The Threat of Inflation

Forecasting the Economy—
The Stock Market Versus Econometric Models

Federal Reserve Membership—
Estimates of the Cost to Member Banks
Of Reserve Requirements
The Threat of Inflation

Remarks by
David M. Lilly
Member of the Board of Governors
Federal Reserve System

before a
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It is a pleasure for me to be here in the Eleventh District and to appear before so distinguished a group of banking and business leaders. Since I joined the Board of Governors last year, and even before that time, I have focused particular attention on the need to improve our economic education and understanding—an improvement that is sorely needed in our society and should be actively advanced.

Because your positions place you in the forefront of economic education in your communities, I would like to discuss with you today an issue that, while perhaps the greatest threat to our economic society as we know it, has not yet received the public attention that it deserves. That issue is inflation. It's a disease that could change the entire fabric of our life unless it is brought under control. And I must say to you in all frankness that we at the Federal Reserve feel very lonely when the Government institutions that worry about inflation are asked to stand up and be counted. We live in almost virtual isolation, a condition that I hope will change, and change dramatically, as time goes on.

The seriousness of inflation cannot be overestimated. Except for a brief period after World War II, prices in this country in recent years have been rising faster than in any other peacetime period in our history. Most recently, there has been some respite from double-digit inflation, but a resurgence of inflation could jeopardize the future of our country, if past experience is any guide. No country in history has been able to maintain widespread economic prosperity, once inflation got out of hand. And the unhappy consequences are not just of an economic nature. Inflation inevitably causes disillusionment and discontent. It robs millions of people who have set aside funds for education or retirement, and it hits the poor and the elderly especially hard.

Inflation has also been a contributing factor to the fall of governments. Even in this country, the distortions and injustices created by inflation have contributed to a distrust of government officials and governmental policies. History teaches us that the discontent bred by inflation can provoke disturbing social and political change. The ultimate consequences of inflation could well be a significant decline of economic and political freedom.

To appreciate the threat of inflation fully, one must understand how it has infected our economy. There is in our society a built-in inflationary bias that has grown more intense over the last decade. Our long-range problem of inflation has its roots in the structure of our economic institutions and in the financial policies of our Government. This basic fact is all too frequently obscured by outside events that increase the rate of inflation noticeably, such as a crop failure or action to raise oil prices. The plain truth is, however, that the United States—and many other countries throughout the world—has developed an underlying bias toward inflation that has only been magnified by these special influences.

Where does this leave our traditional tools of policy? Fiscal and monetary policies still have important roles to play in our fight against inflation, but they can no longer do the entire job. Removal—or even a reduction—of structural barriers will help us squeeze the inflationary bias from the economy and remove the distortions that we, ourselves, have made a part of our system.

One indication of these distortions is the constant penchant of our society to run budget deficits. I have no desire to delve deeply into the pros and cons of budget deficits—nor to criticize what is our very commendable national willingness to provide for the less fortunate members of our society. The record shows, however, that since 1950, deficits have out-run surpluses by 23 to 5. That is a runaway score in anybody's language, and it has tended to put the Government's stamp on inflation.
But let me give you some examples of how the Government has contributed indirectly to the inflationary bias in our economy. Let me explain, first, some of the structural problems we have created and the structural reforms that must be made to supplement traditional monetary and fiscal policies as the best hope of unwinding inflation.

For many years, the Federal Government has regulated various forms of transportation—trucks, railroads, airlines, and ships. A certain amount of regulation is undoubtedly good, but analysts estimate that regulation of transportation in this country has raised costs anywhere from 10 to 30 percent.

Tariffs, together with import barriers, are another factor in this bias. Granted tariffs and import barriers have benefited certain industries and groups of Americans. But they have also served to increase prices of some commodities or to prevent a drop for others.

The list of examples is legion—restrictive building codes, agricultural price supports, the market power of business and unions, pollution controls, safety regulations, pension costs, mandatory retirement, and the minimum wage laws. Taken together or individually, they increase the economy’s bias for inflation.

Let me give you a current example. It is our estimate that the rate of inflation for next year will be 1 percent more because of the new payroll taxes (social security and unemployment insurance), the new minimum wages, and the proposed energy taxes.

I am not making a moral judgment on these programs. I am only suggesting that Congress may well have offset them by other deflationary actions.

Let me take a moment to explain one bias that is particularly troublesome to me. That is the innovation that has crept into our economic thinking in recent years of indexing price increases. Since the economy experienced double-digit inflation several years ago, there has been more and more emphasis on indexing. The “cost-of-living adjustment” has frequently been called an engine of inflation by government economists. Nevertheless, more and more labor contracts now include the same type of provisions.

There are some economists who believe a cost-of-living escalator—or indexing—is a perfectly rational approach to the nagging problem of inflation. As costs go up, incomes also go up by the same amount and the effects of inflation are nullified, or so the argument goes. But indexing also has one destructive feature that makes it an unacceptable approach to inflation. It serves to take away the incentive of people to fight the inflation itself. It is an admission of defeat. It is, literally, throwing in the towel, and that is one thing I and my colleagues at the Federal Reserve will never do.

While I am on this point, let me say that I have been particularly distressed of late by business’ tacit acceptance of these new sorts of escalators and arrangements—almost as a matter of course now—and by their effects on the structure of the labor market. For one reason or another—fear of strikes or delays perhaps—management is simply not pressing as hard as it should be or as it once did to hold down labor costs. This is also a form of giving up the fight; I don’t think there is another area in which structural inflation so clearly has a life of its own, or in which we have acquiesced so easily to expectations of continuing inflation. We need now to examine much more diligently the structure of the labor market to look closely at the fact that we have permitted high unemployment to exist while concurrently granting high wage increases. We need to look at other such distortions that have been allowed to occur. These practices are inimical to our goals of full employment and stable prices.

What we as a people have done, in summary, has been to subject our available resources to increasing intense demands. At the same time, we have sought to ensure that incomes do not get eroded when excessive pressures generate inflation. This amounts to creating upward pressures on costs and prices, and then arranging to perpetuate them. It is an awesome combination and one which we at the Federal Reserve must cope with.

I become very disappointed when I see the Federal Reserve alone in its struggle against inflation. Too often, our perseverance is attributed to callousness about the answer to the following question: Won’t the unemployment picture worsen if we try to reduce inflation? But the answer to that question happens to be an emphatic NO. There is no longer a meaningful trade-off between unemployment and inflation. Inflation is one of the major causes of unemployment in the current environment. It leads to hesitation and a sluggish buying. Today’s high unemployment rate is, fundamentally, the legacy of an inflation that surely could have been avoided if proper steps had been taken in time.

I hope you have not become discouraged by my remarks thus far. Now that I have painted a rather gloomy picture of inflation, let me offer some measures designed to bring it under control. And I must
emphasize that inflation can be brought under control if we work together. Only a few years ago, we had double-digit inflation. The present rate of inflation is half what it once was, but we must do better and we can.

Conventional thinking about the economy, however, is out of date. Ways must be found to reduce unemployment while at the same time avoiding a new wave of inflation. The areas that must be explored are many and difficult, but we must open our minds if we are to have any chance of ridding our economy of its inflationary bias.

The first step in an anti-inflationary program is prudent monetary and fiscal policy. This is essential. Any heightening of inflationary expectations will erode business and consumer confidence and impair the economic expansion now underway. Thus, any attempt to make a “quick fix” of our major economic problems by a heavy dose of economic stimulation may be counter-productive. Only a steady, moderate policy will provide the foundation for both a lessening of inflation and a return to full use of our labor force and productive capacity.

But prudent monetary and fiscal policy is not all that is required. Inflation is more than an evil of the business cycle. As I have emphasized, it is a structural phenomenon as well. We must improve the efficiency and flexibility of our markets. Structural changes in our economy will be hard to come by. But we must make the effort if we are to have any success in our struggle.

For example, steps must be taken to improve competition among businesses through increased emphasis on antitrust policy, changes in regulatory procedures, and an easing of barriers to international trade. Local building codes that do not reflect modern construction techniques should be reexamined and changed where necessary. We should begin to substitute economic incentives for the morass of costly and inefficient safety and environmental regulations we have imposed on certain industries.

As I mentioned, I have a special interest in our labor market policies. Our job training programs should be strengthened to increase productivity of workers, particularly minorities and teenagers. These programs should provide a better match between worker skills and business requirements. We also need expanded job bank programs. The Federal minimum wage law is pricing many teenagers out of the job market. It has been estimated that a 25-percent rise in the minimum wage is associated with an average of a 3- to 6-percent reduction in teenage employment. When the minimum is raised, employers tend to ignore the less skilled worker and seek the more productive employee. Employers may also attempt to get along with fewer employees. Some Federal laws—such as the Davis-Bacon Act, which requires the payment of “prevailing wages” on government construction contracts—continue to escalate costs. As I indicated, we must find alternatives to automatic cost-of-living adjustments that have the same effect. There is also a belief that the unemployment compensation laws provide such generous benefits that incentives to work are reduced. Reform of the welfare system to increase work incentives, a rethinking of mandatory retirement policies—these are also needed. I could go on, but I think you get the picture.

A restructuring of our economic system—along the lines I have outlined—would improve the efficiency and effectiveness of our conventional tools. During periods of excessive demand, for example, less restraint would be required to bring inflation under control. Consequently, I am convinced that structural reforms deserve more attention from Congress and, yes, from the general public than they have been receiving. Too many people have tended to concentrate on overall fiscal and monetary policies. These traditional tools are, of course, useful and essential; but once inflationary expectations have become widespread, the tools must be used with great care and moderation. We must work to remove the inflationary bias of our economy.

On our part, we at the Federal Reserve will continue to provide money and credit sufficient to accommodate a continuation of the orderly economic expansion. We will strive to avoid excessive growth in money and credit that would stimulate further inflationary pressures. The Federal Reserve System, moreover, is committed to a gradual reduction over the longer run as one of the conditions that must be achieved in order to bring about an end to the inflation. As I have tried to emphasize, however, other conditions are also necessary to reach this happy end, including progress in reducing the structural distortions that have added to our economy’s inflationary bias.

But these policies require public support and understanding. People must understand that this problem of inflation is a serious long-term threat to our social and economic system. People must understand that government programs, no matter how worthy, are likely to have inflationary consequences unless they are accompanied by an appropriate means of financing. Even programs that are superficially costless may still impede the efficient workings of markets and the flexible adjustment of prices. Such programs may impose very heavy burdens of their own.
The Federal Reserve, in this struggle against inflation, has a unique role to play. Congress has enabled the Federal Reserve System to operate independently of day-to-day political pressures. Considerable scope for independent judgment has been permitted by providing for the appointment of members of the Federal Reserve Board for long, staggered terms. Moreover, Congress has placed the Federal Reserve System outside the usual appropriations process.

This provides us with a unique environment especially conducive to adopting a longer-run point of view. And it is this longer-run perspective that leads us to our great concern about the problem of inflation. We hope to convince others that this concern is warranted and that this struggle against inflation is worthy of their support.

Let me offer one idea that might have appeal for Americans who are worried about inflation. Many people who have been worried about the destruction of our environment succeeded in pushing through requirements for “environmental impact statements” for many types of development. Although many businesses have complained about the “red tape” produced by these statements, they have served a purpose in helping to protect our environment. In some cases, projects have been canceled or modified because of their impact on the environment. We should, perhaps, borrow a page from this book and require “inflation impact statements” to be filed by the Government in connection with changes in the minimum wage, import restrictions, and other regulations that give our economy an inflationary bias. True, this would add another layer of red tape to already cumbersome procedures, but it would awaken the public to the cost that must be borne when new legislation is adopted and new procedures are instituted. Some Federal agencies have already mandated such an approach.

Somehow, inflationary pressures have to be uprooted. But that cannot be done without changing a number of ideas and attitudes that have been popular for a generation or more. Consequently, we should have no illusions about finding a quick and easy solution. It will take years of prudent and vigorous public policies and restraint on the part of consumers, workers, and business firms alike. Even so, I am confident that with the imagination you and other business leaders across the country are displaying, we can work to put an end to inflation and restore the conditions essential to a stable prosperity.
The Stock Market Versus Econometric Models

By Wallace H. Duncan

There is a traditional wisdom, often heard along Wall Street and in other financial circles, that the future course of the economy is to be read in the trend of the Dow Jones averages. Just as the Crash of '29 was the harbinger of the Great Depression, it is said, so also does the stock market signal the less cataclysmic expansions and contractions of today's economy.

At times, this view is also coupled with strong skepticism of efforts to predict economic trends through the assembly and interpretation of massive amounts of statistics using computers and econometric models. For example, in a recent article in the Wall Street Journal, a case was made for the stock market's forecasting ability. The author arrived at the following conclusion:

So who is right? Well, though the economists give us "hard numbers," while the stock market gives us nothing but massive intuition, it is the market that is more often in the right. . . . there does not exist an econometric model which, over these recent years, has consistently outperformed all the other models—nor do all the models taken together give us more accurate predictions than the stock market.

If this view is correct, then a great many economists and statisticians could be assigned to work on other problems, and the makers of national economic policy could simply take their signals from the stock market.

The contention that the stock market is at least as good an economic forecaster as are large-scale econometric models certainly should not be dismissed out of hand. Fortunately, it is not difficult to devise comparative tests of forecasting capabilities. But the evidence from the tests reported here is that, though not without some capability, the stock market is nevertheless inferior to large-scale econometric models as an economic forecaster.

The view that the stock market serves as a precursor of economic activity rests on two quite different types of analysis. The first contends that stock market participants as a group are able to foresee the future path of the economy with a substantial degree of accuracy and that the movement of stock prices reflects this informed consensus. The second is that changes, for whatever reasons, in stock prices actually cause subsequent changes in economic activity through influencing the spending decisions of consumers and businessmen. These two views—the stock market as economic seer and the stock market as economic cause—are considered in general terms before turning to an analysis of the evidence of the stock market versus econometric models as economic forecasters.

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Stock market as a predictor

A cursory look at the accompanying graph reveals that the tops and bottoms of stock price swings are related to those of the economy and tend to precede them. And there is ample reason to expect such a relation. Corporate profits are affected by production and sales, and in turn, stock prices reflect, among other things, investors' expectations of future corporate profits. If investors are able to guess the future with some measure of success, stock prices should provide a leading indication of changes in the state of health of the economy.

Standard and Poor's index of prices of 500 common stocks is one of the 12 components making up the Commerce Department's composite index of leading indicators. This index of stock prices is also given the most weight of all the components in the calculation of the composite index, since it has the highest score as an individual leading indicator according to six objective criteria. Since the 12 components of the composite index of leading indicators were selected as the best among 150 cyclical indicators studied, and stock prices receive the highest score of these

1. Irving Kristol, "The Foxes vs. the Hedgehog," June 14, 1977. See also the lead editorial in the October 20, 1977, issue.
Economic recessions and recoveries are usually signaled in advance by the stock market.

RATIO SCALE
1941-43=10

NOTE: Shaded areas indicate economic recessions as dated by the National Bureau of Economic Research.
SOURCE: Standard & Poor's Corporation.
best 12, it is evident that a strong case exists for looking to the stock market for clues as to where the economy is headed.

However, there is also some evidence that stock prices do their job as predictor of economic downturn too well. Paul Samuelson, a winner of the Nobel Prize in economics, has remarked dryly that the “stock market has correctly predicted nine of the last five recessions.”

Samuelson is alluding to the stock market’s most serious drawback as a leading indicator—its tendency to produce false as well as dependable signals. While the exact count of false signals depends on how one wishes to define them, there can be little serious doubt that in 1962 and in 1966, stock market declines incorrectly indicated the approach of recession. In those instances, Standard and Poor’s index of 500 stocks declined about 28 percent and 22 percent, respectively. These stock market declines were considerably greater in magnitude than those that had correctly signaled the onset of the previous three recessions.

Thus, it is difficult to say with much confidence just what any particular stock market decline may be signaling. For example, the present market decline from September 1976 is greater than some prior declines that have correctly signaled approaching recessions, and at the same time, it is less than some that have turned out to be false signals.

Stock market as cause of economic fluctuations
The stock market’s role as a leading indicator implies no necessary causality. Both the stock market and the economy may be responding to other forces that are in fact causal agents, with the stock market leading the economy simply because it responds more quickly to these other forces. For example, changes in monetary or fiscal policy may have an immediate impact on the stock market as investors assess the implications for future profits, while the actual impact on the economy may not be evident for several quarters.

In recent years economists have been devoting more attention to the possibility that changes in stock prices may actually cause subsequent changes in aggregate demand and, consequently, in employment and output of the economy. Such influence may operate through consumption or investment, or both.

The most generally accepted view of how changes in stock prices affect consumption is that consumption depends, among other things, on wealth. Consequently, other things being equal, an individual’s consumption increases when his wealth increases and declines when his wealth declines. Thus, stock price changes cause changes in wealth, which in turn cause changes in consumption—and this in turn causes changes in employment and production.

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This view is consistent with the life-cycle theory of consumption, which is built into the giant economic model of the economy known as the MIT-PENN-SSRC model. This model contains several hundred mathematical equations, consumes oceans of economic statistics, and is used extensively by the Federal Reserve Board and others to simulate the economy. As with other gadgetry devised by man, it is ever in need of update and repair. In its latest version, for any change of $1,000 in wealth, annual consumption spending changes about $47. While a complete adjustment takes place over a period of a year and a half, almost two-thirds of the full change in consumption spending occurs within two quarters of a change in stock prices.


An alternative way of looking at the relationship between stock prices and consumption is the liquidity hypothesis. In Mishkin’s view, consumer behavior responds primarily to the composition of wealth rather than its total amount. The consumer’s balance sheet is divided into illiquid assets (housing and consumer durables), financial assets, and liabilities. Financial assets provide a buffer against forced liquidation of illiquid assets during periods of adversity.

When financial assets are reduced by a decline in stock prices, the consumer shifts his demand away from housing and durables in an attempt to restore the balance between illiquid assets and the buffer of financial assets. Conversely, rising stock prices cause the financial assets to be more than needed to perform the buffer function, and, consequently, consumers increase their demand for durables and housing. Mishkin estimates that for every $1,000 change in the value of financial assets, spending on consumer durables changes $63 per annum and on housing $32 per annum. This estimate of the effect on consumer durables spending is about a third greater than the estimated effect on consumption in the MIT-PENN-SSRC model.

Business investment in new plant and equipment is a second category that may be affected by changes in stock prices. One theory of how stock prices affect investment is that fixed capital provides a continuous flow of services to the firm and these services are paid for by a continuous flow of “rental” payments in the form of dividends to equity sources and interest to lender sources. When a rising stock market causes the dividend-stock price ratio to fall, the “rental price” of capital from equity sources declines and managements are stimulated to invest in new plant and equipment. Conversely, a falling stock market increases the rental price of capital and inhibits new investment.

There are other theories of course. One compares the market value of a firm (as represented by the total value of outstanding equity shares) with the replacement cost of its capital. In this view, whenever a rising stock market causes the market value of a firm to exceed the replacement cost of its capital, investment will be stimulated since “a corporation can sell paper claims to physical capital for more than the capital costs.” Conversely, investment is inhibited when firms would raise less money by selling paper claims to capital than the physical capital actually costs.

What, then, might be the total effect that a change in stock prices could have on the economy, operating through both consumption and investment? Barry Bosworth, using the MIT-PENN-SSRC model, estimates that about a fourth of the decline in national output during the 1974-75 recession can be attributed to the prior decline in the stock market. In other words, had the market remained at the level it reached in late 1972, the subsequent economic decline would have been only three-fourths as severe as actually occurred. Employing the alternative relationships based on the liquidity hypothesis, Mishkin estimates that the decline would have been only half as great as it actually was, had stocks remained at their prerecession level.

**Stock market and econometric models**

Useful information for forecasting is embodied in stock prices, whether the stock market tends only to foresee the economy’s future path or actually helps to cause it. The question is, How much information? Does this information enable one to forecast the economy with greater, or less, precision than can be obtained with large-scale econometric models currently in use?

This question is of particular importance at the present time, since the stock market is currently signaling a different economic outlook than that of most forecasters using econometric models. A model

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based on past stock prices, to be described subsequently, is forecasting relatively weak economic growth for both the present quarter and the first quarter of 1978, with real gross national product (GNP) projected to increase at annual rates of 2.6 percent and 3.3 percent, respectively. This is quite close to Chase Econometrics' forecast of 2.5 percent for the present quarter but somewhat stronger than the 1.8 percent of growth projected for the first quarter of 1978. However, most comparable current predictions of other recognized forecasters tend to be significantly more optimistic than either of these.

At least a tentative answer to the question of relative forecasting capabilities can be provided by analysis of past experience. The rate of growth of real GNP was compared with past rates of change of stock prices for a 25-year period from mid-1947 to mid-1972 using conventional regression analysis. 10

A positive and significant relationship was found between the rate of change of GNP in any quarter and the rate of change of stock prices during the two immediately preceding quarters. No consistent relationship was found for quarters further removed in time. This suggests that the stock market is a relatively short-term forecasting device, providing little useful information beyond a forecast horizon of about six months. 11

The observed relationship was used to forecast real GNP growth rates at quarterly intervals over the subsequent five-year period from mid-1972 to mid-1977. Obviously, such forecasts were not precisely "on target," as is common with nearly all forecasts. The forecast errors of the stock price model were compared with errors of other forecasts for the same period. These included the forecasts of Chase Econometric Associates and of Data Resources, Incorporated, based on their econometric models; a primarily subjective economic forecast made by the Conference Board; and a naive model. The Conference Board, Chase Econometrics, and Data Resources were selected from a number of widely recognized forecasts because the data were available for the entire forecasting period and were most closely comparable to the stock price model in timing. The naive model forecasts that next quarter's growth rate

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<th>Forecaster</th>
<th>Mean absolute error1</th>
<th>Root-mean-square error2</th>
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<td>One quarter ahead</td>
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<td>Stock price model</td>
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1. The average of the absolute values of the errors.
2. The square root of the average of the squared values of the errors; similar to a standard deviation.

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2. The square root of the average of the squared values of the errors; similar to a standard deviation.

Note: Forecasts are for each quarter and for each two-quarter period from the third quarter of 1972 through the second quarter of 1977, inclusive.

Sources: Conference Board, Federal Reserve Bank of Dallas, U.S. Department of Commerce.

10. A number of alternative specifications of the relationship between GNP and stock prices were tried. The results reported here are based on the relationship that provided the best fit, thus giving stock prices the best chance of forecasting with errors of minimum size. However, even the best fit was capable of explaining only about a fourth of the quarterly variation in the percentage rate of growth of GNP. The appendix to this article contains a detailed description of the statistical procedures and results.

11. This result is consistent with the view that investors have some ability to see into the economic future for a period of about six months but have little ability to do so beyond that. Alternatively, it also suggests that most of the casual effect that changes in stock prices may have on the aggregate demand for goods and services tends to occur within a relatively short time lag.
will be the same as last quarter's and that the growth rate over the next two quarters will be the same as that over the previous two quarters.

The forecasting errors are summarized in Table 1. The smallest errors over the five-year period were achieved by Chase. Its average absolute errors were about half those of the naive model for both one-quarter and two-quarter forecasts. The forecasts based on past stock prices resulted in errors that were about three-fourths as large as those of the naive model. Thus, using the naive model as a reference point, Chase was able to reduce the size of forecasting errors about twice as much as the forecasting model based on past stock prices. While Chase achieved the best results, both of the large-scale econometric models forecast more accurately than did the stock price model.  

Suppose, however, that one compares the forecasting errors of different models for only the turning points of economic expansion and contraction. Would past stock prices forecast better than large-scale econometric models at such turning points? For the period studied, the answer is no. The Chase and Data Resources econometric models both have smaller average absolute errors in the turning-point quarters than the Conference Board's subjective forecast or the stock price model. The average absolute error of the stock price model is about midway between average errors of the best econometric model and the naive model. However, because there were only four turning-point quarters during the period studied, it is not possible to state with assurance that this relationship would be likely to be maintained in other periods.

The evidence from both the 20-quarter sample period and the 4-quarter turning-point sample thus suggests that economic forecasts based on past stock prices are not able to outperform the forecasts of the large-scale econometric models. For the full five-year period and for the turning points, the stock price model was able to reduce the size of the errors of the naive model by only about half the amount accomplished by the best-performing large-scale econometric model.

One might thus conclude that while the stock market does provide information that is useful in forecasting the economy, such information alone does not permit forecasts as accurate as those attainable with the large-scale econometric models. A secondary conclusion is that these models appear to be capable of forecasting with errors about half as large as those of a naive model, which simply projects the most recent trend.

![Table 2: Forecasting Errors—Turning-Point Quarters](image-url)

12. Additional statistical tests were conducted to determine whether the differences between the mean absolute errors of the various forecasting models were significant or were simply due to random chance. As a result, the possibility that the differences between the Chase errors and those of the stock price model were due to random chance—implying that the mean absolute errors of the two models would not differ if the samples were infinitely large instead of only 20 quarters—could be rejected with a 95-percent level of confidence. These forecasting results thus indicate that at least one of the large-scale econometric models performs significantly better than forecasts based on past stock prices.
Appendix
The stock price model

In seeking the best econometric relationship between real gross national product and lagged stock prices, severe problems of serial correlation of residuals were encountered when the data were used in the form of levels of GNP and stock prices. Use of a Cochrane-Orcutt iterative estimation technique allowing for first-order autocorrelation did not adequately cope with the difficulty; hence, the relationship was estimated in the form of percentage rates of change. A comparison of the standard deviation of the regression equation with the root-mean-square error (3.87 and 3.76, respectively) indicates that there was no deterioration of the estimated relationship in the post-sample-forecast period.

The best fit was obtained by regressing quarterly data of annual rates of change of real GNP on past annual rates of change of nominal stock prices. The latter were calculated from quarterly averages of stock prices as measured by Standard and Poor's composite index of 500 common stocks, with historical data obtained from the Commerce Department's Business Conditions Digest. Regressions were also run using real stock prices (deflated by the GNP implicit deflator), using monthly rather than quarterly rates of growth of past stock prices, and using log-linear forms. But no improvement in fit could be obtained.

The best relationship was chosen as the one having the smallest standard deviation of the residuals, subject to the constraint that no negative coefficients on lagged stock price terms were permissible. The best relationship estimated was:

\[ Y_t = 2.77 + .064SP_{t-1} + .038SP_{t-2} + e_t \]

\( \rho = .238 \) (2.45)  
\( R^2 = .245 \)

Durbin-Watson statistic = 2.04

Standard deviation of the estimate = 3.87

where \( Y \) = annual percentage rate of change of real GNP at quarterly intervals, and \( SP \) = annual percentage rate of change of nominal stock prices at quarterly intervals. Numbers in parentheses denote t statistics.

All the coefficients are significant at the 5-percent level, with the constant term and the coefficient on stock prices lagged one quarter being highly significant at the 1-percent level. The Cochrane-Orcutt iterative estimation technique was used, employing 100 quarterly observations from 1947-Q3 through 1972-Q2, inclusive.

It is apparent from the adjusted \( R^2 \) statistic that only about a fourth of the quarterly variation in annual growth rates of GNP can be explained by lagged stock prices. And the standard deviation of 3.87 percent is relatively large compared with the mean real GNP growth rate of 3.81 percent during the period.

The estimated relationship was then used to make 1-quarter-ahead forecasts in the 20-quarter post-sample period of 1972-Q3 through 1977-Q2, inclusive. The information contained in the preceding error term was used in the forecasts.

A similar estimated relationship deleted the one-quarter lagged stock price term, and this regression was employed to make one-quarter forecasts two quarters ahead in the post-sample period. The one-quarter-ahead forecasts and the two-quarter-ahead forecasts were then combined to obtain the two-quarter, or half-year, forecasts from which the two-quarter errors in the table were computed.

Other forecasts. The other forecasts—those of the Conference Board, Chase Econometrics, and Data Resources—were selected because the data were available throughout the 1972-77 period and the forecasts were usually available in the first month of each quarter. Thus, they are comparable in timing to the forecasts of the stock price model, which could have been made in the first month of each quarter, as soon as a preliminary estimate of the previous quarter's real GNP growth rate became available. Some alternative forecasts—such as those of the Wharton, Michigan, MAPCAST (General Electric), and Merrill Lynch econometric models—were not used because either they were not available as early as 1972 or they were released late in the quarter or at irregular intervals.

Even with the three forecasters included in the tests, there were a few instances in which no forecast was available for the first
month of the quarter (three times for the Conference Board and one time each for Chase Econometrics and Data Resources). The latest prior forecasts were used in these instances. Forecast data for these three forecasters were taken from various issues of the Conference Board Statistical Bulletin and were used in the original form of actual percentage growth rates of real GNP.

The naive forecasts were constructed as simple extrapolations of the most recent growth rates of real GNP, using data that were actually available at the time the forecasts could have been made. They were thus constructed from preliminary estimates and first revisions of real GNP as issued by the Commerce Department.

Biases in forecast comparisons. The stock price model is favored in the tests in two ways. First, as mentioned previously, earlier forecasts for the other models were used in a few instances when no forecast was available for the first month of the quarter. In these instances, the stock price model had the advantage of a shorter forecast horizon. Additionally, the stock price model was estimated from GNP data containing all revisions to date, rather than the corresponding data actually available in 1972. In the forecasting period, the forecast made use of information in the previous error term, and this error term was calculated from current data, including all revisions, rather than from the preliminary estimates that would actually have been available at the time. Thus, the stock price model has had some measurement error purged from it, while the other forecasts have not had the advantage of this ex post refinement.

The econometric forecasts, however, are favored by the test procedure in at least one way. Throughout the five-year forecasting period, the stock price model was not revised. In contrast, the other forecasters were at liberty to adjust their models throughout the period, incorporating new information about changing relationships as it was perceived. In contrast to the stock price model, they were not required to forecast in 1977 with the same model developed to forecast in 1972.

The effects of these biases incorporated in the tests are partially offsetting. And the net effect is probably small enough not to place the conclusions in doubt.

Significance of differences in mean absolute errors. One might consider determining whether the mean of the signed errors of any specific forecaster differs significantly from zero, in order to test for forecaster bias. However, accuracy is probably better measured by the size of the absolute errors rather than by the degree of bias, since the latter appears to be comparatively small in all cases.

It is plausible to assume that the signed errors of any specific forecaster are normally distributed about a mean value somewhere in the vicinity of zero. If so, then the absolute errors will have a distribution that is quite skewed and that will resemble the right half of a normal distribution to the extent that the mean of the signed errors is close to zero. Significance testing of mean absolute errors based on the normal distribution would therefore not be valid for small samples.

However, the central limit theorem indicates that regardless of the distribution of the parent population, the distribution of sample means will approximate a normal distribution for large samples. Significance testing using Student’s t distribution would thus be permissible. While a sample size of 20 is, at best, only marginally suitable as a large sample, it was nevertheless considered to be close enough to warrant the tests. An alternative nonparametric significance test, which does not depend on any population distribution assumptions, was also conducted but did not yield any interesting results.

The null hypothesis tested is:

\[ H: u_1 - u_2 = 0, \]

where \( u_1 \) and \( u_2 \) are the mean absolute errors of two different forecasting models. A two-tailed test is indicated, since it is not known a priori which of the two forecasts may be better. Since the forecast errors cover the same sample period for both forecasters, they are not independent but may be paired by specific quarters. The paired-
sample test is thus appropriate.¹

The null hypothesis that the stock price model errors do not differ from those of Chase Econometrics can be rejected at a confidence level of .95, suggesting that one can be quite confident that the difference in forecasting accuracy between the two models during the sample period does in fact represent a true difference in forecasting capabilities. On the other hand, in a similar hypothesis test between the stock price model and the naive model, the null hypothesis can be rejected only at a confidence level of .50. It cannot be rejected at a confidence level of .60. This suggests that one can be much less certain that a true difference exists between the forecasting capabilities of the stock price model and the naive model.

Federal Reserve Membership—

Estimates of the Cost to Member Banks Of Reserve Requirements

By Edward E. Veazey

Membership in the Federal Reserve System has declined continuously in recent years. In the Eleventh Federal Reserve District, which includes Texas and parts of Louisiana, New Mexico, and Oklahoma, 54 percent of all commercial banks were Federal Reserve members in 1965; in 1976, 46 percent were members. The continuing erosion of membership, long a matter of concern to Federal Reserve officials, has drawn increased attention from bankers, banking organizations, and the Congress in recent years.

All agree there is continuing need for effective monetary policy. Most agree also that this can be realized most effectively if a broad cross section of banks of all sizes, types, and geographic areas are members or, at least, are subject to comparable monetary control. Moreover, simple competitive equity requires that firms doing the same kind of business in like situations be subject to like regulations.

Surveys and studies have revealed a number of reasons why banks choose to be or not to be Federal Reserve members. The reasons given for choosing to be a member usually include one or more of the services available from Federal Reserve banks, or the more general philosophical view that all banks have a responsibility to participate directly in the monetary mechanism of the country and the regulation thereof.

Members have assured access to Federal Reserve credit for certain purposes; they may send their checks to their Federal Reserve banks for collection; their securities may be held in safekeeping in Federal Reserve vaults; money and U.S. Government securities may be transferred to banks anywhere in the country on the Federal Reserve’s wire-transfer facilities; currency and coin are available from their Federal Reserve banks, and excess currency and coin may be delivered to the Federal Reserve for credit; periodic examinations are performed of members operating under state charters. These services are provided without charge, as a privilege of membership.

Banks choosing not to be members have cited a variety of reasons, but with few exceptions the “cost of membership” has been given as an important if not overriding consideration. Member banks are required to hold capital stock of their Federal Reserve bank equal to 3 percent of the member bank’s capital. A 6-percent statutory dividend is paid on such stock; hence, the cost is nominal, except in periods of exceptionally high interest rates. Of more importance, member banks must comply with capital requirements established by the Federal Reserve and provide numerous statistical reports to the Federal Reserve bank.

The major cost of membership, however, is the requirement of the Federal Reserve Act that member banks hold reserves equal to specified proportions of their demand and time deposits. These reserves may consist of currency and coin in the member banks’ vaults and deposits with their Federal Reserve bank. No interest is earned on these reserves. Hence, if required reserves exceed the cash balances member banks would normally hold for ordinary operating needs, member bank earnings are lower than they would be in the absence of the reserve requirements.

In this article we examine the comparative costs of reserve requirements for member and nonmember banks in Texas, New Mexico, Louisiana, and Oklahoma. Nonmember banks in the Southwest are subject to high reserve requirements relative to percentages applicable to nonmember banks in other states and relative to Federal Reserve requirements on member banks. However, the percentages by themselves do not accurately reflect the relative cost of reserve requirements because of important differences in the assets that qualify as reserves and differences
among banks in their need to hold these assets to conduct banking business.

Reserve requirements in District states
As shown in Table 1, reserve requirements for member banks are graduated by the amount of net demand deposits—from 7 percent of the first $2 million of net demand deposits to a maximum of 16 1/4 percent of net demand deposits over $400 million. The structure of reserve requirements on time and savings deposits at member banks is more complex. The requirement varies from 1 percent to 6 percent, depending on the amount of such deposits and their maturity. But the average of reserves on all time and savings deposits is about 3 percent, the minimum level authorized by the Federal Reserve Act.

Reserve percentages for nonmember banks in Texas, New Mexico, Louisiana, and Oklahoma are all at least as high as the Federal Reserve requirements for member banks. In Texas, state reserve requirements are considerably higher. Nonmember banks in Texas are required to hold cash assets equal to 15 percent of total demand deposits and 5 percent of time and savings deposits. By comparison, the smallest member banks are required to hold only 7 percent of net demand deposits and 3 percent of time and savings deposits. Only the four largest member banks in Texas are subject to the highest marginal rate of 16 1/4 percent of net demand deposits. And even for these banks, the average reserve requirement is less than the 15-percent state requirement because lower requirements apply over the first $400 million of net demand deposits.

Thus, in terms of percentages alone, reserve requirements in Texas clearly favor member banks, not nonmember banks. Furthermore, member banks deduct balances “due from” other banks and checks and other cash items in process of collection (CIPC) from gross demand deposits before computing required reserves. Nonmember banks in Texas are required to hold reserves against gross demand deposits.

It is the regulations regarding the composition of reserve assets that reduce the impact of reserve requirements for nonmember banks (Table 2). In Texas, nonmember banks are permitted to include as reserves checks in the process of clearing through a clearinghouse association. The volume of these CIPC items varies greatly with bank size, accounting for a minor proportion of total deposits at the smallest nonmember banks to over 6 percent at the largest.

Nonmembers also may include as reserves any funds on deposit with other commercial banks. Texas law is not specific as to the type of deposit account that can be included as reserves or whether the reserves can earn interest. But as a matter of practice, nonmember banks are permitted to hold time and savings deposits as reserves against their own time and savings deposit liabilities and, thus, earn interest on this portion of their reserves. Most banks hold these reserves in certificates of deposit. However, under legal and regulatory changes made in late 1975, banks and other businesses are now permitted to hold savings accounts; and a few nonmember banks maintain reserves in this form.

State reserve percentages in New Mexico are also higher than Federal Reserve requirements. New Mexico requires nonmember banks to hold cash assets or U.S. Government securities equal to 12 percent of gross demand deposits and 4 percent of time and savings deposits. The percentage requirements

<table>
<thead>
<tr>
<th>Deposit interval (Million dollars)</th>
<th>Requirement (Percent of deposits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net demand deposits</td>
<td></td>
</tr>
<tr>
<td>Less than $2</td>
<td>7</td>
</tr>
<tr>
<td>$2 to $10</td>
<td>9½</td>
</tr>
<tr>
<td>$10 to $100</td>
<td>11¾</td>
</tr>
<tr>
<td>$100 to $400</td>
<td>12¾</td>
</tr>
<tr>
<td>Over $400</td>
<td>16¾</td>
</tr>
<tr>
<td>Time deposits</td>
<td></td>
</tr>
<tr>
<td>Savings deposits</td>
<td></td>
</tr>
<tr>
<td>Maturing in 30 to 179 days</td>
<td>3</td>
</tr>
<tr>
<td>Less than $5</td>
<td></td>
</tr>
<tr>
<td>Over $5</td>
<td>6</td>
</tr>
<tr>
<td>Maturing in 180 days to 4 years</td>
<td>2½</td>
</tr>
<tr>
<td>Maturing in 4 years or more</td>
<td>1</td>
</tr>
</tbody>
</table>

1. Demand deposits subject to reserve requirements are gross demand deposits minus cash items in process of collection and demand balances due from domestic banks. Requirements schedules are graduated; and each deposit interval applies to that part of the deposits of each bank.

2. The average of reserves on savings and other time deposits must be at least 3 percent, the minimum specified by law.

Table 2
SELECTED PROVISION OF RESERVE REQUIREMENTS ON DEPOSITS

<table>
<thead>
<tr>
<th>Item</th>
<th>Member banks, Federal Reserve System</th>
<th>State nonmember banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net demand deposits</td>
<td>7% to 16¼%</td>
<td>12% to 16½%</td>
</tr>
<tr>
<td>Time deposits</td>
<td>1% to 6%</td>
<td>4%</td>
</tr>
<tr>
<td>Deductions from gross demand deposits</td>
<td>CIPC (cash items in process of</td>
<td>CIPC Balances due</td>
</tr>
<tr>
<td>in computing net deposits subject to</td>
<td>collection)</td>
<td>from other banks</td>
</tr>
<tr>
<td>reserve requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve period</td>
<td>Weekly</td>
<td>Semimonthly</td>
</tr>
<tr>
<td>Assets eligible as reserve assets</td>
<td>Vault cash at Federal Reserve banks</td>
<td>Vault cash Balances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>due from other banks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U.S. Government</td>
</tr>
<tr>
<td></td>
<td></td>
<td>securities and state of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Louisiana securities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>up to 50% of requirement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOURCES: Federal Reserve Bulletin.
State banking departments.

apply to gross demand deposits and to daily balances rather than weekly or semimonthly averages. The task of meeting requirements on a daily basis is more expensive and complicated than averaging over longer periods because over time many of the minor day-to-day fluctuations tend to offset one another.

Reserve requirement percentages in Louisiana are quite similar to those of the Federal Reserve. Requirements are graduated over ranges of deposits and, with one insignificant exception, were the same as those at member banks until the reduction of Federal Reserve requirements at the end of December 1976. The calculation of net demand deposits subject to reserve requirements is also the same as for member banks. Cash items in process of collection and balances due from other banks are subtracted from gross demand deposits in computing the balance subject to reserve requirements. But nonmember banks may hold half their reserves in U.S. Government securities and securities of the state of Louisiana, in effect cutting in half any “cost” of holding reserves.

In Oklahoma, reserve percentages at nonmember banks are the same as those imposed on member banks by the Federal Reserve. However, in computing net demand deposits subject to reserve requirements, nonmember banks deduct balances due from other banks only to the extent that they exceed the amount required as reserves in the preceding week. Reserve requirements are based on the average of deposits over a semimonthly period.

The existence of relatively high reserve percentages for nonmember banks could suggest that the burden of Federal Reserve requirements for member banks would be relatively low in the Eleventh District. However, this turns out not to be the case. Nonmember banks generally need more than the legally required reserve assets for ordinary operating purposes.

2. The single exception is a 14-percent, rather than 16¼-percent, requirement on net demand deposits over $400 million, and no nonmember bank in Louisiana is large enough to be subject to this marginal requirement.
Consequently, the relatively high reserve percentages do not significantly affect the amount of cash assets held by them. The difference in the cost of reserve requirements for member and nonmember banks in the Eleventh District is about the same as the nationwide average. The decline in membership in the District also appears to be about the same.

Nonmember banks generally need more than the legally required reserve assets for ordinary operating purposes. Consequently, relatively high reserve percentages in the four southwestern states do not significantly affect the amount of cash assets held by them.

Cost of Federal Reserve requirements in District states

The cost of Federal Reserve requirements to member banks can be estimated by taking the difference between the proportions of "nonearning" cash assets held by member and nonmember banks. The result of such comparisons nationwide are given in Table 3. The first component is the larger amount of vault cash held at member banks. The level of vault cash held by a nonmember bank is assumed to represent the necessary working balances for each size bank. Member banks typically hold more vault cash than nonmembers of similar size. This is probably because vault cash qualifies as part of member bank reserves. The average vault cash held by member banks in excess of the amount held by comparable size nonmember banks nationwide is given in line 1 of Table 3 as a percentage of total deposits.

The second component of the imputed cost of Federal Reserve requirements is excess holdings of correspondent-type balances. Member banks receive correspondent-type services from Federal Reserve banks as well as from correspondent banks. So for member banks, total correspondent-type balances are calculated as the sum of balances at Federal Reserve banks and collected balances at commercial banks. The amount by which this total exceeds collected correspondent balances of nonmember banks of the same size is assumed to reflect the impact of Federal Reserve requirements. This is shown in Table 3, line 2, as a percentage of total deposits of member banks.3

Commercial banks that provide correspondent banking services to other banks find it advantageous to be Federal Reserve members. A number of the correspondent services—such as collecting checks, transferring money and securities, and obtaining currency and coin—are facilitated by having access to Federal Reserve services. Payment to correspondent banks for such services is largely in the form of compensating balances. This is reflected in relatively larger due-to balances at member than nonmember banks.4 We assume, as have some other analysts, that 25 percent of the collected correspondent balances, or due-to balances, is available for profit to the correspondent banks. Thus, 25 percent of the excess of "due-to's" at member banks over those at nonmembers of comparable size is assumed to be attributable to Fed membership. This amount, expressed as a percentage of total deposits, is assumed to offset imputed "costs" of Federal Reserve requirements.

The net "cost" is obtained by adding the first two components and subtracting the third. Estimates of this cost for various size banks nationwide are given in line 4 of Table 3. In most size categories it is the income forgone on 2 1/2 to 3 percent of total deposits. However, at the very largest member banks, the ability to attract correspondent balances reduces this burden significantly.

The cost in the four states of the Eleventh District is given in Table 4. Individual items differ from the national averages, but the overall burden is roughly comparable.

Vault Cash. Both member and nonmember banks in the Eleventh District hold vault cash in amounts generally comparable to the nationwide averages. Louisiana banks and small Texas banks hold slightly more than the national averages, whereas Oklahoma and New Mexico banks and large Texas banks hold slightly less.

Also corresponding to nationwide patterns, member banks hold slightly larger proportions of vault

3. A bank can only invest funds that have actually been collected, so due-to balances and due-from balances must be adjusted to reflect the amount that has been collected and is available to invest. In this study, 56 percent of due-to and due-from balances are assumed to be collected. The same adjustment was made in Robert E. Knight, "Comparative Burdens of Federal Reserve Member and Nonmember Banks," Monthly Review, Federal Reserve Bank of Kansas City, March 1977, and in John Paulus et al., "The Burden of Federal Reserve Membership, NOW Accounts, and the Payment of Interest on Reserves," a Federal Reserve Board staff memorandum of June 1977.

4. Due-to balances are deposits of other banks—that is, deposits that could be withdrawn by other banks.
cash than nonmembers. Nonmember banks have an economic incentive to deposit excess vault cash at a correspondent bank, where in addition to serving as reserves in meeting state reserve requirements, the deposit earns an implicit return in the form of services from the correspondent. Member banks, on the other hand, have no particular incentive to economize on vault cash. Both vault cash and deposits at Federal Reserve banks qualify as reserves. Neither earns interest.

On balance, the excess vault cash at member banks in the Southwest, as shown in line 1 of Table 4, is roughly comparable to nationwide averages and amounts to a fairly minor portion of the total cost of Federal Reserve requirements.

**Due-from balances.** Both member and nonmember banks hold correspondent balances with other banks as working balances for clearing checks, transferring money, and other ordinary banking business. In addition, banks usually hold balances with correspondent banks as compensation for less tangible services, such as investment advice and help from expert personnel.

For the nation as a whole, nonmember banks hold balances due from other banks that equal between 5 and 9 percent of their total deposits. On average, nonmember banks in all four states of the Eleventh District hold more than these due-from balances than do banks in the rest of the nation. Banks in Texas hold significantly higher average balances—ranging from 9 to 11 1/2 percent of total deposits—while banks in the other three states hold only slightly more.

If these holdings were attributable to state reserve requirements, the relative burden of Federal Reserve requirements could be significantly reduced and perhaps even eliminated. However, three types of evidence suggest that the state reserve requirements are not responsible for the higher than average due-from balances at most nonmember banks. First is the existence of a large volume of excess reserves. Even in Texas, with the highest percentage reserve requirements, nonmember banks generally hold far more cash assets than the law requires. As shown in Table 5, more than two-thirds of these banks hold at least half again as many reserves as required.

Second, nonmember banks in Texas have the ability if they were to exercise it, to eliminate all the burden of state reserve requirements by creating the necessary reserves through reciprocal balances. Two banks could simply credit each other's accounts. Bank A could increase the balances due to Bank B, while Bank B increased the amount due to Bank A. Of course, each bank would have to hold reserves on the newly created balances, but 85 percent of such balances would be available to meet reserve requirements. The fact that reciprocal balances are not maintained in significant amounts suggests that banks hold enough deposits for banking purposes to meet the requirement.

A third piece of evidence suggesting that relatively high levels of state reserve requirements in the Southwest do not constrain the activities of nonmembers is the relatively high demand for correspondent balances of member banks. On average, member banks in all four southwestern states hold

---

Table 3

<table>
<thead>
<tr>
<th>Item</th>
<th>Total deposit size (Million dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than $5</td>
</tr>
<tr>
<td>1. Excess vault cash</td>
<td>.82</td>
</tr>
<tr>
<td>2. Excess correspondent-type balances</td>
<td>2.07</td>
</tr>
<tr>
<td>3. Less: Excess due to balances available for profit at member banks</td>
<td>.05</td>
</tr>
<tr>
<td>4. COST</td>
<td>2.84</td>
</tr>
</tbody>
</table>

**SOURCES:** Federal Deposit Insurance Corporation. Federal Reserve Bank of Dallas.

---

Table 4
COST OF RESERVE REQUIREMENTS FOR MEMBER BANKS
IN THE ELEVENTH DISTRICT STATES
(Percentage of total deposits as of December 31, 1976)

<table>
<thead>
<tr>
<th>Item</th>
<th>Less than $5</th>
<th>$5 to $10</th>
<th>$10 to $25</th>
<th>$25 to $50</th>
<th>$50 to $100</th>
<th>$100 to $500</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Excess vault cash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>n.a.</td>
<td>.39</td>
<td>.29</td>
<td>.58</td>
<td>1.20</td>
<td>.56</td>
</tr>
<tr>
<td>New Mexico</td>
<td>n.a.</td>
<td>-.31</td>
<td>.45</td>
<td>-.16</td>
<td>.53</td>
<td>0</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>.09</td>
<td>.21</td>
<td>.02</td>
<td>.28</td>
<td>.28</td>
<td>n.a.</td>
</tr>
<tr>
<td>Texas</td>
<td>.69</td>
<td>.12</td>
<td>.14</td>
<td>.06</td>
<td>.43</td>
<td>.16</td>
</tr>
<tr>
<td>2. Excess correspondent-type balances</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>n.a.</td>
<td>.43</td>
<td>2.76</td>
<td>3.13</td>
<td>5.90</td>
<td>2.80</td>
</tr>
<tr>
<td>New Mexico</td>
<td>n.a.</td>
<td>1.69</td>
<td>1.62</td>
<td>3.32</td>
<td>3.73</td>
<td>2.20</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>5.13</td>
<td>2.81</td>
<td>3.16</td>
<td>2.69</td>
<td>1.27</td>
<td>n.a.</td>
</tr>
<tr>
<td>Texas</td>
<td>1.83</td>
<td>3.20</td>
<td>2.47</td>
<td>2.95</td>
<td>3.39</td>
<td>2.74</td>
</tr>
<tr>
<td>3. Less: Excess due to balances available</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for profit at member banks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>n.a.</td>
<td>-.07</td>
<td>.01</td>
<td>.18</td>
<td>.20</td>
<td>-.23</td>
</tr>
<tr>
<td>New Mexico</td>
<td>n.a.</td>
<td>-.01</td>
<td>.05</td>
<td>-.06</td>
<td>.28</td>
<td>.61</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>.10</td>
<td>.04</td>
<td>.02</td>
<td>.09</td>
<td>.25</td>
<td>n.a.</td>
</tr>
<tr>
<td>Texas</td>
<td>.04</td>
<td>-.03</td>
<td>0</td>
<td>.11</td>
<td>.12</td>
<td>.58</td>
</tr>
<tr>
<td>4. COST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana</td>
<td>n.a.</td>
<td>1.49</td>
<td>3.04</td>
<td>3.53</td>
<td>6.90</td>
<td>3.59</td>
</tr>
<tr>
<td>New Mexico</td>
<td>n.a.</td>
<td>1.39</td>
<td>2.02</td>
<td>3.22</td>
<td>3.98</td>
<td>1.59</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>5.12</td>
<td>2.98</td>
<td>3.16</td>
<td>3.08</td>
<td>1.30</td>
<td>n.a.</td>
</tr>
<tr>
<td>Texas</td>
<td>2.48</td>
<td>3.35</td>
<td>2.61</td>
<td>2.90</td>
<td>3.70</td>
<td>2.32</td>
</tr>
</tbody>
</table>

n.a.—Data not available from enough banks to provide a dependable comparison.

SOURCES: Federal Deposit Insurance Corporation.
Federal Reserve Bank of Dallas.

about 2 percentage points more correspondent-type balances than member banks in the nation—the same amount of extra balances that nonmembers hold. Since state requirements do not apply at member banks, this is additional evidence that the higher demand for correspondent balances in the Southwest is not related to state reserve requirements.

To calculate the excess correspondent-type balances of member banks, their collected balances due from other commercial banks and their reserves at Federal Reserve banks are added together. The amount by which this total exceeds the collected "due-from's" of nonmember banks of the same size equals the excess, which is the largest component of the "cost" of Federal Reserve requirements. It is shown in line 2 of Table 4.

As one might expect, considering the relatively heavy demand for correspondent balances in the Southwest, this component of the reserve cost turns out to be as high in the four states as the nationwide average. The reason is the higher than average due-from's at nonmember banks are matched by higher than average due-from's at member banks.

**Due-to balances.** If banks in the Southwest hold higher than average balances due from other banks, the other side of the coin is higher than average balances due to other banks. Banks in Texas have more due-to's than average banks in the nation in nearly every size category. With a few minor exceptions, these same results hold for Louisiana, New Mexico, and Oklahoma. (Because a large number of correspondent balances are deposited at banks in New York City and other financial centers, total due-to's fall significantly short of due-from's in all four states.)

As member banks have an advantage in providing correspondent banking services and attracting correspondent balances, measurement of the cost of Federal Reserve requirements includes an adjustment to

Results for the four southwestern states are similar, on average, to those for the nation but show somewhat more variation. The cost of Federal Reserve requirements for most of these member banks is the income forgone on 2 to 4 percent of total deposits.

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reflect the additional resources of member banks arising from these due-to balances. Following earlier studies, it is assumed that 75 percent of collected due-to’s is enough to compensate the correspondent bank for services provided the respondent so that 25 percent of collected due-to’s is available for profit. Thus, the burden of member banks is reduced by 25 percent of the excess of collected due-to’s at member banks over those at nonmembers of comparable size. The resulting cost of Federal Reserve requirements is given for each state in line 4 of Table 4.

Results for the four southwestern states are similar, on average, to those for the nation but show somewhat more variation. The cost for most of these member banks is the income forgone on 2 to 4 percent of total deposits.

Summary and conclusion

Reserve requirement percentages for nonmember banks in Louisiana, New Mexico, Oklahoma, and Texas are higher than the average percentages for nonmember banks nationwide. Because of this, it is possible that the burden of Federal Reserve requirements in these states might be lower than elsewhere. If the state reserve requirements constrained nonmembers to hold as large a proportion of cash assets as member banks, there might even be no additional cost attached to Federal Reserve requirements.

However, this is not the case. Nonmember banks in the four states tend to hold more correspondent balances than nonmembers in the nation, but so do member banks. The extra balances appear to be necessary to the conduct of banking business rather than being a constraint imposed by state reserve requirements. Member banks maintain higher than average due-from’s even while holding balances at Federal Reserve banks. They do not behave as though Federal Reserve balances are a good substitute for correspondent balances.

With member and nonmember banks both holding higher due-from’s than the nationwide average, the difference is roughly the same as the average difference nationwide. The resulting cost of Federal Reserve requirements is also about average.

The extent of this cost can be translated from percentage of deposits, as calculated above, to dollar amounts. Taking 2 percent of deposits as an estimate of the burden and 6 percent as an estimate of the return the resources would yield if banks could invest them in short-term, low-risk, readily marketable assets, the cost to member banks nationwide is roughly $700 million. About $52 million of this would be attributable to member banks in Texas, and about $19 million to member banks in Louisiana, New Mexico, and Oklahoma. Of course, the cost rises or falls with the rate of return on securities.

Higher interest rates in recent years have raised the imputed cost of idle reserves, with a predictable impact on membership in the Federal Reserve System. In the past ten years, membership has declined

6. The Paulus study estimated the earnings burden, before adjustment to account for the implicit value of the discount window for member banks, to lie between $531 million and $690 million. The lower estimate assumes excess cash assets could be invested at an interest rate of 5 percent, while the higher one assumes a rate of 6½ percent. After adjustment, the burden was estimated to lie between $431 million and $590 million. See “The Burden of Federal Reserve Membership,” pp. 21-23.

7. One study of a sample of Texas banks suggests that the cost of Federal Reserve requirements is passed on to the communities served by member banks. The study found that membership did result in larger holdings of cash assets and fewer loans. However, the reduction in revenue resulting from this asset allocation was generally offset by higher prices charged for bank services. As a result, profitability was little affected by membership. See Donald R. Fraser, Peter S. Rose, and Gary L. Schugard, “Federal Reserve Membership and Bank Performance: The Evidence from Texas,” Journal of Finance 30, no. 2 (May 1975).
substantially. The proportion of total bank deposits accounted for by member banks has dropped from 84 percent to 75 percent nationwide. In the four south-western states the proportion of total deposits that is held by member banks has dropped from 79 percent to less than 68 percent. The roughly comparable decreases are consistent with the evidence of an average membership burden in the Southwest.

The erosion of membership is of concern to the Federal Reserve principally because it affects or threatens to affect monetary policy. The more non-member banks there are, the more difficult it is for the Federal Reserve to estimate the amount of open market operations that will be necessary to maintain the Federal funds rate within a given range or to achieve desired growth rates of money. A higher proportion of nonmember banks also makes it more difficult for the Federal Reserve to adopt a proposed alternative approach to monetary control that would focus on the level of bank reserves rather than on the Federal funds rate.

The threat of further declines in membership also constrains the Federal Reserve’s ability to use changes in reserve requirements in the conduct of monetary policy. Since the “cost” of the higher requirements falls on member banks, the resulting inequity and threat of further decreases in membership deter use of this instrument. In addition, since nonmember banks do not have equal access to the Federal Reserve discount window, erosion of membership complicates the Federal Reserve’s role as lender of last resort in times of banking emergencies.

A number of ways to alleviate the membership burden are being considered by Federal Reserve officials, bankers, banking organizations, and members of the Congress. Each of the proposals provides member banks a way to earn interest on some of the assets they now hold as reserves. Reserve requirements could be reduced or eliminated, although there is some concern that this could introduce additional instability in money growth. Alternatively, member banks could be authorized to hold a portion of their required reserves in U.S. Government securities or other interest-bearing securities, as is done by many states. Another alternative, which has been detailed in legislation currently before the Congress, would authorize the Federal Reserve to pay interest on reserve balances at Reserve banks and would authorize reductions in reserve requirement percentages for smaller member banks.

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8. One such proposal that could be implemented without threatening any loss of monetary control has been detailed in “A Proposal for Enhancing the Attractiveness of Membership in the Federal Reserve System,” a report by the Board of Directors of the Federal Reserve Bank of Kansas City, June 1977.
Statistical Releases of Federal Reserve Bank of Dallas

Available without charge from: Research Department
Federal Reserve Bank of Dallas
Station K
Dallas, Texas 75222

Weekly
Commercial and Industrial Loans Outstanding at Weekly Reporting Commercial Banks, by Industry—Eleventh Federal Reserve District
Condition Report of Weekly Reporting Commercial Banks—Eleventh Federal Reserve District
Weekly Department Store Sales in Eleventh District Areas (Total Eleventh District, Austin, Dallas, El Paso, Houston, and San Antonio)

Monthly
Commercial and Industrial Term Loans Outstanding at Weekly Reporting Commercial Banks, by Industry—Eleventh Federal Reserve District
Louisiana Industrial Production
Texas Industrial Production and Manufacturing Capacity Utilization

Annual
Condition and Income of Member Banks—Eleventh Federal Reserve District
Employees’ Salary Survey (Member banks in Eleventh District)
Officers’ Salary Survey (Member banks in Eleventh District)
Operating Ratios of Commercial Banks—Eleventh Federal Reserve District
Survey of Trust Department Income and Expenses (Commercial banks in Eleventh District)
New member banks

First National Bank, Copperas Cove, Texas, a newly organized institution located in the territory served by the Head Office of the Federal Reserve Bank of Dallas, opened for business November 16, 1977, as a member of the Federal Reserve System. The new member bank opened with capital of $500,000 and surplus of $500,000. The officers are: J. C. Sloan, Chairman of the Board; David I. Mountain, President; Kenneth J. Ambler, Vice President; and B. M. Sutton, Cashier.

South Texas National Bank, Laredo, Texas, a newly organized institution located in the territory served by the San Antonio Branch of the Federal Reserve Bank of Dallas, opened for business December 5, 1977, as a member of the Federal Reserve System. The new bank opened with capital of $550,000, surplus of $550,000, and undivided profits of $550,000. The officers are: Raymond M. Keck, Jr., Chairman of the Board; Edward H. Starr, Jr., President; Alnoso S. Rios, Vice President; and Nella R. Casas, Cashier and Secretary.

New par banks

Bank of Pleasant Hill, Pleasant Hill, Louisiana, an insured nonmember bank located in the territory served by the Head Office of the Federal Reserve Bank of Dallas, began remitting at par November 10, 1977. The officers are: James A. Tarver, President; W. O. Woods, Vice President; Lurline W. Dykes, Cashier.

Sabine State Bank & Trust Company, Many, Louisiana, an insured nonmember bank located in the territory served by the Head Office of the Federal Reserve Bank of Dallas, and its branches at Zwolle and Florien, Louisiana, began remitting at par November 14, 1977. The officers are: Horace Tompkins, President; James R. Cole, Executive Vice President; Don Zick, Vice President, Zwolle Branch; Stan Russell, Cashier; C. E. Smith, Assistant Cashier; Beatrice Hughes, Assistant Cashier; Kenneth Freeman, Assistant Cashier, Florien Branch; and H. A. Prewitt, Assistant Cashier.
Eleventh District Business Highlights

LOANS ADVANCE SHARPLY AT LARGE DISTRICT BANKS

Growth of total loans at large banks in the Eleventh District in 1977 may be the strongest in a number of years. Cumulative data show that total loans advanced 17 percent in the first 11 months of the year. That was more than twice the average growth rate for comparable periods in the preceding ten years.

On a seasonal basis, the rate of growth in total bank lending picks up considerably in the final month of the year. Consumer borrowing during the Christmas season and borrowing by businesses to meet quarterly tax and dividend payments and operating expenses are usually very strong sources of loan demand toward year-end. In view of the high rate of growth in borrowing already recorded and the expected seasonal increase, it is likely that 1977 will be a record year for borrowing at large banks.

The bank lending category with the fastest rate of increase in 1977 has been real estate loans. Reflecting the rapid growth in District construction activity and a greater emphasis on real estate lending, these loans have increased at record or near-record rates almost every month and advanced 32 percent through November. Moreover, they accounted for slightly more than a fourth of the growth in total loans.

Consumer loans at large banks advanced a record 23 percent through November. That was almost twice as fast as the previous record growth rate for the period and more than three times the average growth for comparable periods in the past ten years.

As in the nation, consumers have accounted for much of the growth in the District economy in 1977. Department store sales advanced about 14 percent in the first 11 months, and sales of new automobiles and other consumer durable goods have also been strong. Thus, use of bank credit cards has increased sharply, and consumers stepped up their bank borrowings appreciably.

Loans to nonbank financial institutions advanced 24 percent in the first 11 months of the year. That compared with an average growth of less than 4 percent in corresponding periods of the prior ten years. Despite sizable deposit inflows at savings and loan associations, the sharp demand for residential mortgages led these institutions to increase their short-term borrowing from large banks. Finance companies also stepped up borrowings at banks to accommodate their own higher level of loan demand.

Loans to businesses also rose at a near-record rate in the first 11 months of the year, even though they declined modestly in the first three months. Spurred by higher demand from transportation, public utilities, construction, and mining industries, total business loans through November rose almost 13 percent. That was more than twice the average growth for the same period in the previous ten years and almost matched the record rate of growth for the first 11 months of 1972.

In the past ten years, total loans at the District's largest banks increased an average of 2.6 percent in December. With almost all major loan categories sharing in the overall advance in total loans in 1977 and with continued strong growth in the District economy in prospect, the growth in total loans at large banks should be at a record rate for the year.

Consumer loan demand is likely to remain well above normal, reflecting continued strength in automobile and retail sales. And business loans could account for a larger share of the overall increase in total loans in December.

(Continued on back page)
Business expenditures are likely to continue to rise more rapidly than funds available from internal sources—largely profits and depreciation allowances. Moreover, the balance sheets of many businesses are in better condition to support short-term borrowing. Liquidity positions are much improved over most recent years, as corporations acquired substantial long-term funds in 1976, 1977, and early 1977 to repay short-term debt and increase their liquid assets. These improved liquidity positions may make short-term bank loans a more attractive source of funds to corporations.

**DURABLE GOODS MANUFACTURING LEADS INDUSTRIAL OUTPUT**

Although preliminary figures show industrial production in Texas slipped 0.2 percent in October, fairly steady gains in output have been made since the trough of the recession in February 1975. The only significant setback during the recovery has been in the second quarter of 1976, when industrial output fell slightly for three consecutive months.

At 141.2 percent of the 1967 base, industrial production in October was 5.7 percent above the level a year earlier. The biggest contributor to that gain was manufacturing, which makes up two-thirds of the production index. Durable goods manufacturing rose 8.9 percent, while the production of nondurable goods rose 5.5 percent.

The biggest increase compared with a year earlier—11.7 percent—was posted by public utilities. But since that sector comprises 4 percent of the index, the increase made only a small contribution to the overall gain in industrial production.

Mining had the smallest increase—0.8 percent—of the three major sectors. And although its share of the production index is 29 percent, mining added little to the gain in total output since October 1976.

Much of the increase in durable goods manufacturing has been in materials and equipment supplied to construction and drilling industries. And a significant portion of that increase has come since the fall of 1976.

The boom in construction activity has raised the output levels of furniture and fixtures, lumber and wood products, and stone, clay, and glass products. And the expanded search for crude oil and natural gas has continued to boost the production of oil field equipment, which accounts for nearly half of all nonelectrical machinery output.

Production of fabricated metals and electrical machinery has also grown substantially. And a share of that growth has been due to the increased demands of the construction and drilling industries, although that share is not as great as in the case of nonelectrical machinery.

Production of primary metals and transportation equipment industries since the fall of 1976 has been mixed. Output of steel, used in both the construction and drilling industries, has bolstered the primary metals industry, while production of nonferrous metals has lagged. Output of transportation equipment slipped throughout most of the period; only in September and October were significant gains recorded.

In nondurable goods manufacturing, the food and kindred products industry has recorded the steadiest gains in production since October 1976. But output in printing and publishing and in petroleum refining has also shown steady upward trends.

The patterns of output of the apparel, paper, and chemical industries have been uneven. Apparel production, for example, rose sharply in late 1976 and showed no further strength in 1977. Paper production has also had its ups and downs. Paper output in October, although above a year earlier, was down from the first quarter of this year. Similarly, chemical production in October was ahead of a year earlier but down from last spring.

The only nondurable goods industry that has drifted down is textiles. Output of the industry grew in the first year of the recovery but has been slipping for nearly two years.

Much of the sharp rise in output of public utilities was weather-related. Last winter in Texas was colder than normal, and heating requirements raised fuel demands—especially for natural gas and, to a lesser extent, electricity. And with record-high temperatures last summer, air-conditioning demands increased electric loads substantially.

The smaller gain in mining output resulted as increases in drilling activity and in production of metal, stone, clay, and earth minerals barely offset declines in crude oil and natural gas production. Despite the steady climb in drilling activity, there is little indication that the decline in oil and gas production will abate.

**OTHER HIGHLIGHTS:**

- Total deposits at member banks in the Eleventh District continued to increase sharply in October, as both demand deposits and time and savings deposits were up.
- The value of total building contracts, seasonally adjusted, in the four states of the Eleventh District fell in October after four months of increase.
- The number of housing starts in Texas also declined from September and totaled 11,400 units, seasonally adjusted, in October.
- Total employment in the Eleventh District states in October rose 0.4 percent over the previous month. Unemployment fell to 5.3 percent of the civilian labor force from 5.6 percent in September.
- Consumer prices in Houston rose 0.6 percent from July to October to a level 5.9 percent above a year earlier. The latest rise was the smallest increase in that city's consumer price index in nearly five years.

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