identified. Natural groupings in the MISR rankings might be evidenced in the data comprising the ranking, provided the procedure and the data were sensitive enough to detect such natural groupings. We expected that banks performing in the extreme high and low ranges of the ranks might represent separate distributions of banks with unique characteristics, each with its own mean standard of behavior as measured by its multivariate rank.

In our preliminary research aimed at identifying distinctly defined groups, the evidence was mixed, based on relatively simple methods. Nonetheless, there is a reasonable presumption that resistant banks are markedly different from banks that are vulnerable and that such natural groups can be identified. In any event, the analysis did not depend on the statistical probabilities derived from the discriminant functions but rather provided a way of weighting our variables. We decided, therefore, to explore discriminant techniques to evaluate the overall importance of the variables in the MISR in identifying banks that received low summary ratings during the period studied. In evaluating the discriminant techniques employed in this manner, we minimized the costs of classification errors as described earlier; these procedures do not utilize any statistical probabilities based on a discriminant function.

The discriminant technique was employed in conjunction with the MISR to yield a function (MISF) as follows. Several alternative segments of the ranking were sampled to obtain data from which to estimate a function. This function then was used to obtain scores for all the banks in the Second Federal Reserve District for selected years, with banks in the estimation group excluded from the overall list. The results reported here are based on a random sample drawn from the bottom and top 10 percent of the MISR ranking. Entering all twelve variables stepwise in a predetermined order, we found that one variable—*i.e.,* operating expenses-total revenues—impeded the function's ability to identify vulnerable banks that subsequently received low summary ratings over the entire period 1969-early 1975 once the other eleven variables were entered. Therefore, the function was employed without that variable. The results show a potential gain in efficiency of nearly 42 percent, over the entire period 1969-early 1975, with some tendency for the gains to diminish in the subperiods near the end of the full period under review. The results suggest that the MISF, along with the MISR, merit further attention as alternative approaches to the identification of banks that can be considered vulnerable in the event of economic strains or uncertainties.

CONCLUDING COMMENTS

To sum up, the results of the analysis thus far suggest that it is possible to identify vulnerable banks in advance of a significant deterioration in their financial condition by several alternative procedures. This early identification could yield significant efficiencies through allocation of supervisory resources to those sectors of the banking industry where there is evidence of significant vulnerability to economic difficulties. Effective use of the approaches described here would, of course, depend on there being a significant measure of confidence in the accuracy of the separation between resistant and vulnerable banks obtained through the procedures described in this article. Although more work is needed in this area, we believe the analysis presented here can help to improve the efficiency with which supervisory resources are deployed.