FEDERAL RESERVE BANK OF KANSAS CITY

Economic Review

First Quarter 1994

Economic Review

Federal Reserve Bank of Kansas City

First Quarter 1994 *Volume 79, Number 1*

Contents

Chirinko and Morris present a framework for examining fiscal policies aimed at spurring capital formation and highlight the conditions for their success. First, they show why capital formation is an important determinant of economic growth. Second, they show how the optimal amount of capital formation, and therefore economic growth, is determined. Third, they show how economic distortions can cause capital formation to fall short of the socially optimal amount. Finally, they discuss several fiscal policies that have been proposed to raise capital formation.

Achieving Price Stability: A 1993 Report Card

By George A. Kahn

The primary goal of Federal Reserve monetary policy is to foster maximum sustainable growth in the U.S. economy by achieving price stability over time. Although considerable progress toward price stability has been made since the early 1980s, inflation remains above the level most analysts would associate with price stability. Because price stability is the key contribution the Federal Reserve can make toward maximizing long-run growth and living standards in the United States, it is important for the Federal Reserve to remain vigilant in its efforts to keep inflation in check.

This article examines the behavior of inflation over the past year in relation to the Federal Reserve's goal of achieving price stability over time. The first section discusses why price stability is important and how the Federal Reserve has made significant progress toward price stability since the early 1980s. The second section describes the behavior of inflation in 1993, showing that inflation declined for the year as a whole. The third section shows that inflation expectations also declined in 1993, suggesting the public believes the inflation outlook has improved. Together, these findings suggest the Federal Reserve made progress in 1993 toward achieving price stability.

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PRICE STABILITY AS A GOAL OF MONETARY POLICY

The Federal Reserve Act, as amended by the Employment Act of 1946 and the Full Employment and Balanced Growth Act of 1978, spells out the goals of monetary policy. They are stability and growth in the economy, a high level of employment, stability in the purchasing power of the dollar, and reasonable balance in transactions with foreign countries. Though there may be tradeoffs among these goals in the short run, there are no necessary tradeoffs in the long run. In fact, stability in the purchasing power of the dollar—or price stability—is a prerequisite for maximum growth in the economy in the long run. While the Federal Reserve has made considerable progress in reducing inflation over the past 15 years, inflation remains above the level most analysts would consider consistent with price stability.

What is price stability?

Price stability is achieved, according to some definitions, when inflation is not a factor in the

decisionmaking processes of households and businesses. Because of difficulties in measuring the aggregate price level, however, price stability does not necessarily imply achieving a constant level for a specific price index. All statistical measures of inflation are flawed. And there is no consensus on which of many imperfect measures to "stabilize." As a result, policymakers look at a variety of inflation indicators in gauging progress toward price stability.

The most widely monitored inflation indicator, and the one the Federal Reserve highlights in reports to Congress, is the consumer price index (CPI). Like all measures of inflation, the CPI is imperfect. One problem associated with the construction of the CPI is adjusting prices to reflect changes in the quality of goods and services. When innovation allows manufacturers to improve their products, consumers get more product for their dollars. For example, consumers can buy appliances and automobiles that are safer to use and more energy-efficient, televisions with higher quality pictures and sound, and personal computers with greater computing power. On a quality-adjusted basis, the price of these products has fallen. Statisticians try to adjust for such quality changes in computing the CPI but, to the extent quality improvements are understated, the CPI exaggerates inflation.

Another problem with the CPI is that it does not capture changes in the "market basket" of goods and services purchased by consumers. Rather, the CPI measures changes over time in the price of a fixed market basket.[1] To the extent consumers respond to individual price increases by switching to comparable items that cost less, the CPI may overstate inflation. For example, if consumers consider beer to be a close substitute for wine, they will buy more beer when the price of wine increases. For these consumers, an increase in the price of wine will be of little or no consequence.

These problems suggest that price stability may be consistent with positive CPI inflation. While there is considerable uncertainty about the size of the upward bias to the CPI, most estimates suggest it is small. One study, based on a survey of the literature, estimates the bias to fall within a range of zero to two percentage points (Wynne and Sigalla). Another study estimates an upper bound of 1.8 percent and a "more reasonable" bias of about one percentage point (Lebow, Roberts, and Stockton, pp. 32-33). According to this estimate, price stability would be achieved with a CPI inflation rate of 1 percent. Thus, although there is considerable uncertainty about what CPI inflation rate corresponds with price stability, most estimates suggest a fairly low rate.

In addition to the CPI, policymakers look at a variety of other inflation indicators in assessing progress toward price stability. None is perfect. Some of the most important alternative indicators to the CPI are the CPI excluding food and energy prices, the producer price index (PPI) with and without food and energy prices, the implicit GDP deflator, and the fixed-weight GDP deflator. As discussed in the accompanying box, these indicators differ from the CPI and each other in many important respects. While most of the discussion in this article focuses on CPI inflation, the article also describes movements in the other indicators of inflation.

Why is price stability important?

Reducing inflation is important because inflation is costly. Inflation discourages saving and investment by creating uncertainty about future prices. It forces businesses and individuals to spend time and money predicting future prices and hedging against unanticipated inflation. And, through its interaction with the tax system, it can increase tax burdens by artificially raising incomes and profits. All of these factors cause the economy to operate less efficiently, hampering economic growth and ultimately reducing standards of living (Fischer).

BOX

ALTERNATIVE INDICATORS OF INFLATION

Because no single price index perfectly measures inflation, analysts look at a variety of indexes in assessing the behavior of inflation over time. These indexes differ according to how they are calculated and according to the goods and services they cover.

The *consumer price index* (CPI) measures the average change in the price of a fixed market basket of goods and services purchased by consumers. The market basket is composed of seven major categories of expenditures—food, housing, apparel, transportation, medical care, entertainment, and other goods and services. Goods and services included in the index may be domestically produced or imported.

The *producer price index* (PPI) measures average changes in selling prices received by domestic producers of goods. The index is classified by stage of processing, with separate measures for finished goods, intermediate goods, and crude materials. Of all the PPI indexes, the PPI for finished goods is the most closely watched and the one that is cited in this article. The PPI measures prices at the first level of commercial transaction. Therefore, the PPI can sometimes serve as an indicator of future changes in broader measures of the general price level, such as the CPI. But because the PPI excludes services, its use as an indicator of consumer price inflation is limited.

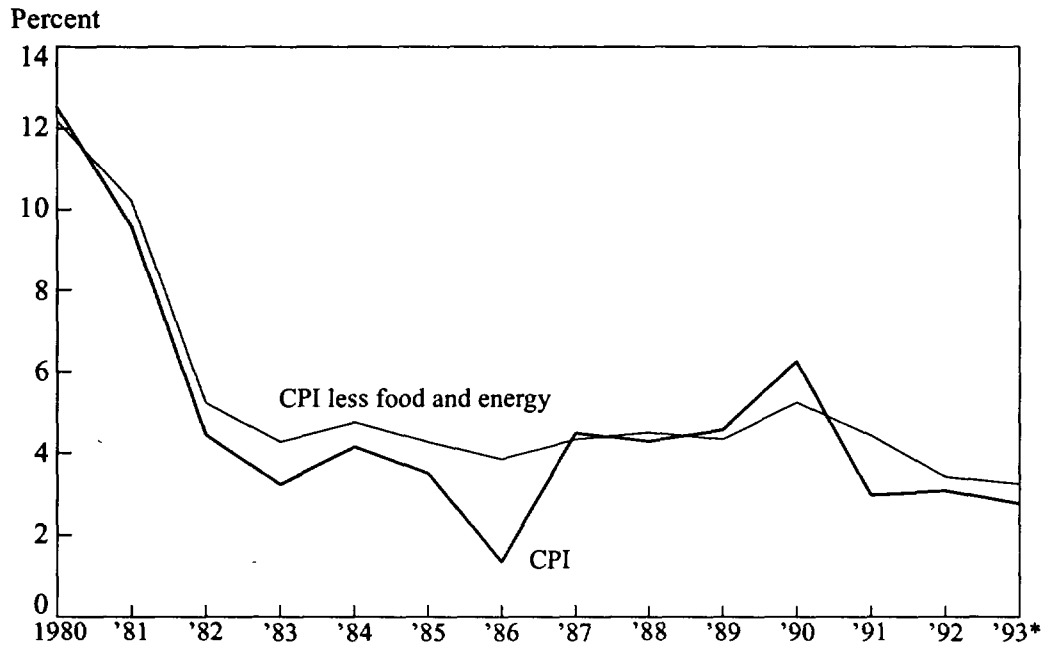
Removing the food and energy components from the CPI and PPI sometimes gives a better indication of the underlying or *core inflation* rate. Food and energy prices are volatile and not always representative of economywide fundamentals. For example, when a drought raises food prices or OPEC raises oil prices, the effect on inflation is temporary. Looking at the CPI or PPI net of food and energy prices in such a situation can give a better indication of underlying inflationary pressure.

The GDP-based indicators of inflation measure average price changes for all goods and services produced in the United States, including investment goods and exports, but excluding imports. While the *implicit GDP deflator* allows changes in consumer and business spending patterns from one quarter to the next, the *fixed-weight GDP deflator*—like the CPI and PPI—holds spending patterns constant. The GDP-based inflation measures are derived from the same raw data CPI and PPI. Therefore, they potentially suffer the same quality-adjustment biases as the CPI and PPI.

Because in the long run inflation is a monetary phenomenon, monetary policy is the only tool available for keeping inflation under control. As the nation's central bank, the Federal Reserve makes monetary policy and holds sole responsibility for maintaining the purchasing power of the dollar. Because inflation is inherently costly, the Federal Reserve has in recent years pursued a policy of working toward price stability over time. By achieving this goal, the Federal Reserve minimizes

Chart 1

CPI Inflation Since 1980



Note: Data are Q4/Q4 percent changes.
*1993:Q3/1992:Q3
Source: Bureau of Labor Statistics.

the costs of inflation and contributes to maximizing the economy's long-run growth potential.

How far have we come toward price stability?

Substantial progress has been made in the last 15 years toward price stability. In the late 1970s and early 1980s, inflation as measured by the CPI reached double digits. The high and rising inflation rates of this period led the Federal Reserve to adopt a policy of gradually reducing monetary growth to gradually reduce inflation. This policy has been largely successful. CPI inflation has fallen from over 12 percent in 1980 to under 3 percent in 1993 (Chart 1). Inflation is thus significantly lower now than 15 years ago, but still higher than most estimates of price stability.

CPI inflation has not declined steadily, however, largely because of factors unrelated to monetary policy. Chief among these factors have been changes in the price of imported oil. For example, a drop in the price of imported oil led to sharply lower inflation in 1986. In addition, an increase in oil prices associated with Iraq's invasion of Kuwait led to a burst of inflation in 1990. As shown in Chart 1, when the influence of energy prices and food prices—another volatile sector—is removed from the CPI, the pattern of

Table 1

FOMC Inflation Projections for 1993
(Percent)

	February	July
Range	2½ to 3	3 to 3½
Central tendency	2½ to 2¾	3 to 3¼

Note: Data are Q4/Q4 percent changes for the CPI.
Source: Board of Governors of the Federal Reserve System

inflation since 1980 has been somewhat smoother. Data on the CPI, less food and energy, also show that progress against inflation stalled in the mid-to-late 1980s. Only recently has inflation again begun to fall.

INFLATION IN 1993

The Federal Reserve expected to make further progress toward price stability in 1993. This expectation was realized. Although inflation rose early in the year, it fell over the year as a whole.

What were the Federal Reserve's projections?

At the beginning of 1993, the Federal Reserve projected that inflation would decline. On a fourth quarter over fourth quarter basis, CPI inflation in 1992 came in at 3.1 percent, while on a December over December basis CPI inflation came in at 3.0 percent. With this experience as background, the Federal Open Market Committee (FOMC)—the Federal Reserve's principal policymaking body—believed there was scope for a modest decline in CPI inflation in 1993. The projections of CPI inflation for 1993 made in February by the Federal Reserve Board Governors and Bank Presidents ranged from 2 1/2 percent to 3 percent. A large majority of the forecasts fell within a narrower range of 2 1/2 to 2 3/4 percent (Table 1). Thus, with economic growth expected to be moderate and unemployment declining only gradually, the FOMC expected inflation to fall slightly in 1993.

Later in 1993, after inflation came in somewhat higher than expected, the FOMC revised upward its projections for inflation (Table 1). In July, the FOMC raised its range of projections of CPI inflation to 3 to 3 1/2 percent, with a majority of FOMC members expecting inflation in a narrower range of 3 to 3 1/4 percent.

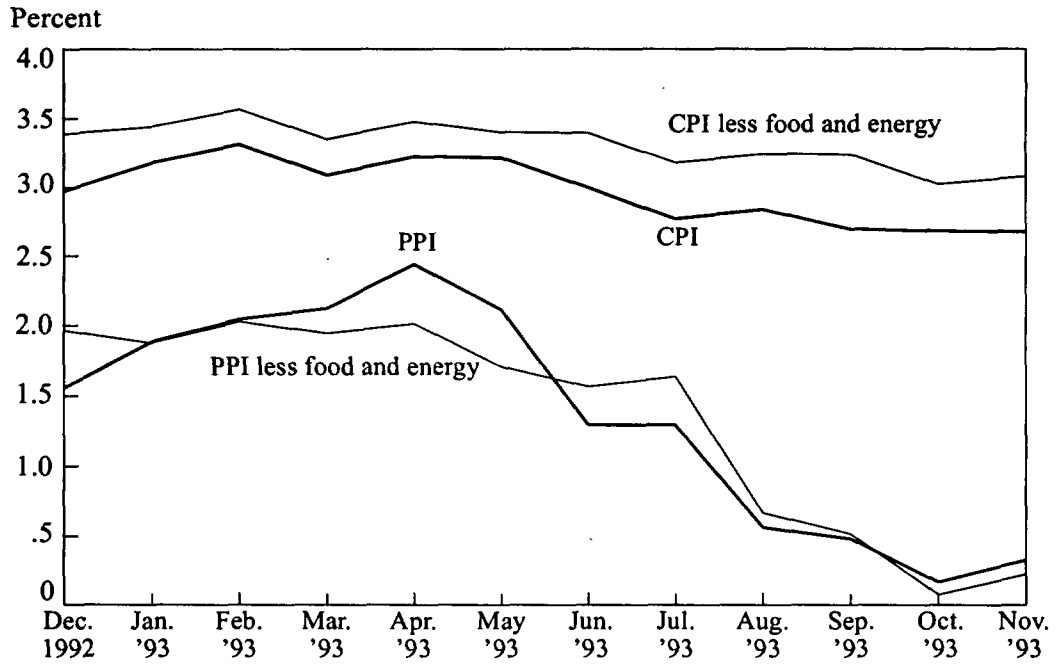
What was the reality?

All major measures of inflation behaved similarly in 1993. All measures increased in the first several months of the year but declined slightly for the year as a whole. While economic fundamentals, such as slack in the economy, contributed to the decline for the year as a whole, a number of special factors contributed to the pattern of inflation throughout the year.

Statistical profile. Inflation indicators, released monthly and quarterly, all showed reductions in inflation for the year as a whole after moving higher early in the year. For the year through November, CPI inflation—with and without food and energy prices—declined slightly, while PPI inflation—with and without food and energy prices—declined more sharply (Chart 2). In the first four months of the year, all four of these inflation indicators either remained steady or rose. Likewise, the GDP-based measures of inflation declined from the fourth quarter of 1992 to the third quarter of 1993—the latest quarter for which data are available (Chart 3). And, like the CPI and PPI, they registered increases in the first quarter.

Chart 2

Monthly Inflation Indicators



Note: Data are 12-month rates of change.
Source: Bureau of Labor Statistics.

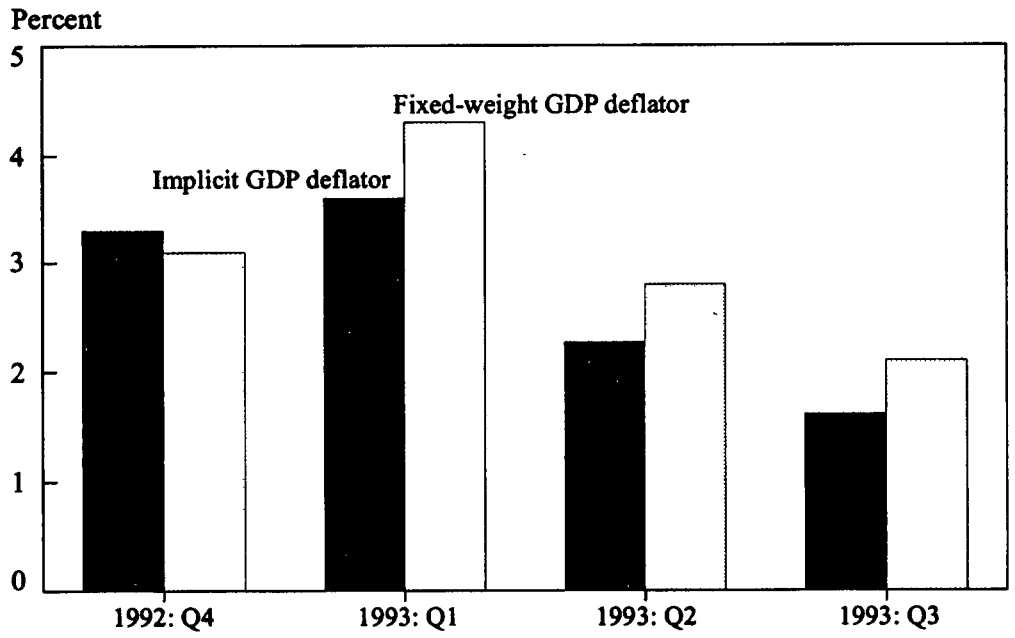
Fundamental factors. Most fundamental factors pointed to a decline in inflation for the year as a whole. The most important fundamental factor was slack in the economy in the form of excess industrial capacity and unemployment.[2] For example, capacity utilization rates in manufacturing averaged 80.9 percent in the first 11 months of 1993, well below the 82-83 percent rate that is sometimes suggested as a threshold for higher inflation. Not until November did manufacturing capacity cross the lower end of the inflation threshold, hitting a high for the year (through November) of 82.2 percent. As a result, for the year as a whole, excess industrial capacity put downward pressure on inflation.

Unemployment also put downward pressure on inflation. Unemployment remained above most estimates of the unemployment rate associated with stable inflation. These estimates of the "natural rate" of unemployment range from 5.5 percent to 6.5 percent.[3] Averaging 6.9 percent in the first 11 months of 1993, unemployment therefore exceeded the range of most estimates of the natural rate. As a result, downward pressure was exerted on inflation throughout the year.[4]

With unemployment remaining above the natural rate and declining only gradually through the year, labor cost increases remained moderate in 1993. Growth in labor costs have important implications for inflation because labor costs are roughly two-thirds of total production costs. While total labor costs rose somewhat faster than

Chart 3

Quarterly Inflation Indicators



Note: Data are quarterly rates of change at annual rates.
Source: Department of Commerce.

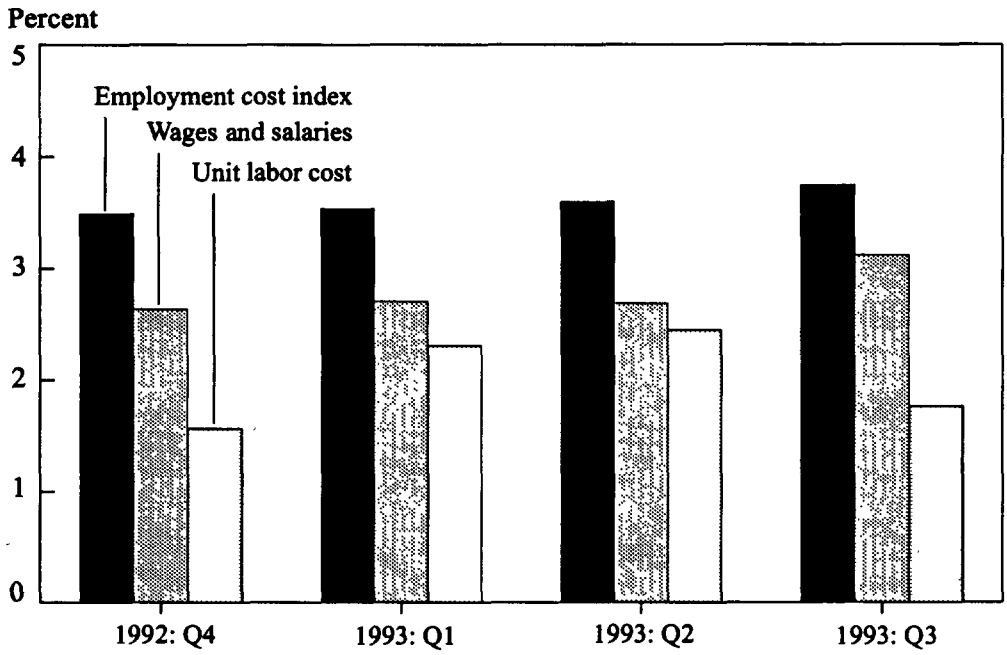
prices in 1993, productivity growth has been strong.[5] As a result, unit labor costs—the labor cost incurred in producing one unit of output—increased only modestly.

One of the best measures of labor costs, the employment cost index (ECI), shows these trends clearly (Chart 4). The ECI is a measure of total labor costs including benefits.[6] According to the ECI, total labor costs rose less than 4 percent in the first three quarters of 1993. The wage and salary component of the ECI rose less than 3 percent. And, because of rapid productivity growth, growth in unit labor costs ranged from 1.8 to 2.4 percent in the first three quarters of 1993—a rate less than the rate of inflation.

Another fundamental factor affecting inflation—prices of materials used at the earliest stages of production—gave mixed signals in 1993. These materials prices, also known as commodity prices, fluctuate minute by minute in auction-type markets and sometimes provide an early warning signal of future movements in the prices of finished goods and services. In 1993, two closely watched indexes of commodity prices both rose early in the year, then diverged (Chart 5). The Journal of Commerce (JOC) index of commodity prices, which is weighted toward industrial materials, rose sharply in January, February, and March. Similarly, the Commodity Research Bureau (CRB) Futures Index, which is weighted toward agricultural products, rose sharply in February, March, and April. Although the CRB

Chart 4

Wage Inflation



Note: Data are 4-quarter rates of change.
Source: Bureau of Labor Statistics.

index continued to trend up, the JOC index crested in April and fell steadily through the rest of the year. On the whole, commodity prices had little long-term influence on inflation in 1993.

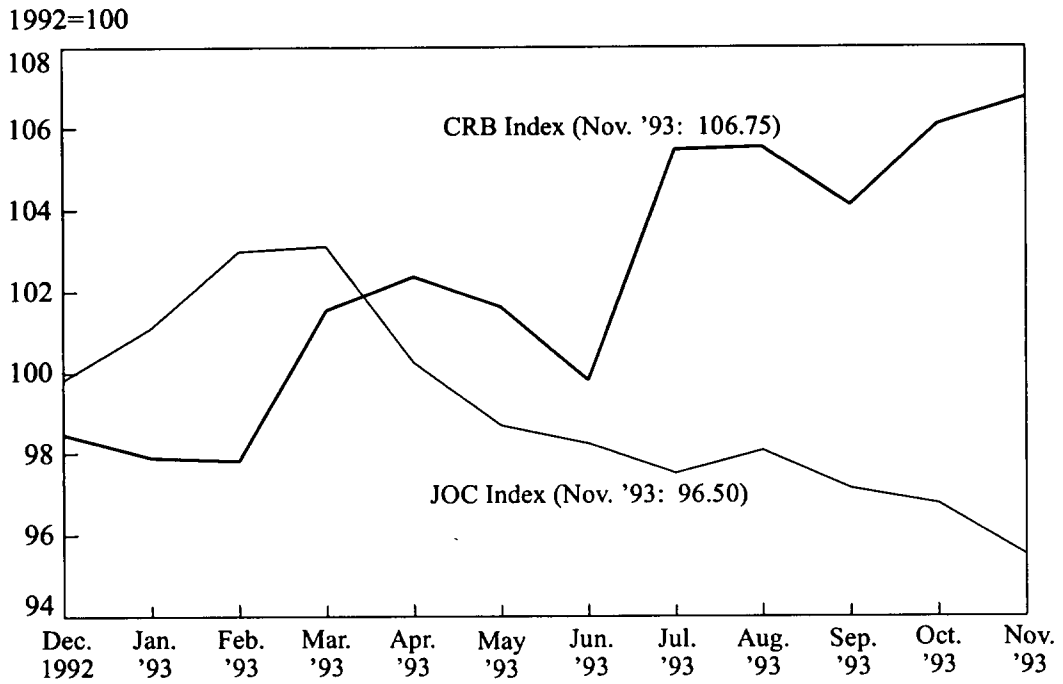
Special factors. While fundamental factors underlie the decline in inflation for the year as a whole, fluctuations in the inflation rate from month to month are largely explained by a number of special factors.

Several special factors help explain the rise in inflation early in the year. *Incomplete seasonal adjustment* of price indices has been offered as one explanation for the temporary increase. Under current methodology, several of the components of the CPI are not seasonally adjusted even though they have shown seasonal price increases early in the year. Had these components been seasonally adjusted, the overall CPI would have shown less of an increase early in the year.[7] In addition, changing retail practices may have affected the pattern of price changes among components of the CPI that *are* seasonally adjusted. For example, in recent years, retailers have been introducing new, higher priced spring merchandise earlier in the year. Using seasonal adjustment factors based on historic retailing practices has thereby caused inflation to be overstated in January and February in the last few years.[8]

Another factor contributing to higher inflation early in the year was a 2.6 percent jump in *tobacco prices* caused by higher federal excise

Chart 5

Commodity Price Indexes



Source: CRB Commodity Index Report, *Journal of Commerce*.

taxes in January. Finally, *bad weather* early in the year contributed to inflation by boosting fresh fruit and vegetable prices.

Other special factors, on net, contributed to lower inflation in the remainder of the year. *Energy prices* began to fall in May, putting downward pressure on inflation. The gasoline price increases that usually go into effect in May and June apparently did not stick in 1993.[9] In addition, a 4.3 cents per gallon increase in the federal excise tax on gasoline went into effect in October and temporarily boosted consumer price inflation, but a November oil glut put downward pressure on inflation. Finally, *tobacco prices* temporarily dampened inflation as producers of tobacco products cut prices 25.6 percent in August.

While these and other special factors help explain the month-to-month fluctuations in inflation, they largely reflect temporary influences on inflation. Over the longer run, inflation is determined by monetary policy and its influence on such economic fundamentals as slack in the economy. Accordingly, in judging inflation trends and the long-run outlook for inflation, the focus must remain on fundamentals.

How did reality match the FOMC's projections?

Assuming prices increase in December at a rate similar to November, overall CPI inflation

will fall a few tenths of a percent in 1993 from its 1992 rate of 3.1 percent (fourth quarter over fourth quarter).[10] As a result, CPI inflation will come in near the high end of the narrow range projected by the FOMC in February and slightly below the low end of the narrow range projected by the FOMC in July (Table 1). Excluding food and energy prices, CPI inflation is also likely to decline slightly. Thus, in line with the expectations of the FOMC, further progress was made in 1993 toward price stability. This progress is particularly noteworthy because the economic recovery is well over two years old, a point in many previous recoveries when inflation rose.

INFLATION EXPECTATIONS IN 1993

Has the modest decline in inflation in 1993 led to a reduction in inflation expectations? Inflation expectations are important because a decline in expectations is an essential ingredient in making progress toward price stability. Unfortunately, most measures of inflation expectations show that inflation is expected to rise in the future. However, the extent of the expected increase declined in 1993, in both the short run and the long run. Though the public apparently remained skeptical that inflation would fall further, the public lowered its estimate of the expected future rise in inflation.

Importance of expectations

Inflation expectations are important for two main reasons. First, inflation expectations are a key determinant of inflation. For example, if inflation is expected to fall, businesses will be more willing to reduce the rate of increase of product prices, and workers will be more willing to moderate their wage demands. Both businesses and workers will realize, in an environment of lower inflation, they can maintain their real prices and wages with lower nominal price and wage growth. As a result, actual wage and price inflation will fall. A decline in inflation expectations will therefore lead to a decline in inflation.[11]

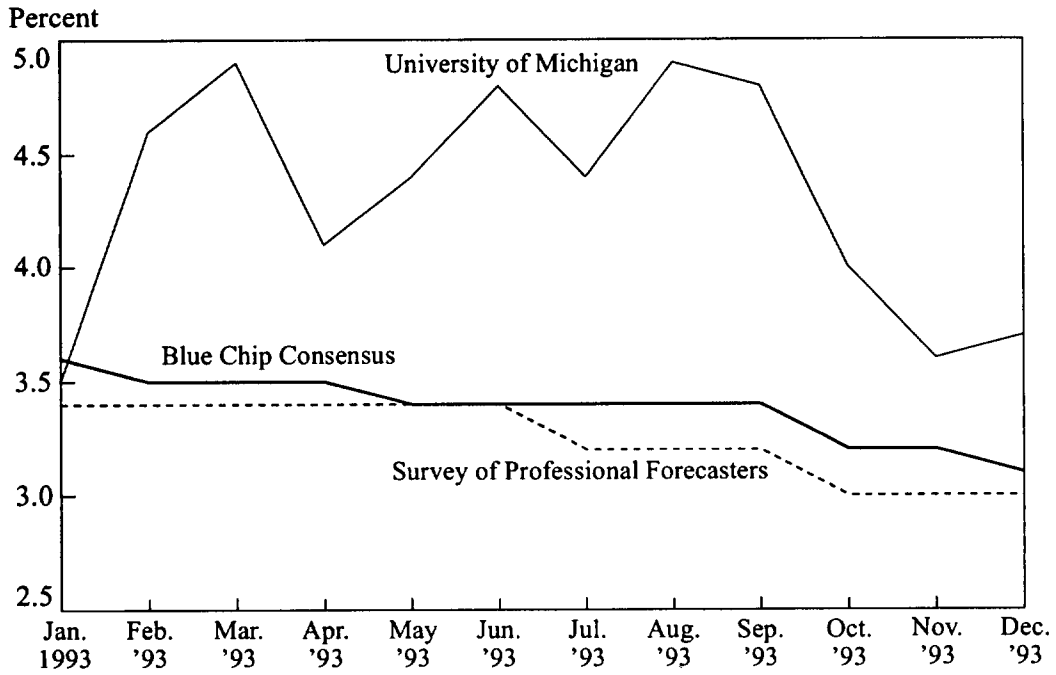
A second reason that inflation expectations are important is that they signal how workers and businesses view future monetary policy. For example, a central bank that plans to reduce inflation over time, but fails to generate falling inflation expectations, lacks credibility. Businesses and workers will continue to plan on an unchanged inflation rate when setting prices and wages and, as a result, inflation will persist. Reducing inflation under these conditions becomes more difficult and more costly (Kahn and Weiner). It is therefore important for expectations to adjust downward when monetary policy acts to lower inflation. Knowing how expectations are changing gives an indication of the credibility of monetary policy and thereby an indication of the speed with which inflation will fall.

Short-term expectations

Short-term inflation expectations were lower at the end of 1993 than at the beginning of that year. For example, inflation expectations for 1994 fell in 1993. Although private forecasters do not expect the decline in inflation that occurred in 1993 to be sustained in 1994, most forecasters adjusted downward their expectations of the likely increase in inflation (Chart 6). One measure of inflation expectations is the Blue Chip consensus forecast of CPI inflation. According to this indicator, expected CPI inflation from 1993:Q4 to 1994:Q4 fell steadily through 1993, reaching a low of 3.1 percent in December 1993. Another indicator of short-term inflation expectations is the survey of professional forecasters compiled by the Federal Reserve Bank of Philadelphia. This survey, conducted on a quarterly basis, shows expected CPI inflation

Chart 6

Short-Term Inflation Expectations



Note: The Blue Chip Consensus and the Survey of Professional Forecasters data are forcasts of CPI inflation from 1993:Q4 to 1994:Q4. The University of Michigan data are expected CPI inflation over the next 12 months.
Source: Blue Chip indicators; Survey Research Center, University of Michigan; and the Survey of Professional Forecasters, Federal Reserve Bank of Philadelphia.

for 1994 declining steadily through 1993 and reaching a low of 3.0 percent in December.

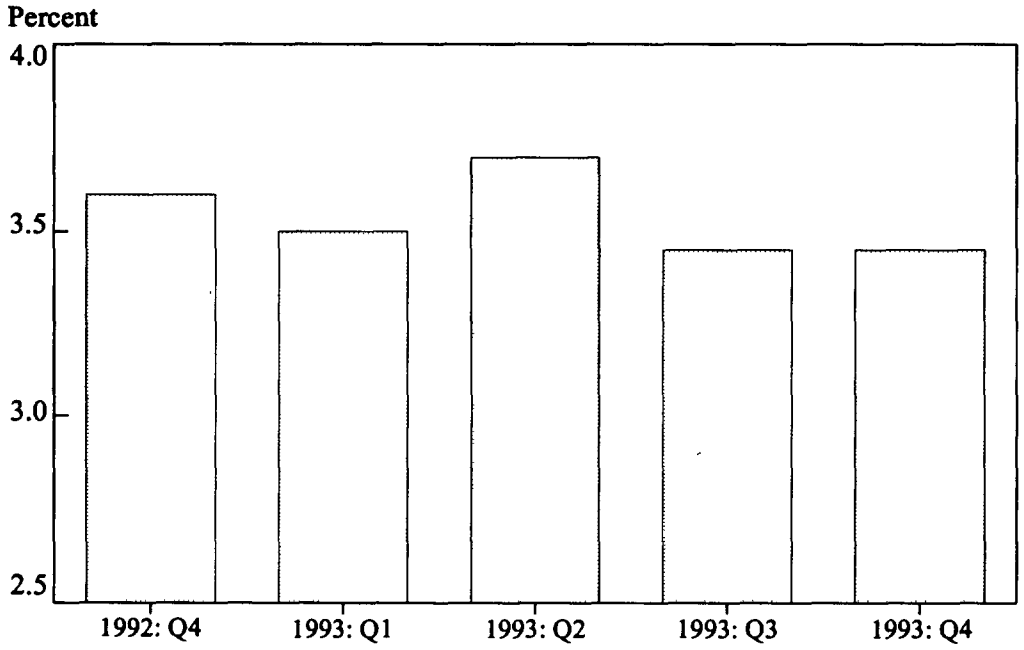
In addition, the University of Michigan's consumer survey of inflation expectations for 12 months ahead, after rising sharply in February, trended down through the remainder of 1993. In comparison to the inflation outlook of professional forecasters represented in the Blue Chip consensus and the Philadelphia Fed survey, consumers' outlook on inflation was more volatile and more pessimistic. Nevertheless, through most of 1993 the short-term outlook for inflation appeared to improve.

Long-term expectations

The long-run outlook for inflation also improved in 1993. This improved outlook is apparent in surveys of long-term inflation expectations and in developments in the U.S. Treasury bond market. While forecasters expect inflation to rise over long time horizons, they have adjusted down their expectation of the extent of the rise. For example, long-term inflation expectations, as measured by the Philadelphia Fed's survey of professional forecasters, declined through the year (Chart 7).

Chart 7

Long-Term Inflation Expectations



Note: Long-term expectations are the median of forecasts for CPI inflation over the next 10 years.
Source: Survey of Professional Forecasters, Federal Reserve Bank of Philadelphia.

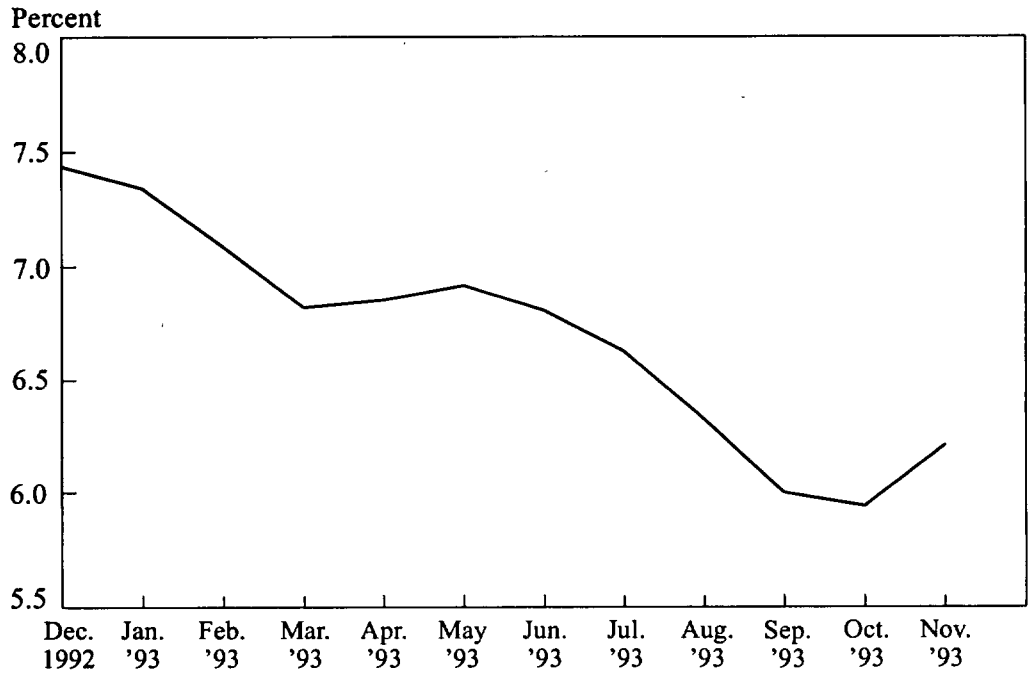
Although increasing in the second quarter, expected CPI inflation over the next ten years declined from just over 3.5 percent in the fourth quarter of 1992 to just under 3.5 percent in the fourth quarter of 1993.

Reflecting in part a decline in inflation expectations, the yield on long-term Treasury bonds fell sharply in 1993 (Chart 8). This evidence supports the view that investors believe progress has been made toward price stability. Inflation erodes the value of assets that yield a fixed nominal rate of return such as Treasury bonds. As a result, investors demand an "inflation premium" when they invest in these fixed-rate assets. If investors revise down their expectations of future inflation, they will be more willing to accept a lower nominal rate of return on Treasury bonds. Although many factors may have contributed to the fall in bond yields, including a more sluggish recovery than expected and the passage of the deficit reduction package, the decline in Treasury yields is yet another piece of evidence consistent with the view that inflation expectations fell in 1993.

The decline in both short-term and long-term inflation expectations should help reduce inflationary pressures in the economy. Lower inflation expectations will be built into future prices and wages, reducing actual inflation. In addition, lower inflation expectations may signal greater public confidence in the Federal Reserve's ability to keep inflation under control. This increased confidence in Federal Reserve policy could make further reductions in inflation easier.

Chart 8

30-Year Treasury Bond Yield



Source: Board of Governors of the Federal Reserve System.

CONCLUSIONS

Inflation and inflation expectations fell in 1993. The Federal Reserve therefore made progress in 1993 toward its objective of achieving price stability over time.

The outlook for inflation in 1994 is less clear. Although expectations of inflation for 1994 fell throughout 1993, they remain above the actual rate of inflation for 1993. Thus, most forecasters continue to expect inflation to increase. The December Blue Chip consensus forecast for CPI inflation from the fourth quarter of 1993 to the fourth quarter of 1994, for example, is 3.1 percent, slightly higher than inflation in 1993. This expectation is likely based on a view that the elimination of slack in the economy next year will exert modest upward pressure on inflation. For example, as of November, capacity use rates are within the 82-83 percent inflation threshold, unemployment has fallen to 6.5 percent, and the yield on the 30-year Treasury bond has risen a bit.

An increase in inflation in 1994, however, is by no means inevitable. Some slack still remains in labor markets. Businesses are aggressively acting to cut costs. Productivity is growing at a faster rate than in the past. Energy prices have dropped. And fiscal policy remains restrictive. If Federal Reserve monetary policy can ensure the economy does not overshoot the level of economic activity associated with nonaccelerating inflation, some further progress toward price stability will be possible.

ENDNOTES

[1] The market basket is revised roughly every ten years.

[2] In addition, the economy grew at a moderate rate in the first three quarters. Because the speed of expansion is positively related to inflation, the relatively slow pace of economic growth in 1993 also helped to moderate inflation.

[3] For a discussion of the natural rate of unemployment and evidence that the natural rate has risen recently to about 6.3 percent, see Weiner.

[4] A simple rule of thumb can be used to estimate how much downward pressure unemployment has exerted on inflation. The rule of thumb, which has been reliable in the past in relating inflation to unemployment, says that one point-year of unemployment is associated with a 0.5 percentage-point reduction in inflation. A point-year of unemployment is one year of unemployment one percentage point above the natural rate (Kahn and Weiner). With an average unemployment rate of 6.9 percent in 1993 and an assumed natural rate of 6.0 percent the midpoint of the range of estimates the economy has experienced almost a full point-year of unemployment. Therefore, the expected decline in inflation would be 0.45 percentage point (0.9 x 0.5). With an actual decline in CPI inflation of only 0.3 percentage point (from 1992:Q4 to 1993:Q3), the rule of thumb suggests that unemployment exerted somewhat less downward pressure on inflation than in the past. However, taking lagged effects of unemployment on inflation into account or choosing slightly different time frames might lead to an estimate closer to historical experience.

[5] For a discussion of productivity growth in the current expansion and its implications for output and employment growth, see Kahn.

[6] The employment cost index provides a measure of labor costs for a fixed set of jobs. Thus, it is similar to a fixed-weight price index because it does not allow for shifts in workers across jobs and industries.

[7] The December CPI and the historical data released with it will have new, more extensive seasonals.

[8] In addition, the Bureau of Labor Statistics, which compiles the CPI, has recently begun incorporating price increases associated with new fashions more rapidly into the CPI. Therefore, even if retail practices have not changed, the CPI might still show higher inflation early in the year.

[9] Patrick Jackman, as quoted in the *Daily Report for Executives*, 1993.

[10] The precise figure depends on CPI data for December, which were not available at the time the article was written.

[11] The decline in inflation will be permanent only if the expectations of lower inflation are realized (Kahn and Weiner).

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Financial Markets in 2020

By Charles S. Sanford, Jr.

At Bankers Trust, we spend a lot of time anticipating trends in the financial markets, not only those affecting short-term price movements but also those that are responsible for the long-term evolution of the system itself.

Anticipating the longer term is especially compelling today considering the speed at which the financial system is changing. Even our inherent romanticism doesn't let us forget that we are straddling the 20th and 21st centuries, a period when more than ever the future seems just around the corner.

But there's the future and the future. For the purpose of this paper, let's impose a stop-loss on our observations. I like the year 2020. For one thing, it is the year when the Jet Propulsion Laboratory predicts that Voyager will stop transmitting data back to Earth—a forecast that for some reason I find exciting. Twenty-seven years also is far enough away to allow trends to develop, yet near enough to be useful for long-range planning. And it doesn't hurt to know that 20/20 stands for perfect vision. Maybe that alone will improve the odds of my being correct.

Thus this paper will focus on the period between now and the year 2ust 1993.u020, contemplating how the financial functions will evolve over that period and how quickly change will come.

Anyone who deals in the financial markets knows that anticipating trends is difficult at best. But he or she also realizes that not to try is tantamount to accepting the most unlikely scenario of all: no change. So I will plunge ahead.

CONSTANTS AND CHANGE

Heraclitus said it best: "All is flux, nothing stays still. Nothing endures but change." That is true. Nonetheless, between now and 2020 two phenomena will remain constant. First, human nature will not change. Second, the basic financial functions, as I will define them, will not change, although how we perform these functions will change.

First for human nature. A very basic element of that nature is a hunger for security—law and order, job security, retirement security, decent and affordable health care, and financial security. For a variety of reasons, people have begun to feel that organizations, especially governments, designed to provide their basic security no longer can be relied on.

This societal change is having a profound impact on financial institutions' relationships with their clients and employees, who once automatically accepted an institution's promise that "We know what is best for you."

Charles S. Sanford, Chairman, Bankers Trust, delivered this paper at the Federal Reserve Bank of Kansas City's Symposium on "Changing Capital Markets: Implications for Monetary Policy," Jackson Hole, Wyoming, August 1993.

By necessity, not by preference, people are becoming more involved in creating their own security by doing their own homework and making their own decisions. "One-way broadcasting" and "command and control" styles are no longer acceptable. This pervasive sense of vulnerability is putting risk management at the top of the agenda for many people and organizations. To the degree that financial institutions can better help their clients deal with risk, the clients are very ready for change. In any event, gaining their trust will be an essential challenge for financial institutions.

In addition to the sense of individual vulnerability, two other facets of human nature will affect the pace of change: people's inherent thirst for knowledge and their frequent aversion to change. The first is the motivator behind financial innovation and the second is the greatest barrier to it.

That barrier is deeply entrenched, as evidenced by a report from an observer at the Digital World Conference, which was held in Los Angeles in July 1993: "Given that this was a conference on digital technology for industry insiders, I saw very few laptop computer note takers; 99 percent used paper and pen. Very few had mobile telephones with them, and consequently the lines at the pay phones were lengthy."

We see that even technologists have trouble adjusting to the new environment. I have no doubts, though, that their children, steeped in today's technology, will be far less likely to be lining up for pay phones by the time they dominate the work force—well before 2020. It won't be long before the impact of the "computer games" generation is strongly felt at the policy-making level.

Countering any inertia that works against change is the human drive for knowledge. And this thirst has been whetted by rapid advances in financial theory, as exciting and as portentous as the 20th century's major developments in physics and biology. A substantial portion of this paper will deal with those developments.

Let me emphasize, however, that this paper looks *only* at the future impact of *currently* available technology. It does not delve into Buck Rogers speculation about new inventions (or Star Trek, depending on your age and frame of reference). And it does not talk about couch potatoes with virtual reality helmets operating out of hermit huts. It recognizes that an ocean of new technologies is available to today's markets, but that the process toward implementation of these technologies has hardly begun.

Some may believe that the predictions in this paper are too bold, but I believe that if anything, change will be faster and more far-reaching.

THE BASIC FINANCIAL FUNCTIONS

As the existing technologies come onstream, they will affect how the basic financial functions will be performed. These functions are (1) financing, (2) risk management, (3) trading and positioning, (4) advising, and (5) transaction processing. This paper will avoid many standard financial terms of 20th century thought. Although financial functions will be the same, they will be looked at differently in the 21st century. Thus we will not refer to "loans," "borrowings," or "securities," but to "claims on wealth" or "financial claims." We will avoid the term "banks" because banks, certainly as we know them, will not exist.

Financing

Financing facilitates the movement of funds from suppliers to users. Usually it starts with the identification of users and suppliers by a financial institution and ends with the creation of products to satisfy both.

Successful products created by a financial intermediary enable each party to meet its needs for timing and location of cash flows and for the

amounts of money to be supplied or used. The intermediary also helps clients assess the merits of alternative products, seeking to find the least costly source of money for users and getting the best possible return for suppliers, taking into consideration their appetites for risk.

Risk management

Risk management is the process of moving clients closer to their desired risk profiles by helping them shed unwanted risks or acquire new risks that suit their portfolios. At times, this can be done simply by matching a client who wants to shed a risk with one who wants to acquire that risk. More often, it involves unbundling, transforming, and repackaging risks into bundles tailored to fit the particular needs of various clients.

Trading and positioning

Trading and positioning is the buying and selling of claims on wealth. It provides liquidity to clients so they can more easily alter their portfolios or raise cash. It also moves market prices of financial claims closer to their fair values and makes market prices more visible and reliable.

Advising

Advising is making decisions on behalf of clients or giving them information and advice that help them make better decisions for themselves.

Transaction processing

Transaction processing is the storing, safeguarding, verifying, reporting, and transferring of claims on wealth.

As noted, some of these functions are taking on new forms and are becoming more sophisticated, but they will be needed as much in 2020 as they are today.

TECHNICAL AND MARKET ENVIRONMENT IN 2020

Again, technology is driving these changes. Information technology already is helping us execute these financial functions better and faster by providing improved data collection, calculation, communications, and risk control. By 2020, those tools will be much cheaper and far more powerful. As indications of this trend: A transistor, once costing $5, costs less than a staple today; entire reference libraries are now stored on one 5-inch compact disc, and computer users have become accustomed to increasing their processing power by a factor of 10 every five to seven years at no additional cost. And the progress is geometric because each element—computation, availability of data, communications, and algorithms—feeds on the others.

This revolution in information technology is enabling the financial world to operate on a much more complex level than before.

At times the speed and power at which computation and communications tasks can be accomplished is so much greater than in the past that it brings qualitative change, not just quantitative change. For example, the options business could not operate as it does today without high-speed computers to track its intricacies, including the monitoring of risk profiles and valuations. Computer technology has made it possible to disaggregate risk on a broad scale and redistribute it efficiently, enabling management to maintain greater risk control while giving employees more freedom to use their own judgment. In other words, information technology allows a financial organization to decentralize while improving control.

The ability to program computers to digest ever-larger amounts of information more and

more quickly enables us to apply sophisticated automated logic—what we call "automated analytics"—to many problems, such as performing elemental arbitrage tasks. Eventually these programs will be embedded on computer chips, which will be able to solve progressively more complex problems—and on a global basis.

Indeed, by 2020, a true global marketplace will be established, with everyone—individuals, companies, investors, organizations, and governments—linked through telephone lines, cables, and radio-wave technology. With the touch of a button, people will have access to other individuals and vast databases around the world. Such access will be readily available through phones, interactive television, workstations, or hand-held "personal digital assistants" that combine all these functions.

Organizations will be "fully wired" so that their computers will capture incoming and internally generated data, analyze the information, and make it instantly available to any authorized person, wherever he or she may be. Armies of clerks and administrators no longer will be needed to serve as messengers, translators, reconcilers, or summarizers of information. As discussed below, this will change how firms are managed.

To further increase the system's efficiency, all financial claims (including claims on volatility) will be in book entry form, and ownership of all these claims will be transferable instantly anywhere around the globe via 24-hour multicurrency payment systems. Settlement risk will be eliminated and with it a major bottleneck to transaction flows. This has enormous implications for releasing capital and lowering transaction costs.

WEALTH ACCOUNTS

A key to the system will be "wealth accounts," in which companies and individuals will hold their assets and liabilities. These accounts will contain today's relatively illiquid assets such as buildings and vehicles as well as what we know today as stocks, bonds, other securities, and new types of financial claims. These accounts would also contain all forms of liabilities.

Computers will continuously keep track of these items in the wealth accounts and will constantly mark both assets and liabilities to market, making these items effectively liquid. Within an individual wealth account, the arithmetic sum of the items will be the net worth. Yesterday's income and today's wealth will always be known with a high degree of confidence.

The wealth accounts will be the focal point for financial processing and reporting. The integrity of these accounts will be validated by institutions, much the same as checking accounts or mutual funds are today. Wealth accounts will be instantly tapped via "wealth cards." For example, this will allow you to pay for your sports car by instantly drawing on part of the wealth inherent in your vacation house.

Wealth accounts will simplify the provision of credit. In the ultimate extension of today's home-equity lines, instant credit will be available to companies and individuals secured with the current value of their wealth accounts. Leverage constraints will be established by investors and perhaps central banks. Some investors will continue to extend unsecured credit on the basis of an individual's expected income stream, but this would violate this writer's strongly held view that one should never extend unsecured credit to anything that eats.

Owners of wealth accounts will use automated analytics to help them determine their risk/reward appetites and suggest appropriate actions to achieve those targets. If the owner approves, the wealth account would proceed to automatically implement the program. Of course, some people will prefer the advice of a human on more complex or large transactions, for both expert judgment and psychological comfort.

Automated analytics will also provide cus-

tomized investment management, making the wealth accounts far superior to today's mutual funds. In effect, individuals will have the option to manage their own mutual fund.

All seekers of financial claims will understand that to get full access to the financial markets they will be legally responsible for keeping their wealth accounts up to date. These accounts will be electronically accessible to any authorized user, directly or through computerized analytics programs. Privacy will be maintained as with today's checking accounts.

Global electronic bulletin boards will be the principal medium through which buyers and sellers will post their needs and execute transactions. Many financial claims (including what are known today as loans and securities) will bypass middlemen (commercial and investment banks) and will be bought and sold by electronic auction through these global bulletin boards, with minimal transaction costs.

Today we have only a few recognized rating agencies. In 2020 we will have hundreds—perhaps thousands—of specialized providers of news, data, and analysis that will provide interactive electronic bulletins, on demand, real-time, and tailored to each subscriber's particular notion of risk.

There will be no special need for retail financial branches because everyone will have direct access to his or her financial suppliers through interactive TV and personal digital assistants. True interstate banking will have arrived at last! Or more accurately, true "global banking" will have arrived, as every household will be a "branch."

A key feature of 2020 is that nearly everything could be tailored to a client's needs or wishes at a reasonable price, including highly personalized service from financial companies. Firms will be selling to market segments of one.

In addition to the bulletin boards that will be open to anyone who pays a nominal fee, users and suppliers of financial claims will be networked to each other to exchange real-time data and documents (computer-to-computer), to automatically execute most day-to-day transactions, and maybe to confer via virtual reality electronic meetings. On any given deal, firms may compete not only with their natural competitors but with their nominal clients as well. In effect, supplying financial assistance will be a free-for-all. It will not be limited to those calling themselves "financial institutions" because any organization or individual will be able to reply to needs posted on the bulletin boards. That means an organization that specializes in financial matters may, at times, find itself competing directly with its clients.

Other elements of the financial world of 2020 are especially hard to predict. What form will robbery and fraud take? As we said, human nature will not change and dishonesty will be around in 2020 as it is today. Voice recognition, DNA fingerprinting, and secure data encryption will instantly verify transactions, preventing today's scams. But new forms of "information crime" will appear.

Geography will be less of a constraint. Many employees could be geographically dispersed, such as those engaged in processing (for cost advantages), in sales and marketing (to be close to the customer), and in handling local problems that require local solutions. But the people responsible for creating products and overall strategy will still have to be in major cities. These people need the creative stimulation that is found primarily in cities, where they will thrive on face-to-face contact with people from different backgrounds and cultures and from different disciplines—artists, scientists, businesspeople, and lawyers.

PARTICLE FINANCE

In fact, a convergence is taking place among these disciplines as finance becomes more like science and the arts. Financial theory is becom-

ing increasingly important and tremendously useful as theoretical advances have emerged in the last few years. These include portfolio theories, asset pricing theories, option pricing theories, and market efficiency theories.

Many of the financial world's most creative people are devoting their time to these theories and are radically improving our comprehension and management of risk. They deal with variables as straightforward as interest rates and as complex as the weather—all of which have an enormous impact on the markets.

This path-breaking work is providing a solid platform for innovation in practice as well as in theory. The rapidly growing acceptance of derivative-based financial solutions is one very important example of this.

At this point, however, the science of markets is at an extraordinarily early stage of development. We are still in a "Newtonian" era of "classical finance," in which we tend to look at financial instruments—such as stocks, bonds, and loans—in static, highly aggregated terms.

Models based on classical finance analyze risk at the level of "securities" (or options on these securities) and usually assume that the volatilities of the securities are constant over time and can be estimated with statistical averages of past price data—a stationary world where there is no progress, no structural change, no evolution. But in reality, a security's volatility is based on a highly aggregated bundle of many complex underlying risks that are unlikely to be stationary and that usually interact with one another. Classical finance also assumes that human beings are rational economic decisionmakers—an assumption that frequently appears to be violated.

Most classical finance models looking at Bankers Trust would concentrate on the "beta" of its stock—the stock's volatility relative to the market. These models would have great difficulty dealing with the multitude of underlying critical risk factors that produce beta, such as changes in financial market volatility, changes in global product, the volumes of our transaction processing, an earthquake in Japan, changes in consumer confidence in the United Kingdom, or a change in our corporate strategy. We describe these critical factors as "financial attributes." Beta ignores them or grossly summarizes them as homogeneous packets of white noise.

Theoreticians, however, are not ignoring them. Researchers have begun to look for a theory—what we call "The Theory of Particle Finance"—that will help us better understand an asset's financial attributes.

Finding such a theory is not just around the corner, but we are seeing interesting signs of progress, and by 2020 a much more powerful financial discipline will be in place. We are beginning from a Newtonian view, which operates at the level of tangible objects (summarized by dimension and mass), to a perspective more in line with the nonlinear and chaotic world of quantum physics and molecular biology.

Quantum physics, which operates at the level of subatomic particles, and which may eventually bridge subatomic and astronomical events, goes much deeper than Newtonian physics—beyond objects to molecules, to atoms and to subatomic particles.

Similarly, classical biology operated at the level of the organism and was preoccupied with taxonomy and anatomy. Biology advanced by probing deeper into the cells and genes, which are much closer to the fundamental building blocks of life. This made it possible to explain some of the critical interactions among cells, organisms, and the environment.

Like quantum physics and modern biology, particle finance is beginning to look beneath beta to identify an asset's financial attributes, including the attributes' individual and collective volatility. Efforts also are being made to integrate these attributes into the desired financial claims.

This work is creating order from apparent disorder, providing building blocks that will allow the more effective packaging and manage-

ment of risk in an economy whose structure is constantly changing.

The purpose of this research is to reach the most efficient balance of risk and return—getting a higher expected return on the same risk or getting the same return with lower risk.

As noted earlier, the theory of particle finance is still in its infancy—but by 2020, it will be much further advanced, aided by an explosion in computing power and financial data. We can't say which of today's early attempts to advance the theory of particle finance will work, but already the developments are intriguing.

For example:

(1) Chaos theorists are attempting to find the underlying structure and pattern—if they exist—of the apparent randomness of changes in asset values. (The "Random Walk" may not be completely random after all.)

(2) Researchers are building neural networks that mimic certain complex properties of the human brain. When harnessed to massive computing power, it is hoped that these neural networks will find meaningful patterns in the "noise" of financial attributes and, learning from experience, will strip away some of the apparent randomness of financial events.

(3) "Fuzzy logic" is a mathematical way of drawing definite conclusions from approximate, vague, or subjective inputs. Because it attempts to embody certain kinds of human perception and decisionmaking skills, it may help us understand complex interactive systems that involve human intervention (like financial markets).

(4) Combinations of these and/or other new methods may produce the answer. For example, information gleaned from the neural networks might be used to define "fuzzy" relationships in the system and then to write "fuzzy" rules to control the processes or to predict the system's behavior in new situations.

The 2020 technology environment promises much greater market efficiency through better information and lower transaction costs. However, as particle finance uncovers myriad risk variables, now existing but "invisible," it also uncovers the inefficiencies associated with these variables. Also, the constants of human nature will still produce financial fads and bouts of irrational market euphoria and gloom (although we can hope that better information will dampen their intensity). The ideal of a perfectly efficient market will not be achieved by 2020, if ever.

Particle finance and more powerful technology will substantially reduce the amount of unwanted risk borne by individuals, institutions, and the system as a whole. We will find better ways to quantify, price, and manage today's familiar risks. We will also uncover, quantify, price, and manage risks that exist today but are hidden from view. The net benefits will be great—even granting that new and unforeseen risks could be created by this environment.

APPLYING PARTICLE FINANCE

Meanwhile, progress is being made at the front lines as well as in the labs. Pioneers in the derivatives business are successfully identifying, extracting, and pricing some of the more fundamental risks that drive asset values, such as interest rates, currency values, and commodity prices. Even though today these early applications look crude and primitive, they have already created a new and powerful process for solving important and practical financial problems. These range from limiting an airline's exposure to fuel price increases to helping a company hedge the value of a pending acquisition.

And important new applications are already on the runway: credit derivatives and insurance derivatives, for example.

Long before 2020, credit risks will be disaggregated into discrete attributes that will be readily traded, unbundled, and rebundled. Intermediaries will manage a large book of diversified long and short positions in credit attributes.

They will make markets in credit risk attributes and in bundles of attributes customized to suit the particular needs of their clients.

Such tailored products will permit each business to price and manage credit risk arising from its activities in a way that is best for that business. Perhaps even residual credit risks left after this process will be covered by a third-party insurance policy.

As the discipline of particle finance evolves, the primary job of financial institutions will be to help clients put theory to practical use. Just as today's man on the street does not practice particle physics, he will not practice particle finance in 2020.

It may often be done for him or her through automated analytics. For example, particle finance and automated analytics would provide much better asset allocation advice than is available today—allocating positions across many financial attributes rather than just picking the stock-bond mix.

The more advanced automated analytics programs will be like today's sophisticated computer chess programs, which can beat most players, but not all. As a result of competition from automated analytics, experts will be challenged to move on to higher and higher levels of wisdom and creativity.

However, the financial professional who prices the risk attributes will continue to use a combination of automated analytics and judgment. He or she will be responsible for the validation of the logic and historical data used in the automated analytics. In addition, forecasts of prospective market conditions will continue to play a critical role in pricing risk attributes, especially where prospective events are influenced by nonlinear relationships or structural changes that are not evident in past data or experience. We would expect a combination of chaos theory, fuzzy logic, and other tools to assist with predictive problems.

While advances in financial theory and technology will give talented people more powerful tools to apply their human creativity, they will not be replaced with robots. The CAT scan did not replace skilled neurologists—it gave them a tool that allowed them to apply their judgment with more precision and power.

In addition, highly skilled and creative specialists will continue to be needed to define and solve problems that are particularly complex and unique. These financial specialists will be the highest practitioners of particle finance, combining a creative grasp of financial possibilities with a psychoanalyst-like ability to help clients understand the true nature of their preferences for risk and return.

THE ROLE OF CENTRAL BANKS

The role of central banks will change as financial markets change. Two basic functions of central banks will be to protect us from systemic risk and to keep inflation in check.

The mechanisms by which central banks will deal with inflation in the world of 2020 are not clear. One method might be the use of margin requirements to control the amount of credit extended against wealth accounts. Clearly, capital controls and fixed exchange rates will be relics of an earlier age.

Another mission will be to avoid systemic collapse. We emphasize that this is *not* the same as dampening market volatility. Nor will regulators have to concern themselves with the fate of individual institutions, ending government-sponsored bailouts. Examiners will monitor the risk attributes of individual institutions to judge whether and how they contribute to the risk attributes of the system as a whole. (Everything else is random noise that cancels out at the portfolio level.)

Central bankers will focus on the prospective behavior of the system as well as current values of key targets. They will operate in the alphabet of financial risk as many advanced professionals

do today—"delta" risk, the change in the values of instruments that are derived from the values of other instruments; "gamma" risk, the impact of highly nonlinear price changes on the behavior of the portfolio; "vega" risk, the change in the behavior of the portfolio arising from changes in the implied volatilities of the underlying instruments; and "theta" risk, the change in the behavior of the portfolio arising from the passage of time.

To effectively operate in this environment, central bankers will have to thoroughly understand and use the new computer and communications technology. Human nature being constant, they will also need to understand the psychology of crowd behavior and its prospective impact on financial market stability.

Thus central banks will have tools to prevent systemic collapse in the world portfolio similar to the tools that financial institutions will use to manage the corporate systemic risk in their portfolios. These tools will include real-time data and automated analytics.

Insuring against systemic risk will require a globally coordinated effort, which could well be the biggest challenge to the central banks. Will governments be able to put aside their parochial nationalistic agendas?

A FEW IMPLICATIONS FOR FINANCIAL INSTITUTIONS ARISING FROM PARTICLE FINANCE IN 2020

Particle finance presents a cornucopia of new business opportunities for financial institutions. Myriad risks, perhaps inexhaustible risks, are yet to be uncovered, described in "probability of occurrence" terms and then rebundled to satisfy client needs. There will always be a need for new disciplines and technologies to measure and deal with these risk attributes. In addition, all of these attributes and bundled products must be stored, safeguarded, verified, reported, and transferred.

Financial professionals will constantly be reeducating themselves. We, for example, are creating a "Bankers Trust University," where our people will be encouraged to spend many of their working hours.

Obviously, in the era of the theory of particle finance, financial organizations will look very different from the way they do today and will require a new type of manager.

With virtually no layers of management, financial organizations will attract an array of highly skilled and creative experts, including a wide array of people from science and mathematics.

Senior management will be like conductors of orchestras guiding their "artists" and "scientists" through example and influence rather than by "command and control." One of the important jobs of top managers will be to get their technical experts and managers to play in the same key. They are temperamentally different from one another, but as finance, science, and the arts continue to gradually merge, the scientist, artist, and manager will become more alike. The leaders' most important functions will be to inspire by articulating a clear vision of the organization's values, strategies, and objectives and to know enough about the business to be the risk manager of risk managers.

Superior judgment will always be essential and will continue to be valued highly since it will not be embedded on silicon. Depth of talent will be critical to success, so recruiting and retaining people will remain management's most important job. Technology will never replace the subtlety of the human mind. People will be the most important factor in 2020, just as they are now. We must learn how to grow wise leaders from the ranks of specialists, a difficult task.

CONCLUSION

These concepts will not flourish unless society blesses them. A social critic may say they are nothing more than a financial engineering exer-

cise designed to enrich a few at the expense of many—a zero-sum game.

Not true. For as risk management becomes ever more precise and customized, the amount of risk that we all have to bear will be greatly reduced, lowering the need for financial capital. This will have a tremendous social value because financial capital that had been required to cushion these risks will be available elsewhere in society to produce more wealth to address society's needs. In addition, this will liberate human capital by the greater leveraging of talent.

And these concepts will not flourish unless our clients bless them. As valuable as macro capital generation may be, it is not enough. On a micro basis, individuals and organizations must see value for themselves; clients must buy the service. Their trust must be earned by delivery of objective diagnostic help and solutions of value to them. We shall earn it.

Agriculture Rides Out the Storm

By Alan Barkema and Mark Drabenstott

Harsh weather pummeled U.S. agriculture in 1993, destroying crops and threatening a downturn in the farm economy. But while the rough weather took a large toll from many farmers, others prospered. Overall, the industry ended the year in solid financial condition.

Agriculture is well-positioned for a better year in 1994. With a return to normal weather, crop production should rebound. Higher crop prices, pushed up by lean crop inventories, may reward farmers for bringing larger crops to market. But higher crop prices will also push up feed costs for livestock producers. Overall, prospects for farm earnings are relatively bright, although little change is expected in the industry's already strong balance sheet.

AGRICULTURE WEATHERS A HARSH YEAR

Agriculture will long remember 1993 as a year of weather extremes. Winter storms temporarily crippled the Great Plains cattle industry, wet weather and floods washed out crops in the Midwest, and drought seared crops in the Southeast. In the end, farm income held up surprisingly well, despite the severe weather. Livestock producers notched solid profits, as meat production hit another record. Higher crop prices created a financial windfall for many crop producers who sold grain stored from last year's bumper crop or who harvested near-normal crops this year. While the harsh weather of 1993 created financial hardship for many farmers, solid balance sheets enabled most to ride out the rough year.

Uneven farm financial conditions

The flood commanded a lot of attention in 1993, sparking fears that it jeopardized the farm recovery. But as is true with most weather developments, the flood created both losers and winners. Once the flood waters receded and the pluses and minuses could be weighed, it became clear that farm financial conditions were steady to slightly improved for the nation and the Tenth District.

Farm income inched ahead in 1993 despite substantial crop losses. Net cash income, a measure that subtracts cash expenses from cash receipts, totaled $59 billion in 1993, a new record in nominal terms (Chart 1). Adjusted for inflation, net cash income was unchanged from 1992. Looking back over recent years, farmers have kept incomes on a high plateau, although there has been some erosion after adjusting for inflation. Net

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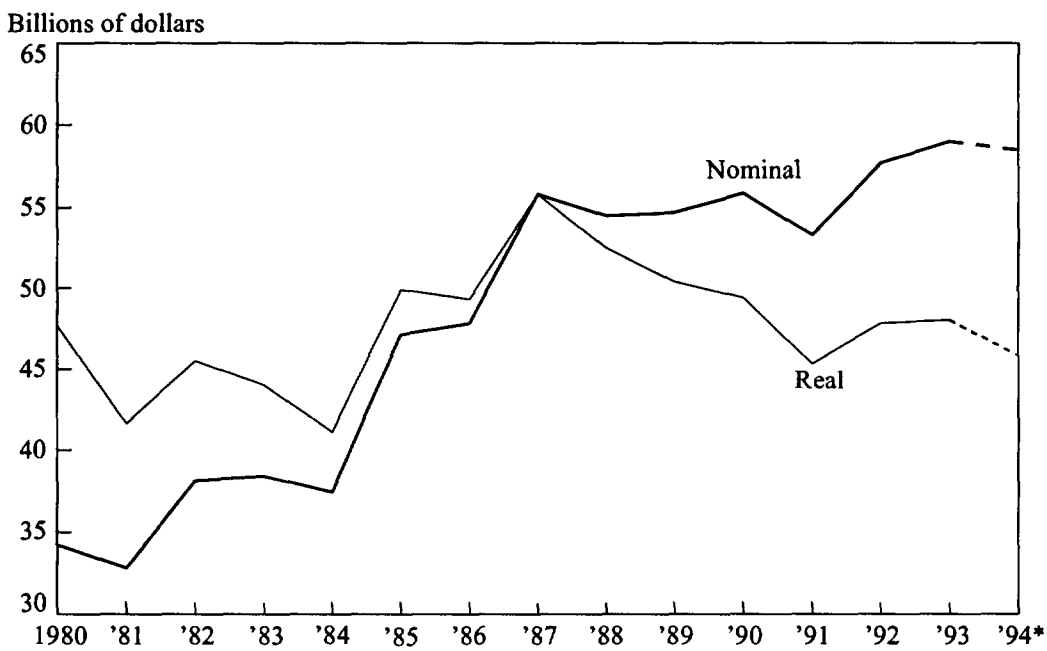
Chart 1
Net Cash Farm Income



*Forecast.
Source: U.S. Department of Agriculture, Economic Research Service, Agricultural Outlook Conference.

farm income, which takes account of fluctuations in farm inventories, showed more impact from the flood. Due to a $3 billion drop in farm inventories—the biggest drop since the 1988 drought—net farm income fell 10 percent to $44 billion. Much of that drop will be recovered in the coming year when farm inventories are expected to accumulate.

Several factors accounted for the record 1993 net cash income in the wake of the flood. Livestock producers, which account for roughly half of total farm receipts, had strong earnings for the year. Many farmers were able to sell crops held over from 1992 at prices pushed higher by the flood. Moreover, most of the reduced 1993 crop will not be sold until the 1994 calendar year, postponing much of the impact on farmers' income statements. Farm expenses increased just 1.3 percent, helping to maintain profit margins. Finally, government payments were up more than $2 billion in 1993, helping to offset the flood's adverse impact.

Notwithstanding the slight overall gain, the farm financial picture was unusually uneven across the Farm Belt, due mostly to the flood and, to a lesser extent, a drought in the Southeast. The loss in the 1993 corn crop is a good indicator of where farm finances suffered the most. Minnesota and Iowa saw their 1993 corn crops cut roughly in half, compared with average production

in recent years (Table 1). South Dakota, Missouri, and Wisconsin suffered cuts of about a third. Nebraska saw a 21 percent drop, and a 1 percent decrease occurred in Kansas.

For the Tenth District as a whole, farm income probably increased in 1993. Much of the damage in Missouri was in the eastern half of the state, which lies outside the Tenth District. Nebraska's crop losses were offset by higher crop prices. And crop losses in Kansas were slight. More important, the cattle industry, which accounts for nearly 60 percent of district farm cash receipts, earned strong profits in 1993.

Other district indicators also point to a steady farm financial picture. By the third quarter of 1993, farmland values in the Tenth District had risen 3.7 percent from the year before, a slight rise in real terms (Chart 2). Land values were weakest in Missouri, where crop losses were the greatest. Ranchland values rose more than other types of land due to a strong cattle industry the past couple of years.

The farm sector balance sheet was steady in 1993 despite early fears prompted by the flood. Farm assets, farm debt, and farm equity all inched higher (Table 2). Adjusted for inflation, the sector's equity position was down less than 1 percent. On average, farmers continued to have a relatively low debt-asset ratio of 16 percent. Moreover, a decline in market interest rates enabled farmers to cut interest payments to just 5.7 percent of gross income, less than half the percentage of a decade ago.

Nationwide averages, of course, do not reflect the range of local financial impacts due to adverse weather. Many farmers in the flood-affected states experienced a sharp slip in financial condition. Loan repayment rates in western Missouri, for instance, were sharply lower in the third quarter according to a survey of agricultural bankers there. Bankers expect some deterioration in loan quality where crop losses were significant. But due to generally high loan quality when the year began, bankers generally expect only a small percentage of farmers to be forced out of business.

Table 1

Corn Production in Leading States

(Millions of bushels)

	1990-92 average	1993	Percent change
Iowa	1,631	880	-46.1
Illinois	1,381	1,300	-5.9
Nebraska	997	785	-21.3
Minnesota	741	322	-56.6
Indiana	697	713	2.3
Ohio	417	361	-13.5
Wisconsin	347	216	-37.7
South Dakota	251	161	-35.9
Missouri	248	167	-32.8
Michigan	244	237	-3.1
Kansas	218	216	-1.0
United States	8,297	6,344	-23.5

Source: U.S. Department of Agriculture.

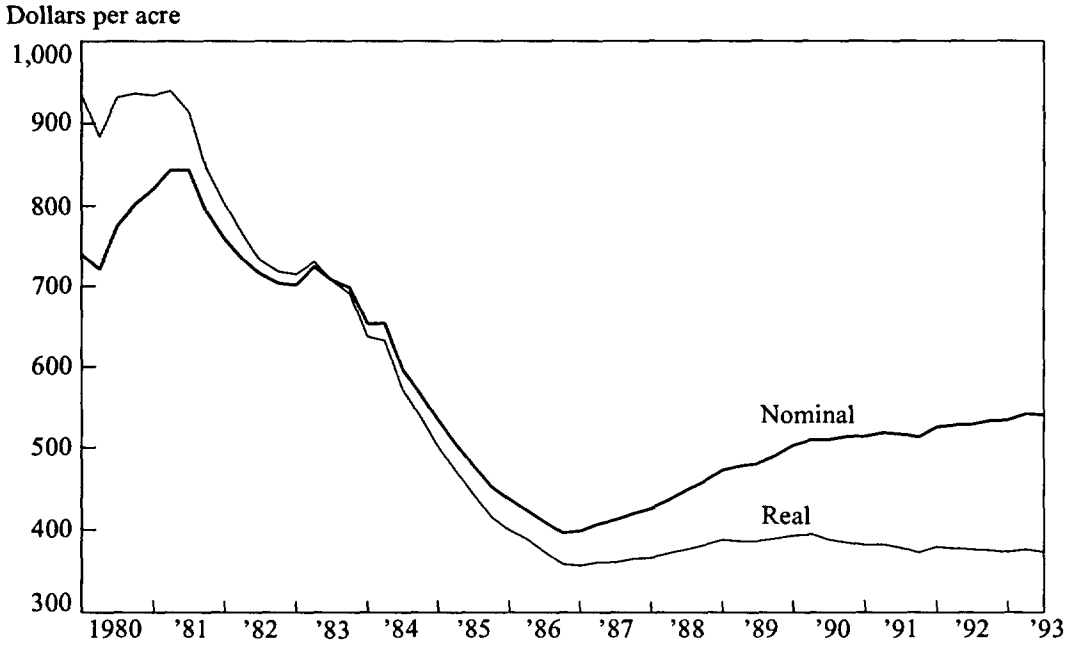
Another good year for livestock producers

Livestock producers notched another good year in 1993 as meat production hit a record high. Livestock prices went through sizable ups and downs, but most producers earned solid profits for the year. Extremely harsh weather in the early part of the year held back the growth in beef production, which was steady for the year as a whole. Pork production fell as producers responded to poor profit margins. Poultry growers, meanwhile, continued their persistent expansion, helped by growing demand at home and abroad.

Beef production finished steady in 1993 but

Chart 2

Farmland Values
Tenth District



Note: Values include only nonirrigated cropland.
Source: Federal Reserve Bank of Kansas City, Agricultural Credit Survey.

might have increased except for a bad start early in the year. The U.S. cattle inventory was higher in January 1993 than the year before, paving the way for more beef production. But the central and southern plains region, where the nation's cattle feeding is concentrated, suffered an especially cold and snowy first quarter. The harsh weather held back weight gains and slowed marketings. Cattle feeders boosted production in the second half, but not enough to increase beef output for the year.

Cattle prices were strong through most of the year due to the smaller than expected beef output. Prices for finished steers set records at more than $80 a hundredweight in the first quarter. Prices stayed at near-record levels in the second quarter but fell in the second half as beef output increased along with meat supplies in general. For the year as a whole, prices for choice steers in Nebraska markets averaged $76.28, up about a dollar from the year before (Table 3). The high prices kept cattle feeders in the black for most of the year. Higher corn prices and lower cattle prices produced losses in the fourth quarter.

Pork production fell 0.8 percent in 1993, more than had been expected. Throughout the first half of the year, producers expected to boost output. But negative profit margins for many producers through the last half of 1992, coupled with the small corn crop in 1993,

Table 2

Farm Balance Sheet Excluding Operator Households and CCC Loans on December 31
(Billions of dollars)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Assets										
Real estate	586.2	542.3	578.9	595.5	615.7	628.2	623.2	633.0	647.9	662.9
Nonreal estate	186.5	182.1	193.7	205.6	214.0	220.1	219.0	228.5	230.1	237.1
Total assets	772.7	724.4	772.6	801.1	829.7	848.3	842.2	861.5	878.0	900.0
Deflated	818.5	747.6	772.6	771.0	764.7	749.4	715.5	710.8	706.0	705.0
Liabilities										
Real estate	100.1	90.4	82.4	77.6	75.4	74.0	74.5	75.7	76.5	77.5
Nonreal estate	77.5	66.6	62.0	61.7	61.8	63.4	64.4	63.6	66.5	67.5
Total liabilities	177.6	157.0	144.4	139.3	137.2	137.4	138.9	139.3	143.0	145.0
Deflated	188.1	162.0	144.4	134.1	126.5	121.4	118.0	114.9	115.0	113.6
Proprietors' equity	595.1	567.4	628.2	661.8	692.5	710.9	703.3	722.2	735.0	755.0
Deflated	630.4	585.6	628.2	637.0	638.2	628.0	597.5	595.9	591.0	591.4
Debt-to-asset ratio (percent)	23.0	21.7	18.7	17.4	16.5	16.2	16.5	16.2	16.3	16.1

Note: Figures for 1993 and 1994 are forecasts.
Source: U.S. Department of Agriculture.

apparently caused fewer hogs than expected to be slaughtered.

The pork industry was widely watched as one of U.S. agriculture's most dynamic segments in 1993. Production continued to concentrate in the hands of fewer, larger producers as the industry became more vertically integrated. Large producers tend to control all phases of production and processing, from animal genetics to final retail products. Many of these large companies are locating production facilities in the Tenth District—and in Missouri, Oklahoma, and Wyoming in particular.

Large supplies of competing meats kept hog prices lower than the cutback in production might otherwise have indicated. Prices for barrows and gilts in the benchmark Iowa-southern Minnesota market averaged $46.07 a hundredweight, about 7 percent higher than the 1992 average but lower than many market analysts had projected. With feed costs low through the first three quarters, most producers earned profits for the year as a whole.

The poultry industry continued to expand

Table 3

U.S. Farm Product Price Projections

(January 12, 1994)

	Marketing years			
Crops	1991-92	1992-93*	1993-94+	Percent change
Wheat	$3.00/bu.	$3.24/bu.	$3.10-3.25/bu.	-2.0
Corn	$2.37/bu.	$2.07/bu.	$2.55-2.75/bu.	28.0
Soybeans	$5.58/bu.	$5.60/bu.	$6.10-7.10/bu.	17.9
Cotton	$.58/lb.	$.55/lb.	N/A	N/A
	Calendar years			
Livestock	1992	1993*	1994+	Percent change
Choice steers	$75.36/cwt.	$76.28/cwt.	$71-77/cwt.	-3.0
Barrows and gilts	$43.03/cwt.	$46.07/cwt.	$44-50/cwt.	2.0
Broilers	$.53/lb.	$.55/lb.	$.50-.56/lb.	-4.0
Turkeys	$.60/lb.	$.63/lb.	$.59-.65/lb.	-1.0
Lamb	$61.00/cwt.	$65.85/cwt.	$61-67/cwt.	-2.8
Milk	$13.09/cwt.	$12.83/cwt.	$11.70-12.70/cwt.	-4.9

* Estimated.

\+ Projected.

Source: U.S. Department of Agriculture.

aggressively in 1993. Broiler production increased more than 5 percent as consumer demand continued to grow. Moreover, broiler producers shipped 22 percent more chicken products to foreign buyers in 1993. Broiler exports now account for more than 8 percent of total U.S. production. The increase in exports was an important factor helping to support broiler prices in the face of much bigger suppliers. For the year, prices averaged 55 cents a pound, a little higher than a year ago. Because feed costs were fairly low for the first three quarters, broiler producers earned solid profits in 1993.

Turkey producers held production growth in check in 1993 and were rewarded with the best profits in years. After several years of persistent production increases, turkey growers held output growth to less than 1 percent. A sharp rise in turkey exports and increased U.S. consumer demand led to average prices of 63 cents a pound. With feed costs low through the first three quarters, profit margins were positive. Passage of the North American Free Trade Agreement (NAFTA) is clearly a good omen for this industry as Mexico accounts for nearly three-quarters of U.S. turkey exports.

Rough weather for crop producers

The growing season began with ample spring rains, an auspicious start according to the grain trader's adage, "Rain makes grain." But as the rains drenched the western Corn Belt with the most summer rainfall in more than a century, some sodden fields were never planted and others were washed out. The cool, wet weather held back corn and soybean yields, slowed the winter wheat harvest, and hurt crop quality. An early summer spike in crop prices gradually evaporated as markets began to believe—mistakenly it turned out—that crop losses would not be great.

Despite overflowing rivers and streams, wheat yields overall were surprisingly good. At 38.3 bushels per acre, the national average yield was down just a bushel per acre from the near record in 1992. Still, the wet weather took a significant toll on crop quality in many areas.

Export demand for wheat plummeted as the crop matured. As the large crop ripened in the field and demand stayed sluggish, wheat prices dropped sharply. Despite the late season slide, however, wheat prices averaged $3.24 a bushel during the 1992-93 marketing year ending May 31, up from $3.00 a bushel the previous year.

The rainfall took a much bigger toll on the corn crop. During the winter and early spring, most forecasts pointed to ample supplies of corn and other feed grains. But prospects for corn, the most important feed grain, eroded rapidly as the rains began in the western Corn Belt. Wet weather slowed planting in the spring, and corn planters never reached some fields. Other fields along streams and rivers were destroyed by floods. Meanwhile, in the southeastern states, drought shriveled the corn crop. In the end, U.S. farmers harvested only 63 million acres of corn, down a whopping 9 million acres from the year before.

With a drought in the southeast and a torrent in the western Corn Belt, corn yields fell sharply on the nation's smaller acreage. Iowa, typically the nation's leading corn producer, and counties in adjoining states absorbed the brunt of the weather. The average corn yield in Iowa fell more than 45 percent from the year before. But across much of the eastern Corn Belt, the weather was more favorable and corn yields dipped much less. Overall, the nation's crop averaged 100.7 bushels per acre, down more than a fifth from the year before and the lowest yield since the drought of 1988.

The full extent of damage to the corn crop was not apparent until the combines swung into the fields at harvest time. For example, from August to November, the U.S. Department of Agriculture, the nation's most widely watched crop forecaster, slashed its estimate of the corn crop by 920 million bushels, a drop of about 12 percent. The most recent estimate pegs the crop at only 6.3 billion bushels, down a striking 3 billion bushels from a record crop in 1992 (Table 4).

Corn prices jumped briefly in late spring, with rising concern over water-logged fields and the increased vulnerability of the late-planted crop to an early frost. But price gains were tempered by the enormous inventory of corn remaining from the previous crop. Most of the early season price gains evaporated by harvest time, when it appeared that most of the crop would mature ahead of the first frost. For the 1992-93 marketing year ended August 31, farm-level prices averaged $2.07 a bushel, down sharply from $2.37 a bushel the previous year.

The nation's soybean crop also shrank in the midwestern downpour. Farmers harvested the fewest acres of soybeans in 17 years, due to rains and flooding. Nationally, soybean yields averaged just 32.0 bushels per acre, well off the record yield of 1992. With both acreage and yields down, the crop was about 1.81 billion bushels, down a sixth from 1992 and the smallest since the drought of 1988.

Soybean prices surged in early summer, when it appeared the wet weather would prevent much of the crop from being planted. But most

Table 4

U.S. Agricultural Supply and Demand Estimates

(January 12, 1994)

	Corn (bu.)			Feedgrains (mt.)		
	September 1 - August 31			June 1 - May 31		
	1991-92	1992-93	1993-94	1991-92	1992-93	1993-94
Supply						
Beginning stocks	1,521	1,100	2,113	47.7	34.0	63.1
Production and imports	7,495	9,489	6,364	220.5	278.7	189.7
Total supply	9,016	10,589	8,477	268.2	312.7	252.8
Demand						
Domestic	6,332	6,813	6,375	184.5	198.5	186.8
Exports	1,584	1,663	1,300	49.7	51.1	39.2
Total demand	7,916	8,476	7,675	234.2	249.6	226.0
Ending stocks	1,100	2,113	802	34.0	63.1	26.8
Stocks-to-use ratio (percent)	13.9	24.9	10.4	14.5	25.3	11.9

	Soybeans (bu.)			Wheat (bu.)		
	September 1 - August 31			June 1 - May 31		
	1991-92	1992-93	1993-94	1991-92	1992-93	1993-94
Supply						
Beginning stocks	329	278	292	866	472	529
Production and imports	1,990	2,190	1,814	2,022	2,529	2,492
Total supply	2,319	2,468	2,106	2,888	3,001	3,021
Demand						
Domestic	1,357	1,406	1,341	1,137	1,118	1,198
Exports	684	770	615	1,280	1,354	1,225
Total demand	2,041	2,176	1,956	2,416	2,472	2,423
Ending stocks	278	292	150	472	529	598
Stocks-to-use ratio (percent)	13.6	13.4	7.7	19.5	21.4	24.7

Note: Data represent millions of bushels or metric tons.

Source: U.S. Department of Agriculture.

of the early price gains gradually eroded, and by harvest time prices had tumbled more than a dollar a bushel from the summer peak. For the 1992-93 marketing year ended August 31, farm level prices averaged $5.60 a bushel, almost unchanged from the previous year.

A BRIGHTER HORIZON IN 1994

After weathering a rough 1993, prospects for agriculture should brighten in 1994. What weather the new year will bring is unknown, but the odds favor a return to more normal weather and a rebound in crop production. Farmers should have a chance to sell their larger crops at higher prices. Higher feed costs, however, could rein in livestock profits. Overall, farm income should remain solid in 1994, but little additional improvement is in store for the industry's already strong balance sheet. Longer term, the new NAFTA and the prospective agreement in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) brighten the industry's prospects in the world marketplace.

Steady farm finances

Farm financial conditions should remain healthy in 1994, despite the aftereffects of the flood. With normal weather, crop producers should refill their grain bins while benefiting from higher prices. But the high prices will squeeze profit margins for the livestock industry, the leading source of farm income in recent years. The farm sector's balance sheet should be steady in 1994, with farm asset values likely to be flat in real terms as farmers continue to resist adding debt.

Farm income may be flat in 1994 but could edge down in real terms. Higher income to crop producers will slightly offset lower profits to livestock growers. Crop receipts will rise due to higher average grain prices and an expected rebound in the crop harvest. Livestock receipts may be steady to down slightly in 1994, but profits will slip due to higher feed costs. Government payments should edge down as higher crop prices reduce the size of crop subsidies. Farm expenses will increase only modestly as farmers benefit from a low rate of general price inflation. Overall, net cash farm income may be steady in 1994, while slipping 2 to 3 percent in real terms. Net farm income, which takes farm inventories into account, may jump as much as a fifth as farmers refill their grain bins.

Steady farm income should carry over to a stable farm balance sheet in 1994. Farmland values are likely to continue their recent pattern of rising at roughly the same rate as inflation, leaving no gain in real terms. Farm debt, meanwhile, is unlikely to increase much if at all in 1994. Net worth, therefore, probably will be little changed in 1994 in real terms.

Farm credit conditions should be generally favorable in 1994. Farm loan demand has grown steadily over the past year, and banks and other credit providers appear to have plenty of funds available to meet the demand. Farm loan interest rates as of early 1994 are the lowest in 18 years. The biggest concern seems to be whether last summer's flooding will lead to a jump in farm failures. To date, the evidence suggests some mild deterioration in credit quality in weather-affected regions but no sharp increase in failures. Nevertheless, there will probably be more farm loans on banker watch lists in 1994, and concerns will elevate quickly if bad weather returns.

Food prices in check

The 1993 increase in food prices was tame, and prices should stay in check as 1994 unfolds. The food component of the Consumer Price Index increased 2 percent in 1993, compared with 1.2 percent in 1992. Weak consumer demand has

held back prices of food consumed both at home and away from home. In addition, the farm value of food, which accounts for 30 percent of retail prices, declined in 1993 despite higher livestock prices.

In the year ahead, food prices will probably rise about 3 percent, roughly equal to the rise of prices in general. As the economy strengthens, consumer food demand should also pick up. But growth has been weak in recent years, with spending on food rising an average of just 0.4 percent a year in real terms over the past four years. Thus, consumer demand is unlikely to put significant upward pressure on prices anytime soon. In addition, low oil prices will hold down transportation costs, which have a significant impact on retail prices. Finally, the farm value of food will increase modestly in 1994, held down by a slight drop in livestock prices.

Policy outlook

Key developments in farm policy are on tap for 1994, both domestically and internationally. The debate on domestic farm policy will warm up before gathering a full head of steam in 1995. Meanwhile, 1994 will be a critical year for international farm policy, as the NAFTA is implemented and Congress considers the recent deal struck in the Uruguay Round of the GATT.

Domestic policy. New budget realities will frame the domestic farm policy debate. Under a leaner national budget, fewer government dollars are available to boost farm incomes. Policymakers are almost certain to encourage farmers to rely less on government payments and more on market prices. In 1994, farmers will get a taste of a more market-oriented policy when the Acreage Reduction Program (ARP) is set to zero for all the major program crops. The ARP is the proportion of land farmers are required to idle if they wish to receive government payments. Usually, policymakers are reluctant to set the ARP at zero because that would boost production, push down crop prices, and expose the federal budget to larger farm subsidies. But lean crop inventories reduce that risk in 1994.

Longer term, enabling U.S. farmers to plant more cropland has much to recommend it. When U.S. cropland lies idle in government programs, foreign farmers are encouraged to expand production, diminishing U.S. farmers' share of the global food market. Moreover, idling cropland tends to raise the cost of producing grain, inhibiting U.S. competitiveness in world markets. By the same token, however, free access to the global food market is a prerequisite for maintaining farm incomes as domestic production expands and government payments shrink in a tighter budget environment. Thus, progress in prying open world markets in the NAFTA and the GATT comes at an auspicious moment.

The NAFTA. The NAFTA, which went into effect January 1, 1994, is of keen interest to U.S. agriculture because it pulls down trade barriers between the United States and Mexico. Mexico is already one of the industry's most rapidly growing markets. In the mid-1980s, Mexico established new policies of free enterprise and free trade, which gave the nation's long-stagnant economy a shot in the arm. Growing incomes have encouraged the nation's 90 million consumers to upgrade their low-quality diets, swelling demand for food imports from the United States. Sales of U.S. farm products to Mexico have tripled since 1986, boosting Mexico's share of U.S. farm exports to nearly 10 percent.

The NAFTA promises further gains in farm trade with Mexico. The NAFTA will fuel further growth in incomes and food demand in Mexico, while tearing down barriers that obstruct farm trade between the two nations. The NAFTA will create both winners and losers in U.S. agriculture. U.S. grain producers, who already fill nearly three-fourths of Mexico's substantial grain supply gap, may reap the largest benefits from freer access to the Mexican market. U.S. livestock producers will also benefit from Mex-

ico's growing appetite for beef, pork, and poultry. Some U.S. horticultural producers, however, may face stiffer competition from Mexican producers. Overall, the industry's prospective gains under the NAFTA will easily outweigh its losses.

The Uruguay Round. The successful conclusion to the NAFTA paved the way to agreement in the Uruguay Round by demonstrating the U.S. commitment to freer world markets. The Uruguay Round is far more ambitious than the NAFTA, wrapping nearly 120 nations into a global effort to pry open trade in farm products, manufactured goods, intellectual property, and almost everything in between. But as the Uruguay Round neared its December 15 deadline, the long dispute between the European Community (EC) and the United States on farm trade threatened to sink the entire agreement, after more than seven years of tortuous negotiations.

The United States broke the deadlock in the Uruguay Round by agreeing to renegotiate the Blair House agreement, a deal on farm trade struck with the EC in November 1992. Since then, the United States had maintained that the Blair House agreement was final. But France steadfastly threatened to torpedo the entire GATT Round unless the Blair House agreement was reopened. As the negotiations reached the December 15 deadline, imposed by the expiration of the U.S. administration's fast-track negotiating authority, the United States reluctantly agreed to reconsider the Blair House accord.

The main sticking point in the original Blair House agreement was the requirement that the volume of subsidized farm exports be cut by 21 percent in six equal annual steps. France, the EC's leading farm exporter, complained that the cuts would drive down French farm incomes. To overcome the French objection, the new compromise "backloads" or delays the export reductions until later in the six-year period. Under the new deal, the EC's subsidized wheat exports must fall to 13.4 million metric tons in six years, the same ceiling as in the original Blair House accord. But in the meantime, the EC will be able to unload an additional 8 million metric tons from the mountain of surplus grain accumulated during years of heavy subsidy under the EC's Common Agricultural Policy.

In exchange for renegotiating the Blair House accord, the United States won some additional concessions from the EC. The United States gained greater access to the EC market for some 20 U.S. farm products including fruit, turkey, and pork. And the EC also guaranteed the United States could export up to 2.3 million tons of corn and sorghum annually to Spain and Portugal, reconfirming an interim agreement struck in 1986 when Spain and Portugal joined the EC.

While the Blair House renegotiation was underway, separate negotiations led Japan to open its rice market to foreign growers. The Japanese have insisted on maintaining self-sufficiency in rice production, even though Japanese consumers could buy foreign rice at a lower price, long a sore point for U.S. rice producers. Except for emergency imports to cover shortfalls in the domestic crop, as in 1993, the Japanese rice market is closed to foreign rice. Under the Uruguay Round agreement, Japan will open the door—if only a crack—to rice produced in the United States and elsewhere.

The agreement struck in the Uruguay Round awaits the approval of Congress. If approved, the new global trade agreement would go into effect in July 1995. In the end, the Uruguay Round falls far short of its initial, ambitious goal of eliminating all trade-distorting farm policies. But the agreement takes global farm policy a big step in the right direction. In total, U.S. agriculture will clearly benefit from the step.

Export outlook

Exports of U.S. farm products may hold steady in 1994. The supply of farm products available for export will be down sharply, due to

much smaller grain and oilseed crops. And the meager exportable supplies will meet stiff competition from foreign competitors who harvested better crops. Nevertheless, stronger food demand in a healthier world economy and higher grain prices will shore up the value of farm exports, offsetting the decline in volume. On balance, farm exports could be $42.5 billion in fiscal year 1994, about the same as the year before. Farm imports may also hold steady at $24.5 billion, leaving the farm trade surplus unchanged from a year ago at $18 billion.

Sales of value-added products, like horticultural and livestock products, will anchor U.S. farm exports in 1994, continuing the strong shift away from bulk commodity exports, like grains and oilseeds. In 1994, value-added exports, including livestock, dairy, poultry, and horticultural products, could rise to a new record. Meanwhile, the volume of wheat, feed grain, and oilseed exports could plummet nearly 15 percent, although higher prices for corn and soybeans may offset much of the decline.

Asia and Latin America will be the most promising markets for U.S. farm products in 1994. Japan will remain U.S. agriculture's leading customer with record purchases of nearly $9 billion. Rising affluence in South Korea, Taiwan, and other rapidly developing Asian nations will fuel demand for U.S. farm products. Meanwhile, strong income growth could boost Mexico's purchases of U.S. farm products to a record of nearly $4 billion in 1994. Longer term, the NAFTA promises to boost Mexico's purchases even more.

While export prospects brighten in the relatively new markets of Asia and Latin America, some traditional markets continue to fade. Farm exports to Russia and other former Soviet republics, once the leading market for U.S. grains, could shrink further in 1994 to a level about half that of 1992. With continued hard times in the former Soviet Union, sales will depend heavily on the availability of credit—with repayment guaranteed by the U.S. government. But that credit will not be available unless Russia repays overdue loans by yearend 1993 and passes a new credit check by the USDA. Meanwhile, EC imports of U.S. farm products—about $7 billion—are nearly as large as Japan's imports, but little growth is likely in 1994. Gains in the EC market await a rebound in a weak European economy and a further winding down of the Common Agricultural Policy's farm subsidies, underscoring the critical importance of the Uruguay Round.

Livestock outlook

The livestock industry will probably have slimmer profits in 1994 than in 1993. A strengthening U.S. economy will boost consumer incomes and meat purchases. But meat supplies are expected to increase substantially, and feed costs will rise well above 1993 levels. Lower profits are expected for beef and poultry producers, while pork profits may hold steady.

Beef production should increase markedly in 1994, although some analysts argue that high feed prices could limit the increase. The cattle industry has expanded the size of its herd the past four years, and the January 1, 1994 inventory is expected to show another increase to 102 million head. The bigger herd and packed cattle feedlots both point to more beef in 1994. Beef production is now expected to rise 4 percent, one of the biggest jumps in recent history. But if the 1994 corn crop is hurt by bad weather and corn prices remain high throughout the year, cattle producers would likely scale back the production hike.

With a bigger beef supply, cattle prices will probably be lower in 1994. An improved economy will help bolster demand for the bigger supply. Nonetheless, prices for finished steers are expected to average $74 for the year, more than $2 less than in 1993. Prices should be strongest in the second quarter, when seasonal meat supplies will be the tightest. But prices are likely to stay below the record levels posted in

the second quarter of last year. Though profit margins will be squeezed by lower prices and more costly feed, most cattle feeders should earn profits in 1994.

Pork production may be down about 2 percent in 1994 despite gains in consumer demand for pork products. Coming off much lower hog prices and sharply higher corn prices in the fourth quarter of 1993, pork producers will be reluctant to expand production, especially since corn prices are likely to stay high during the first part of 1994. Consumer demand for pork, meanwhile, promises to remain relatively strong. The pork industry has aggressively marketed its meat products and has dramatically reduced the amount of fat in pork products through genetic advances. As a result, per capita consumption of pork has grown in recent years, in contrast with declining beef consumption.

Continued strong consumer demand and steady pork supplies should lead to higher hog prices in 1994. Prices may be strongest in the second quarter when pork supplies will decline seasonally, and when beef supplies will also be tight. After peaking at around $50 a hundredweight in the spring, prices in the second half will probably drift below year-ago levels. For the year as a whole, Iowa-Southern Minnesota benchmark prices may average $47 a hundredweight, about a dollar higher than last year. Higher corn prices will probably keep producer profits steady.

Poultry producers will have a good year in 1994, but not as strong as in 1993. Higher feed prices have taken a big bite out of the industry's profit margins. Despite the higher costs, poultry production is expected to surge 5 percent in 1994 to another record high. Broiler producers are expected to increase chicken production 5 percent, aided by strong demand in export markets. Turkey production, meanwhile, should increase a modest 2 percent.

Strong consumer and export demand will keep poultry prices relatively strong despite the sizable increase in supplies. The nation's appetite for poultry products gives no indication of being sated. Over the past five years, for example, per capita consumption of chicken has jumped nearly 18 percent, while beef consumption has slumped 10 percent. Demand is also strong in export markets, where U.S. shipments are expected to set another record. Broiler and turkey prices are expected to average 53 cents and 62 cents, respectively, slightly less than a year ago. Producers will earn profits at those prices, though less than a year ago due to higher feed costs.

Crop outlook

Feed grain and soybean inventories are expected to plunge during the 1993-94 marketing year, a direct result of the disappointing 1993 harvest. A larger planted acreage, encouraged by the zero ARP, should restore grain inventories to more comfortable levels—assuming weather returns to normal. But with inventories the leanest in nearly two decades, crop prices will remain sensitive to changes in crop prospects throughout the 1994 growing season.

The outlook points to a smaller and more competitive global market for U.S. wheat producers. Despite a slight decline in world wheat production, wheat supplies remain relatively large in major exporting and importing countries alike. North Africa, where a severe drought hurt the domestic crop, holds the most promise for U.S. wheat exports. But crops are ample in many other countries. Overall, U.S. wheat exports could be the smallest in three years.

In contrast to the slump in wheat exports, wheat imports could be the largest on record, as Canadian wheat spills over the border into U.S. feed bunks and flour mills. A short supply of corn and other feed grains in the United States has created a more attractive market for Canadian feed wheat. Last summer's wet weather also eroded the quality of much of the U.S. wheat crop. With high-quality wheat in short supply, U.S. wheat millers are willing to pay premium

prices, attracting imports of Canadian durum wheat. Much to the dismay of U.S. durum wheat producers, imports could comprise about a fifth of the U.S. durum wheat supply. At the behest of U.S. wheat growers, the Clinton administration has promised to discuss a reduction in wheat imports with Canadian officials. But strong demand in the United States is likely to maintain a substantial flow of Canadian wheat across the border.

Domestic wheat use may be brisk. With feed grains in short supply, livestock producers may feed nearly a third more wheat than a year ago. And wheat processed into human foods will climb further, rising for the 16th consecutive year. Overall, domestic wheat use could be up nearly a tenth from a year ago. The gains in domestic use, however, will not be big enough to offset weak exports. As a result, the wheat inventory is expected to grow more than a fifth to 642 million bushels. With a bigger inventory, farm level wheat prices may average $3.10 to $3.25 a bushel during the 1993-94 marketing year, down from $3.24 a bushel the year before.

In sharp contrast to the buildup expected in the wheat inventory, the nation's corn stockpile is expected to dwindle to the smallest level since the mid-1970s. The disappointing U.S. harvest will not meet the needs of domestic and foreign consumers who rely on U.S. corn. Thus, the nation will reach deep into the big inventory of corn stored from the record 1992 crop.

Corn exports are likely to drop sharply. Despite the shortfall in the U.S. crop, foreign farmers harvested bigger crops, led by gains in Canada, Australia, the EC, and China—the leading foreign corn exporter. Meanwhile, the former Soviet Union, previously a major buyer of U.S. corn and other grains, is likely to buy far less U.S. grain than in previous years. With meat production declining, demand for U.S. corn and other feed grains will remain weak in the former Soviet bloc. Overall, U.S. corn exports could shrink to 1,300 million bushels, down a fifth from the previous year.

The disappointing corn crop will also trigger cutbacks in domestic corn use. The biggest users of corn, U.S. livestock producers, may feed 9.5 percent less corn than last year. Meanwhile, food, seed, and industrial uses of corn, which are usually less sensitive to changes in corn supply and price, may increase slightly.

Despite sharp declines in corn exports and feeding, the nation's corn inventory is still expected to shrink to just 802 million bushels, about a five weeks' supply. Since harvest, when farmers and crop forecasters discovered far less corn in the nation's fields than expected, corn prices have bounced up. For the 1993-94 marketing year, farm-level corn prices could average $2.55-$2.75 a bushel, sharply higher than the year before.

The soybean outlook also points to weak exports and a shrinking inventory. Exports of soybeans and the two main products obtained from soybeans, meal and oil, are likely to slump in the year ahead. While torrential rains and floods pummeled the U.S. soybean crop, South American producers harvested record crops. For only the third time in history, foreign soybean production outpaced U.S. production. With U.S. supplies down, foreign supplies up, and demand weak in key markets, exports of U.S. soybeans and meal could drop nearly a fifth from last year. But with higher world market prices, export value might be down only slightly.

With the sharp drop in soybean meal exports, fewer soybeans may be crushed into meal and oil in U.S. processing plants. Supplies of soybean meal will still be ample to meet the needs of U.S. livestock producers, however, who are expected to feed about the same amount of soybean meal as in 1993. Overall, the domestic soybean crush may slip only 4 percent from last year's record.

Despite the sharp cutback in soybean exports and the smaller soybean crush, the U.S. soybean inventory may shrink to about 150 million bushels, the smallest since the mid-1970s. Higher soybean prices since harvest will help

ration the smaller than expected supply. For the 1993-94 marketing year, soybean prices may average $6.10 to $7.10 a bushel, a range well above the $5.60 a bushel of the previous year.

CONCLUSIONS

Harsh weather buffeted U.S. agriculture in 1993, but the industry came through the year in better shape than many expected. Financial performance among farmers varied as widely as the weather, which ranged from drought to deluge. Large crop losses created financial hardship for some farmers, but sales of stored grain, higher crop prices, and strong livestock earnings bolstered incomes for many more. Despite the uneven financial performance, agriculture finished the year on solid footing.

The industry looks forward to a better 1994, bolstered by a rebound in crop production and higher crop prices. Nevertheless, lean grain inventories cast critical importance on the 1994 growing season. A larger planted acreage, encouraged by the zero ARP, should restore grain inventories to more comfortable levels—if weather returns to normal. With inventories the leanest in nearly two decades, another short crop could send crop prices—and feed costs—soaring, sending a shudder through the livestock industry.

Entering 1994, agriculture's longer term outlook is brightened by prospective gains in the world food market. NAFTA opens the door to the rapidly growing Mexican market for U.S. farm products. And an accord on global farm trade has finally been struck in the Uruguay Round of the GATT after seven years of frustrating negotiation. The final deal is less than the industry had hoped for, but it nonetheless signals a welcome turn in global farm policy.

The Tenth District Economy: Picking Up the Pace

By Tim R. Smith

The Tenth District economy improved overall during 1993 thanks to a booming construction sector and healthy growth in services. The district's gain was uneven, however, because other major sectors of the region's economy remained mixed. The agricultural and mining sectors were flat, while manufacturing continued to struggle.

Economic performance diverged considerably across the seven district states. The New Mexico economy surged due to strong growth in construction and services. Oklahoma, Colorado, and Kansas also recorded strong growth, but Missouri, Wyoming, and Nebraska did not fare as well. Weak manufacturing continued to buffet Missouri, and sluggish trade and service sectors hampered growth in Wyoming and Nebraska.

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The district economy in 1994 will probably improve slightly as the national economy continues to strengthen. District manufacturing should improve somewhat, but construction may slacken from its recent vigorous pace. The district should not expect to gain additional strength from two of the region's key industries—agriculture and energy. Overall, the district economy is expected to grow moderately in 1994.

This article reviews the district's economic performance in 1993 and explores the outlook for 1994. The first section compares the overall performance of the district and the nation in 1993. The second section focuses on the recent performance and outlook for the district's key industries. The third section surveys the divergent growth pattern across district states in 1993 and discusses each state's outlook for the year ahead.

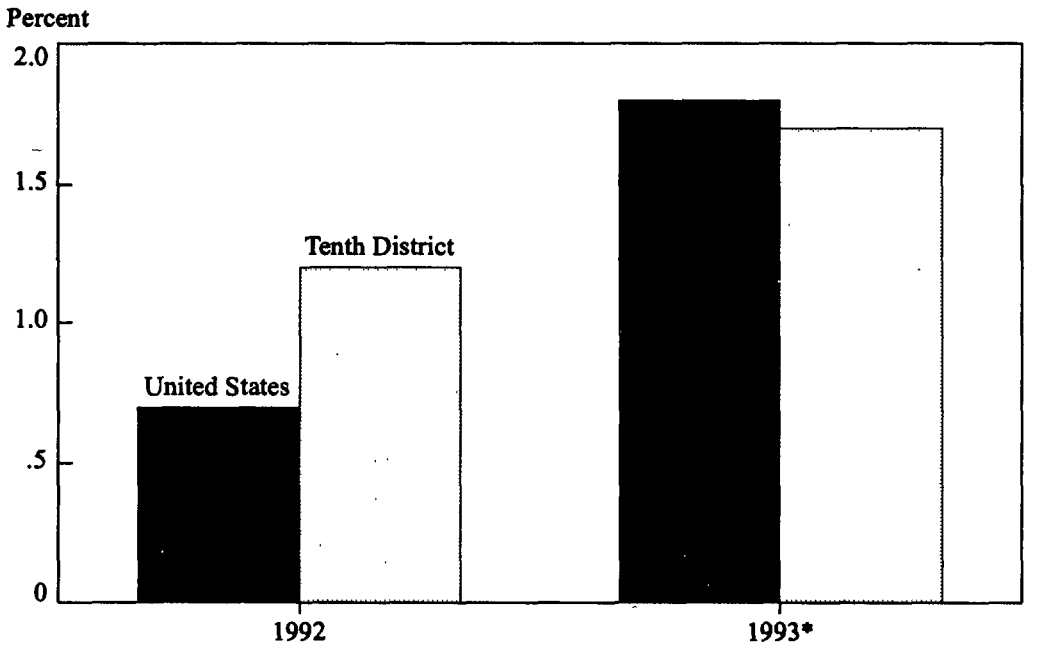
THE DISTRICT ECONOMY ACCELERATES IN 1993

Growth in the district economy accelerated in 1993. But despite the improvement, the district economy was unable to maintain its lead over the national economy as the nation's expansion gathered momentum.[1]

Chart 1

Growth in Nonagricultural Employment

U.S. and Tenth District



*First three quarters, seasonally adjusted annual rates.
Source: Bureau of Labor Statistics.

The strongest evidence of improvement in the district economy comes from employment growth, a broad measure of economic performance. Nonfarm employment in the district grew 1.7 percent in 1993, a half percentage point more than in 1992 (Chart 1).[2] National employment growth was 1.8 percent. The average civilian unemployment rate in the district for the first three quarters of 1993 stood at 5.6 percent, well below the nation's 6.9 percent rate.

Real personal income growth, another broad measure of economic performance, paints a less sanguine picture of the district economy. Real nonfarm personal income grew just 0.3 percent in the first half of 1993, much slower than the 4.1 percent gain recorded in 1992 (Chart 2).[3] Yet even this small gain in the district's real income compared favorably with the nation's real income, which declined in 1993.

The rise in district employment in 1993 was not shared evenly among district states. Jobs grew faster in 1993 than in 1992 in New Mexico, Oklahoma, Kansas, and Missouri (Chart 3). Job rolls continued to grow in Colorado, but not quite as fast as in 1992. In Wyoming, the already slow pace of job growth lost even more steam. And in Nebraska, employment ebbed slightly after rising in 1992.

Growth in real nonfarm personal income also ranged widely across district states. Only New Mexico had stronger growth in 1993 than in 1992 (Chart 4). Income growth slowed or stayed the

same in Wyoming, Colorado, Nebraska, and Oklahoma, while it fell in Missouri and Kansas.

REVIEW AND OUTLOOK BY SECTOR

The Tenth District has a rich mix of industries, which helped it achieve moderate growth in 1993 (Table 1). The strongest force behind the district economy was construction. The service and trade sectors also helped the district add jobs during the year. The mining sector stabilized due to a pickup in natural gas drilling. The farm economy was steady overall, despite uneven conditions across district states brought by flooding. In the government sector, strong job growth at the state and local levels balanced losses at the federal level. The manufacturing sector continued to lose jobs in 1993, but losses were less severe than during the previous year.

Growth in the national economy remained sluggish in the first half of 1993, but then picked up. The national economy in 1994 may slacken somewhat from its robust yearend pace, but it still is expected to grow moderately.[4] The district economy is unlikely to outperform the national economy, but most sectors of the district economy will benefit from improvement nationwide.

District *construction* activity swelled in 1993, lifting economic performance across the region. District construction jobs grew 5.9 percent, following a 4.6 percent gain in 1992. The strong job gain in the district was a full two percentage points higher than in the nation. The value of district construction contracts awarded in the first three quarters of 1993 was up slightly from the already high value recorded in the same period a year earlier. Continued strong activity in homebuilding accounted for the recent strength in the region.

Spurred by lower mortgage interest rates and population growth in the mountain states, residential construction in the district rose sharply in 1993 after another sharp jump the previous year. Most of the activity in residential construction remained in single-family dwellings, while multifamily construction was sluggish. All indicators of residential construction activity were markedly stronger in the district than in the nation.

By contrast, nonresidential construction across the region was flat in 1993. Office vacancy rates fell significantly in all major district cities, some of which were previously plagued with an overhang of office space. Yet vacancy rates did not fall enough to stimulate commercial building. In fact, the value of nonresidential con-

Table 1

Growth in Nonagricultural Employment by Sector, Tenth District States

	Percent change	
	1992*	1993**
Manufacturing	-1.2	-.8
Durable goods	-2.5	-2.2
Transportation equipment	-2.9	-12.3
Nondurable goods	.5	1.1
Food processing	-.1	1.6
Printing and publishing	.8	1.0
Mining	-8.5	.0
Construction	4.6	5.9
Service	2.8	2.3
Wholesale trade	.7	.4
Retail trade	.8	1.7
Federal Government	-.3	-2.7
State and local government	2.5	3.4
Transportation	-.6	1.7
Finance, insurance, real estate	.8	1.3

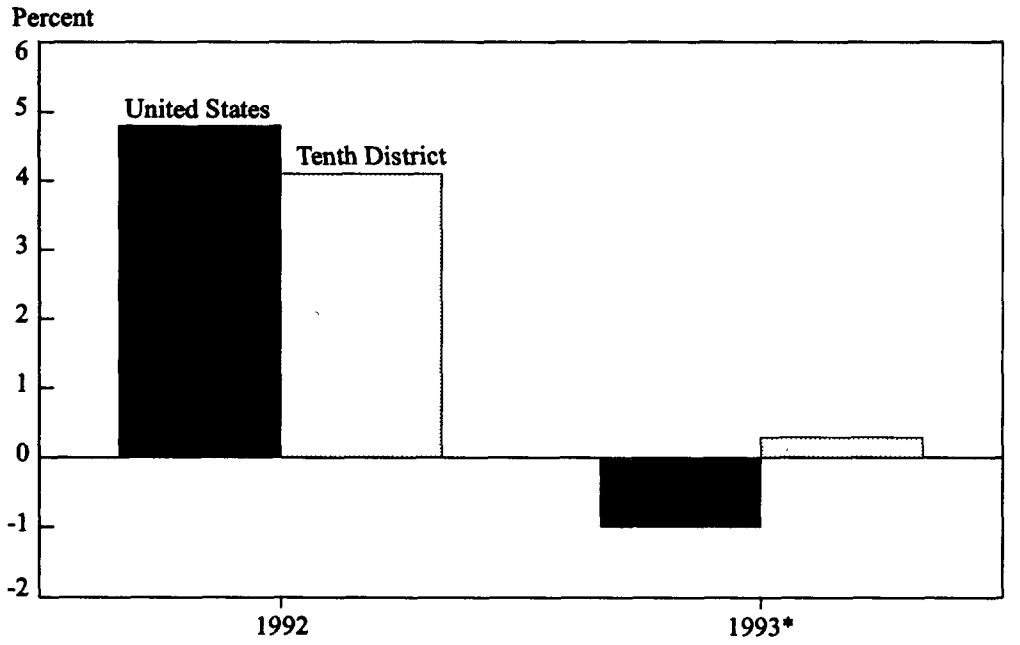
* From fourth-quarter 1991 to fourth-quarter 1992.
**First three quarters, seasonally adjusted annual rate.

Source: Bureau of Labor Statistics.

Chart 2

Income Growth

U.S. and Tenth District



Notes: Income growth rates are based on real nonfarm personal income. For 1993, annualized growth rates reflect only seasonally adjusted data through the first two quarters.
Source: Data Resources, Inc.

tract awards in the first three quarters of 1993 was 3.7 percent lower than the same period a year earlier. In the nation, the value of nonresidential building contracts fell 7.1 percent.

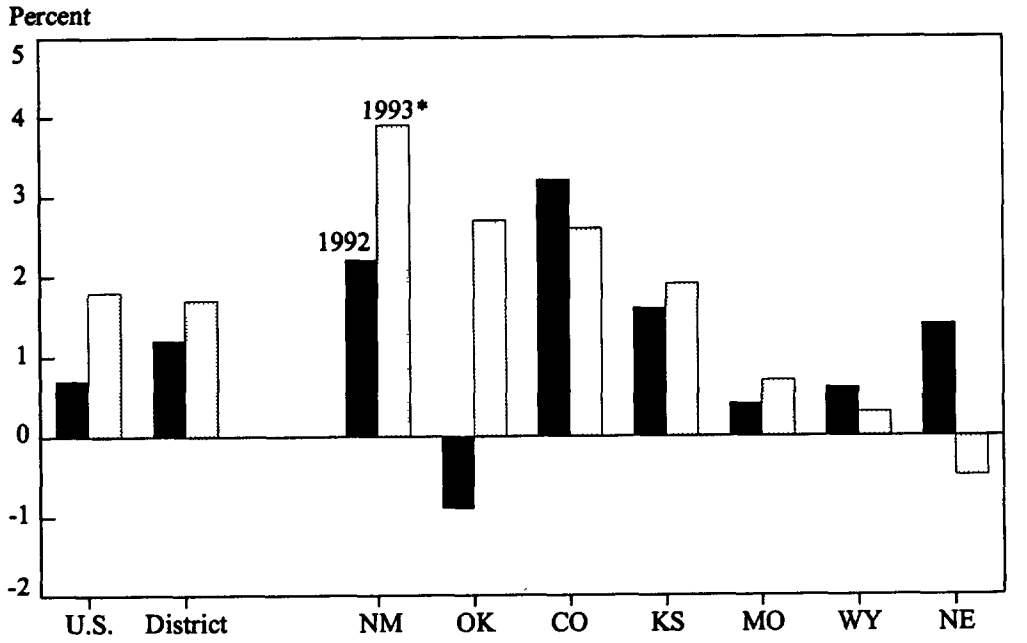
Construction activity probably will expand again in 1994, but at a slower pace. High inventories of new homes may curb homebuilding in some parts of the region, but inmigration will continue to propel activity in the mountain states. While office vacancy rates have fallen across the district, they remain generally high enough to limit gains in commercial building. The Denver International Airport has been a big boost to district nonbuilding and nonresidential construction, but the completion of this massive public project in early 1994 will eliminate thousands of construction jobs. Some of these layoffs will be offset by robust residential building in the district's mountain states.

The *service and trade* sectors were solid forces in the district economy in 1993. Although slipping some from its 1992 pace, service job growth remained healthy (Table 1). The district added service jobs at a rate two percentage points below the nation. Business and health services flourished in some parts of the district, such as the Kansas City suburbs and the metropolitan areas of the mountain states. Tourism—centered

Chart 3

Growth in Nonagricultural Employment

Tenth District States



*First three quarters, seasonally adjusted annual rates.
Source: Bureau of Labor Statistics.

in the Rocky Mountains and southern Missouri—helped boost both service and retail establishments in the region. Although growth in wholesale jobs slowed in 1993, growth in retail jobs returned to a moderate pace, reflecting the overall gains in the district economy.

If the national economy continues to improve, the district's service and trade sectors may grow somewhat faster in 1994. Business and health services are expected to continue bringing new jobs to the region. Moreover, tourism and expansion of discount retail establishments, such as Wal-Mart, will probably boost retail trade.

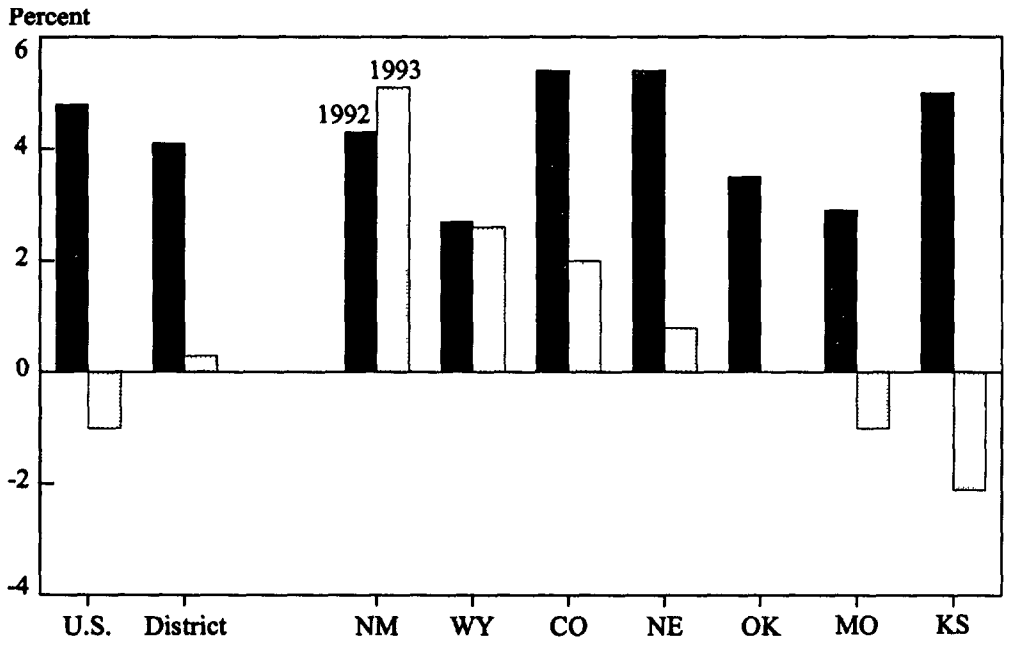
The district *mining* sector leveled off in 1993. After several years of decline, mining employment held steady as natural gas drilling and production propped up the energy industry (Table 1). Meanwhile, nationwide mining employment continued to decline.

The region's mining sector is dominated by energy activity, which turned in a mixed performance in 1993. Preliminary data for the first half of 1993 suggest that crude oil production in the district continued to slide, as it did across the nation's other oil-producing regions. By contrast, district coal production jumped 2.8 percent in the first ten months of 1993, after rising only slightly the previous year.

Chart 4

Growth in Income

Tenth District States



Notes: (See notes, Chart 2.)
Source: Data Resources, Inc.

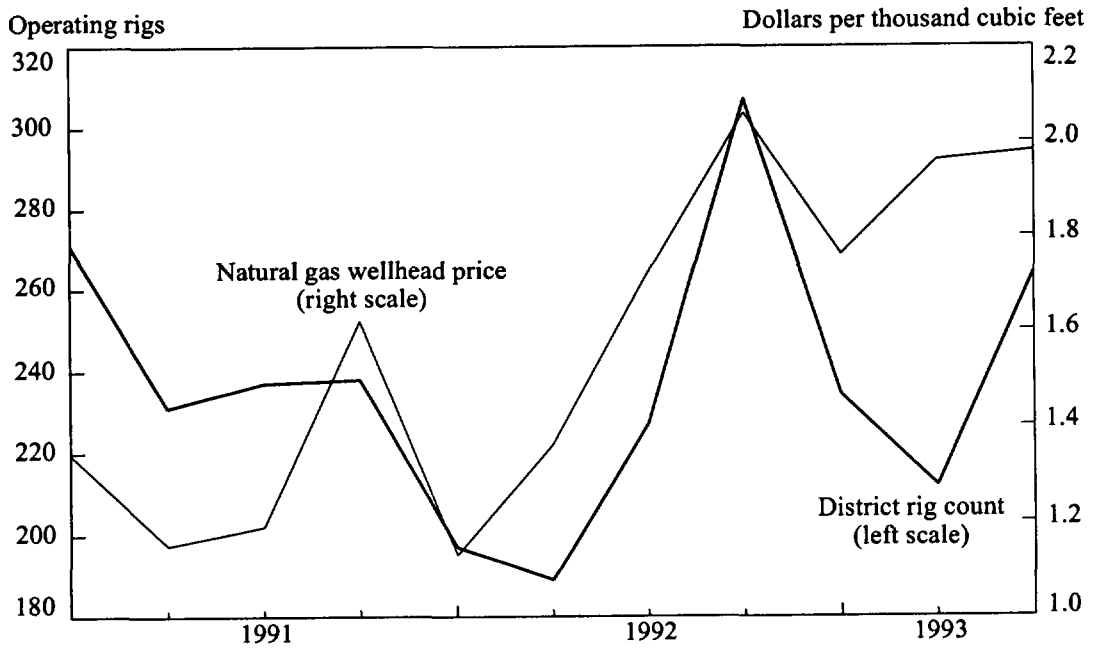
The primary force in the district's mining sector in 1993 was natural gas. Natural gas prices rose sharply in 1992 and remained high this past year, boosting drilling activity in the region (Chart 5). After tax credits for coal-seam methane gas expired at the end of 1992, the average number of gas and oil drilling rigs operating in the district fell. Drilling activity began to pick up again in April 1993, and throughout the summer the rig count averaged about 20 percent higher than year-earlier levels.

The district's energy industry appears to have stabilized. Despite being a large producer of oil, natural gas, and coal, the region has relatively few energy jobs. Therefore, the sizable job losses of past years will not be repeated; nor is mining employment likely to grow appreciably in 1994. The district's output of low-sulphur coal may increase due to environmental regulations that encourage its use, but productivity improvements will continue to limit job gains. Moreover, oil exploration and development probably will continue to trend downward with weak oil prices in prospect. While environmental concerns and new pipelines will continue to support the region's natural gas producers, drilling for natural gas may subside somewhat if natural gas prices fall with oil prices in the year ahead.

The district's *farm* economy was steady overall in 1993, but flooding created uneven performance across the district states. Farm income

Chart 5

Natural Gas Wellhead Price and District Rig Count



Source: Hughes Tool Company and *Oil and Gas Journal.*

improved slightly, but flooding left some regions with much lower income than in 1992. Hardest hit were areas in the eastern part of the district, especially in Missouri. Parts of the district that harvested normal crops benefited from the higher crop prices. Meanwhile, the district's cattle industry turned in another good year.

The district's farm economy should hold steady again in 1994 (Drabenstott and Barkema). A return to normal crops will restore farm incomes in the areas hit hardest by harsh weather and flooding. But profits in the livestock industry may be squeezed by higher feed costs. Despite the unevenness, the district's farm sector will remain financially healthy overall.

The district's important *government* sector remained stable overall in 1993. Substantial job gains at the state and local levels offset large job losses at the federal level (Table 1). The net result was an increase in total government employment of 2.4 percent.

While government jobs grew in all district states except Wyoming, the fiscal health of the individual states varied widely in 1993. The size of a state's general fund balance in relation to its spending provides a simple measure of fiscal health. By this measure, fiscal conditions in 1993 improved in Colorado, Kansas, and Missouri while conditions deteriorated in Nebraska, New Mexico, Oklahoma, and Wyoming. Fund balances remained above 5 percent in five states, a level of reserves generally considered desirable.[5]

The government sector will probably grow even more slowly in 1994. Defense spending cuts will continue to curtail federal government employment, particularly in states where military hardware is manufactured. State and local government employment may continue to increase in 1994 as improved economic conditions bring more favorable fiscal conditions. As a percent of general fund spending, fund balances are projected to be larger in five district states in 1994. And six district states are expected to maintain balances greater than 5 percent of spending (National Governors' Association).

Manufacturing activity improved somewhat in 1993, but still remained a drag on district job growth. The total number of manufacturing jobs slipped 0.8 percent, after dropping 1.2 percent the previous year (Table 1). In both years, the district lost manufacturing jobs at a slower rate than the nation.

The weakest segment of the region's manufacturing sector remained durable goods production. Jobs in the district's important transportation equipment industry dropped sharply, due to continuing layoffs at manufacturers of military aircraft and a new round of layoffs at Boeing's commercial aircraft assembly facility in Wichita. These layoffs overwhelmed small gains in general aviation manufacturing, which saw a pickup in domestic and foreign sales of business aircraft. Dollar sales of general aviation aircraft in the first three quarters of the year rose almost 4 percent, reversing a decline in 1992. Automobile and light truck assembly plants in the district also increased production during the 1993 model year, but the rate of increase in the region was much smaller than in the nation.

Nondurables manufacturing helped offset the weakness in durables manufacturing in the district by posting slow, steady growth in 1993. Food processing, the region's largest nondurables industry, added jobs at a rate of 1.6 percent in 1993, reversing a slight decline in 1992. Another important nondurables industry—printing and publishing—added jobs at a moderate pace in 1993.

The district's manufacturing base should improve further in 1994, but job gains will probably be limited. While the automobile industry may benefit from more consumer spending nationwide, the aircraft industry will remain hampered by defense spending cuts and ailing commercial airlines. Moreover, productivity growth is high for most manufacturers, permitting production increases with limited job gains.

DIVERGENT PERFORMANCE IN DISTRICT STATES

Economic growth improved on average in the district in 1993, but individual states did not share equally in the regional gains. Employment growth picked up in New Mexico, Oklahoma, Kansas, and Missouri but slowed in Colorado, Wyoming, and Nebraska.

New Mexico

The New Mexico economy surged ahead of the other district states in 1993. Employment in the state increased 3.9 percent, up from 2.2 percent in 1992 (Chart 3). Despite robust job growth, an expanding labor force pushed the state's unemployment rate from 6.4 percent at the end of 1992 to 7.4 percent in the third quarter of 1993. Growth in wages, salaries, and transfer payments propelled New Mexico's growth in nonfarm personal income well above growth in other district states.

Construction activity led the growth in the New Mexico economy in 1993. The total value of construction contracts awarded in the first three quarters soared 17.6 percent above the same period in 1992. As a result, construction employment grew more than three times faster than the previous year. The large gains were

driven by single-family homebuilding and industrial construction.

New Mexico's mining sector also helped boost the state economy in 1993. Employment in this important sector increased sharply, reversing a steep decline the previous year. Most of the gains in the state's mining sector came from natural gas, where higher prices and improved pipeline access to important western markets boosted production and drilling activity. The average number of drilling rigs operating in the state during November was up 23.3 percent from a year earlier. Coal production also surged during the year, up 16.8 percent in the first ten months from the same period a year earlier. In contrast, low prices brought layoffs to the state's potash industry.

The manufacturing sector staged a solid recovery in New Mexico during 1993. Factory jobs rose sharply following a modest decline in 1992. Durables and nondurables industries both added jobs, but most of the strength came from durables, which are dominated by the state's high-technology manufacturers. The $1.5 billion expansion at Intel's microchip manufacturing plant in the Albuquerque area—one of the nation's largest industrial expansions—is clear evidence of the turnaround in manufacturing underway in New Mexico.

The overall strength of the New Mexico economy fueled the state's trade and service sectors. Both wholesale and retail trade added jobs at a healthy pace. And employment in services surged, led by social, health, business, and educational services. The state's buoyant tourism industry also remained a source of strength.

In 1994, New Mexico's economy is expected to continue its rapid expansion. A housing shortage in Albuquerque and strong industrial expansion will continue to boost construction activity. Service employment should continue to benefit from tourism and Medicaid-related spending on health care in the state. Some uncertainty surrounds the future effects of the defense build-down on the New Mexico economy, but the state has escaped major defense spending cuts so far.

Oklahoma

The Oklahoma economy improved in 1993 from a lackluster performance the previous year. The clearest evidence of improvement is employment growth of 2.7 percent, a turnaround from the modest decline in 1992 (Chart 3). On the other hand, growth of real nonfarm income was flat (Chart 4). The civilian unemployment rate increased from 5.1 percent at the end of 1992 to 6.2 percent in the third quarter of 1993.

Oklahoma's construction sector benefited from lower mortgage interest rates and a general improvement in state economic conditions. Construction employment jumped 2.4 percent in the first three quarters of 1993, after declining slightly in 1992. Data on construction contracts and housing permits not only reflect robust construction activity but also suggest most of the strength was in single-family housing.

Mining activity in Oklahoma stabilized in 1993 but remained low by historical standards. After several years of trending downward, mining employment increased, due primarily to renewed interest in natural gas. In contrast, declining oil prices continued to depress oil production and exploration. Preliminary data for 1993 suggest production of natural gas rose slightly, while oil production continued its downward slide. Overall, the average number of drilling rigs operating in the state in the third quarter edged up to 99 from 91 a year earlier.

Oklahoma's manufacturing sector improved during 1993 but failed to stage a meaningful recovery. Factory employment was flat, compared with a 1.8 percent decline in 1992. The only employment gains came from the state's nondurable goods plants. Meanwhile, the state's durable goods industries continued to suffer job losses. While durables manufacturing was generally

weak, auto production increased slightly. The Oklahoma City General Motors plant stepped up production by 5 percent during the 1993 model year, following a 34 percent jump the previous year.

The trade and service sectors improved markedly, in step with the overall improvement in the state economy. Employment in retail and wholesale trade increased 3.7 percent in the first three quarters of 1993, reversing a moderate slide the previous year. Growth in service employment also jumped in 1993 from an anemic pace in 1992. Moreover, large gains in state and local government employment pushed job growth in the government sector well ahead of its 1992 pace.

The Oklahoma economy in 1994 may not sustain the same rapid pace it achieved in 1993. The state's increasingly diversified economy will benefit from expansion in the national economy. Agriculture will remain a steady force, and the momentum in homebuilding probably will continue through at least the first half of the year. But prospective weakness in oil prices will limit further gains in the mining sector. As in other states, recovery in the manufacturing sector will be hampered by sluggish exports, restructuring, and defense spending cuts.

Colorado

Colorado's economy grew at a healthy pace in 1993, but slowed somewhat from rapid growth in 1992. Both employment and income growth fell from their 1992 rates (Charts 3 and 4). Despite the slowdown, employment grew fast enough to lower the state's unemployment rate from 5.8 percent at the end of 1992 to 5.5 percent in the third quarter of 1993. Meanwhile, the labor force continued to expand as people moved into the state from struggling regions such as California.

Construction remained the strongest sector of the Colorado economy during 1993. Construction jobs grew 12.7 percent in the first three quarters, up from 9.8 percent in 1992. As in 1992, the strength was spread across all parts of the sector. Strong population growth and low mortgage interest rates boosted residential construction. And ongoing construction at Denver International Airport continued to fuel nonresidential and nonbuilding construction.

Colorado's manufacturing sector remained weak in 1993. Employment in the state's factories slipped 0.5 percent, following a similar decline in 1992. Job losses were confined to durable goods industries. Nondurable goods industries added jobs at a moderate pace.

While the mining sector stabilized in several district states during 1993, Colorado's mining sector continued to shrink. The state's mining employment dropped 3.4 percent, following a much bigger drop the previous year. The average number of drilling rigs operating in the state fell in the first part of 1993 but increased in the third quarter, probably due to a rise in natural gas exploration and development activity. Despite the recent increase, drilling activity remained nearly 14 percent below its year-ago level.

Trade and services benefited from the overall strength in the Colorado economy. A record 1992-93 ski season, strong summer tourism, and the Pope's visit helped retail trade and services add jobs at a moderate pace. These sectors were also helped by the arrival of major league baseball in Denver. Observers credit the Colorado Rockies with creating 3,000 new jobs in 1993. The strong regional economy continued to fuel growth in business services, and the Denver International Airport project supported growth in engineering services.

The Colorado economy is likely to slow somewhat in 1994 but will continue to grow moderately. Nonresidential and nonbuilding construction will drop off with the completion of the Denver airport, but strong population growth should continue to boost homebuilding. Federal government employment will continue to shrink

with federal budget cuts. Moreover, the effects of Amendment 1, which requires voter approval of state and local spending increases, will begin to constrain growth in state and local government. The state's manufacturing sector may pick up if national consumer markets improve significantly. Trade and services are expected to remain strong overall, but the repeal of the tourism tax used for advertising may limit gains in industries linked to recreation.

Kansas

The Kansas economy sent mixed signals in 1993. Although preliminary data show a decline in real personal income, employment grew 1.9 percent (Charts 3 and 4). Despite the moderate employment growth, the state's unemployment rate increased to 4.8 percent in the third quarter from 4.2 percent at the end of 1992.

One of the reasons for the improvement in employment growth in 1993 was solid construction activity. The total value of construction contracts awarded in the first three quarters fell somewhat from the same period in 1992, but the decline was concentrated in nonresidential building. Homebuilding and public infrastructure construction continued at a healthy pace. As a result, construction employment advanced 3.7 percent in 1993, following a similar increase in 1992.

The service sector remained a source of strength in the Kansas economy but slowed considerably in 1993. Employment in Kansas service industries grew 1.9 percent, compared with 4.0 percent the previous year. Weak income growth may account for the slowing in services, particularly in Wichita, where thousands of high-paying manufacturing jobs were lost.

Kansas manufacturing remained weak in 1993. Massive layoffs at Boeing's Wichita assembly plant dealt a blow to the state's durables industries. In addition, new car production fell 2.8 percent at the Kansas City General Motors plant during the 1993 model year after increasing 17.9 percent the previous year. Net billings for general aviation aircraft, on the other hand, increased in the first three quarters of the year compared with the same period a year earlier. Nondurables industries—dominated by food processing—also fared much better, adding jobs at a healthy pace.

Employment in the Kansas mining sector continued to slide in 1993. Mining employment fell 6.6 percent, after an even sharper decline the previous year. Higher natural gas prices spurred a gradual increase in drilling activity, with the average number of active drilling rigs increasing from 24 in the first quarter to 33 in the third quarter. Nonetheless, the state's rig count remained slightly below its level a year earlier.

The Kansas economy will probably maintain moderate employment growth in 1994, but income growth may be weak as the state's manufacturing sector continues to struggle. Food processing should remain a bright spot as it benefits from an improving national economy. Higher crop prices are likely to help the state's crop growers in 1994 but will lead to higher feed costs for livestock producers. The state's natural gas fields may see some increase in activity, but those gains will probably be offset by lower oil prices. Construction will likely continue to lend strength to the state's economy, and growth in services will probably level off at a moderate rate.

Missouri

The Missouri economy remained sluggish in 1993. Growth in employment was a modest 0.7 percent, up slightly from 1992 (Chart 3). Despite the small advance in employment growth, real personal income fell in 1993 after achieving moderate growth the previous year (Chart 4). Moreover, the state's unemployment rate climbed from 5.7 percent in 1992 to 6.3 percent in 1993.

One contributing factor in Missouri's sluggish

performance was the summer flood. Flooding ravaged parts of the state along the Missouri and Mississippi rivers and their tributaries. While rail and highway transportation was interrupted for a short time, the brunt of the disaster fell on the state's farmers. The Missouri corn crop was down 34 percent from 1990-92 average yields. On the other hand, rebuilding in the late summer and fall after the floods helped boost construction activity in the state.

Notwithstanding the flood's impact, the manufacturing sector was chiefly responsible for constraining the Missouri economy. The rate of job loss at the state's factories worsened in 1993, with most of the deterioration in the important durable goods industries. Defense spending cuts continued to batter the aerospace industry, and weak exports hampered other durable goods producers. One exception was production of automobiles and light trucks, which increased slightly during the 1993 model year on the heals of a big increase the previous year.

Construction activity continued to support the Missouri economy in 1993. The value of construction contracts awarded in the first three quarters increased somewhat from the previous year. Some of the gain in homebuilding and nonresidential construction can be attributed to rebuilding after the summer floods. While construction contracts suggest a solid construction sector in Missouri, they led to only a moderate number of new jobs. Construction employment rose only 1.8 percent in 1993, following a 4.1 percent jump in 1992.

Missouri's trade and services sectors were lackluster in 1993. Wholesale and retail employment grew slightly, reflecting the overall sluggishness in the state economy. Service employment fared somewhat better, but still grew much more slowly than in the nation and in most other district states. Booming tourism in southern Missouri continued to prop up the state's retail trade and service sectors.

The Missouri economy is unlikely to improve substantially in the year ahead. Improvement in the state's flood-battered farm sector should help the economy, and improved economic conditions nationwide may boost the important manufacturing sector. Nonetheless, defense spending cuts will continue to depress the state's factory employment.

Wyoming

The Wyoming economy was steady but lackluster in 1993. Employment rose slightly, following modest growth in 1992 (Chart 3). The state's unemployment rate jumped to 5.9 percent in the third quarter from 4.9 percent at the end of 1992. Despite the sluggish job growth, Wyoming's nonfarm personal income surged in the first two quarters, outpacing all other district states except New Mexico.

The state's important mining sector remained stable in 1993. Strength in natural gas markets helped sustain drilling activity. Although the average number of operating oil and gas drilling rigs more than doubled during the first three quarters, the level of activity was just equal to the level a year earlier. Coal production increased 1.4 percent in the first ten months of 1993, reversing an unexpected decline in 1992. And strong construction activity in the nation continued to boost the state's production of soda ash—used in glassmaking.

Wyoming construction indicators were generally strong in 1993. The value of construction contracts awarded in the first three quarters jumped considerably from the previous year. Permits for single-family homes soared, as did contract awards for public structures. But these signs of strength in Wyoming's construction sector did not translate into new jobs. In fact, construction employment fell 5.9 percent following a similar drop in 1992.

The trade and service sectors reflected the lackluster state economy. Employment at retail establishments grew solidly, while employment

at wholesale establishments fell. The solid growth in retail employment can be traced in part to strong tourism. Service employment, meanwhile, changed little from its 1992 level.

The Wyoming economy is expected to grow slowly in 1994. Higher feed prices may squeeze profits for the state's cattle ranchers, and slumping oil prices may put further downward pressure on oil drilling. But if natural gas prices remain relatively high, recently expanded pipeline capacity should continue to support activity in the state's natural gas fields. In addition, another year of strong tourism should prop up the state's trade and service sectors.

Nebraska

The Nebraska economy slowed in 1993. Employment fell slightly after a moderate gain in 1992 (Chart 3). Despite the dip in jobs, Nebraska's third-quarter unemployment rate of 2.5 percent remained the lowest in the district and was far below the national rate of 6.7 percent. The slower state economy was also reflected in sluggish income growth. Real nonfarm personal income grew much more slowly during the first half of 1993 than during the previous year (Chart 4).

Nebraska's non-goods-producing sectors slipped further in 1993. Employment in retail and wholesale trade fell 2.4 percent after a slight gain the previous year. Service employment also fell, reversing moderate growth in 1992. The weak employment picture possibly reflects the overall weakness in the rural parts of the state.

Nebraska's manufacturing sector grew solidly. Manufacturing employment jumped 2.3 percent. Job growth in nondurables industries, dominated by food processing, slowed somewhat but was offset by a considerable pickup in durables industries.

Construction helped buoy the Nebraska economy in 1993 but did not contribute nearly as much strength as the previous year. The total value of construction contracts in the first three quarters remained flat compared with the same period in 1992. A modest jump in homebuilding balanced declines in nonresidential and nonbuilding construction. The jump in homebuilding was strong enough to push up construction employment 3.0 percent, about half the increase of the previous year.

The Nebraska economy probably will improve in the year ahead. Some observers who expect the state's economy to grow moderately in 1994 believe the state economy is stronger than suggested by the 1993 employment data.[6] Improvement in the national economy should benefit the state's manufacturing sector. The service sector, which includes services such as telemarketing that are sold to customers outside the state, may also benefit from improving economic conditions elsewhere in the nation. While higher crop prices benefited the state's farmers in 1993, they will hurt profits of livestock producers in the year ahead.

SUMMARY

The Tenth District economy improved in 1993, but growth was uneven across economic sectors and states. Employment grew moderately while income growth was weak. Overall, economic performance in the district about matched that in the nation. While construction continued to boom, manufacturing faltered. The transportation equipment industry was hit particularly hard by defense spending cuts and a financially troubled commercial airline industry. Harsh weather and flooding hurt the farm economy in the eastern part of the district but brought higher crop prices and better incomes to other parts of the district. While the mining sector stabilized in 1993, it had little overall impact on the regional economy because of its small share of total employment.

As the national expansion gathers momentum in 1994, the district economy should continue to improve. A strengthening national

economy is likely to help the region's manufacturing and service sectors. And expected population growth in the mountain states should lend continued support to the region's construction sector. As the imbalances caused by last year's flooding are corrected, agriculture should continue to provide a stable underpinning to the region's economy but contribute little additional growth. Lower oil prices may dim prospects for the region's energy industry. But potential losses in the energy sector will be offset by the positive effects of lower energy costs on the region's other industries.

ENDNOTES

[1] This article assesses district economic performance using the most recent data available at the time of writing. Preliminary employment data are available for the first three quarters of 1993; income data, for the first two quarters. Other data are available for various time periods. This article places more emphasis on employment data than on income data because it provides an additional quarter of information about 1993 economic performance.

[2] Discussions of employment growth in this article are based on growth for 1992, calculated from the fourth quarter of 1991 to the fourth quarter of 1992, and growth for 1993, calculated as the annual rate of growth from the fourth quarter of 1992 to the third quarter of 1993. The employment data are from the Bureau of Labor Statistics, seasonally adjusted at the Federal Reserve Bank of Kansas City. While agriculture is an important sector of the district economy, nonfarm employment is used to measure district economic performance because the number of direct farm jobs is small and difficult to measure. Nonfarm employment, however, does capture the indirect effects of agriculture on other sectors of the region's economy.

[3] Discussions of income growth in this article are based on growth for 1992, calculated from the fourth quarter of 1991 to the fourth quarter of 1992, and growth for 1993, calculated as the annual rate of growth from the fourth quarter of 1992 to the second quarter of 1993. The income data are seasonally adjusted real nonfarm personal income data from Data Resources, Inc. Income growth recorded in the second half of 1993 is expected to be much higher than in the first half. Therefore, first-half data are probably not good indicators of 1993 economic performance. This article emphasizes employment data which, although subject to revision, are more complete for 1993.

[4] This view reflects the consensus estimate published in the December 10, 1993, *Blue Chip Economic Indicators*. The estimate is for real GDP growth of 2.8 percent in 1992 and 2.9 percent in 1993.

[5] These estimates of 1993 fund balances and general fund expenditures are from the National Governors' Association. The five states with fund balances of 5 percent of general fund expenditures or above were Colorado, Kansas, Missouri, Nebraska, and Oklahoma.

[6] The Labor Department made major revisions to the national employment data in June. Corresponding revisions to state data have not yet been made. Nebraska analysts expect a substantial upward revision, and upward revisions are possible in other district states.

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Fiscal Policies Aimed at Spurring Capital Formation: A Framework for Analysis

By Robert S. Chirinko and Charles Morris

In recent years, policymakers have proposed various fiscal policies to spur long-run economic growth through increased capital formation. The Bush Administration, for example, proposed lowering the capital gains tax rate. The Clinton Administration, among other measures in its economic package, proposed reinstituting the investment tax credit. These proposals stem from heightened concerns that the U.S. economy has been growing by less than its long-run potential, and from the judgment that this subpar growth is due in part to deficient capital formation.

This article presents a framework for examining fiscal policies aimed at spurring capital formation and highlights the conditions for their success. The first section shows why capital formation is an important determinant of economic growth. The second section shows how the optimal amount of capital formation, and therefore economic growth, is determined. The third section shows how economic distortions can cause capital formation to fall short of the socially optimal amount. The final section discusses several fiscal policies that have been proposed to raise capital formation.

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CAPITAL FORMATION AND LONG-RUN GROWTH

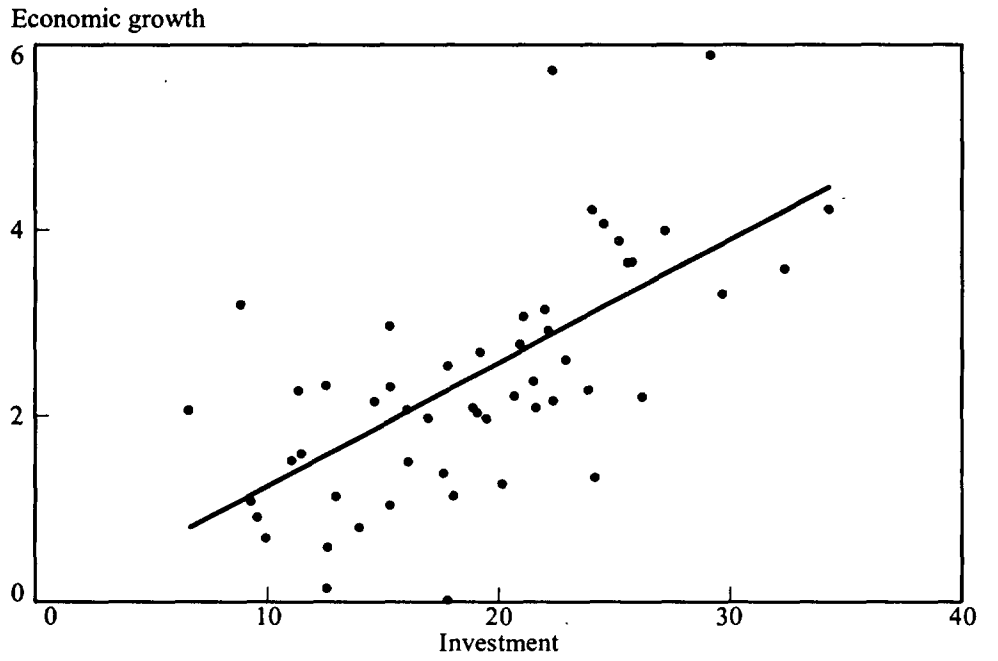
Capital formation refers to the increase in the capital stock that results from investment spending.[1] Capital formation also includes improvements in the quality of capital. For example, the development of faster personal computers also represents capital formation.

Capital formation increases per capita output by making workers more productive. For example, the substitution of typewriters for penmanship enhanced the productivity of office workers. The substitution of word processors for typewriters, in turn, has further raised office worker productivity. Because capital formation increases output per worker, the greater the amount of capital formation, the greater will be the growth rate of per capita output.

The standard theory of economic growth pioneered by Robert Solow suggests policies that raise capital formation cannot permanently raise

Chart 1

Economic Growth and Investment Are Positively Related Across Countries



Note: Economic growth is measured by the growth rate of per capita real GDP. Investment is measured by domestic real gross investment's share of real GDP. The chart shows average annual economic growth rates and investment for 52 countries.

Source: Authors' calculations using data from Summers and Heston.

the growth rate of per capita output. The key assumption in the standard model is diminishing marginal returns to capital formation. Diminishing marginal returns means each successive unit of capital adds less and less to a worker's total output. For example, giving an office worker a word processor will greatly improve performance, but giving the same worker a second word processor will have little additional effect on performance. Due to diminishing returns, as firms acquire more and more capital, the return to capital declines until it just equals the cost of capital. As a result, capital formation will eventuallystop, and there will be no growth of per capita output in the long run. In other words, policies aimed at raising capital formation can raise growth in the short run but not in the long run.[2]

In contrast to the standard theory, empirical evidence suggests there is a positive long-run relationship between capital formation and per capita growth (Chart 1). Chart 1 is a scatterplot of capital formation and economic growth. Capital formation is measured by domestic real gross investment's share of real GDP. Economic growth is measured by the percentage change in per

capita real GDP. The scatterplot includes 52 countries for which data are available from 1950 to 1988. In order to measure *long-run* growth and investment, the data point for a particular country represents the average of annual observations over the whole sample.[3] Because countries with low income levels tend to grow faster than countries with high income levels, the data were purged of the effect of the initial level of income.[4]

Chart 1 shows that countries that invest more tend to have higher long-run rates of economic growth.[5] The average relationship is summarized on the chart by a regression of growth on investment. The regression line has a positive slope, which is statistically significant and economically important.[6] According to the regression, an increase of ten percentage points in the investment share of GDP is associated with an increase of 1.3 percentage points per year in the long-run growth rate of per capita real GDP.[7]

In response to the inconsistency of the empirical evidence with the standard growth model, new theories of growth have emerged in recent years.[8] In the new theories, policies aimed at raising capital formation can raise growth in the long run. The critical feature of the new theories is that the return to capital for the economy as a whole does not diminish because capital is assumed to have a *direct* effect on an individual firm's output and an *indirect* effect on the output of other firms. As in the standard model, the direct effect of capital on a business firm's output exhibits diminishing returns. In contrast to the standard model, however, increases in a firm's capital also indirectly affect the output of other firms in the economy by increasing such factors as the stock of knowledge and the education of the work force. For example, investment by a handful of firms in personal computer technology produced knowledge that allowed many other firms to manufacture personal computers. As long as the indirect effect is sufficiently strong, the return to capital for the economy as a whole does not diminish. Without the constraint of diminishing returns, policies aimed at spurring capital formation can raise growth in the long run.

WHAT IS THE SOCIALLY OPTIMAL AMOUNT OF CAPITAL FORMATION?

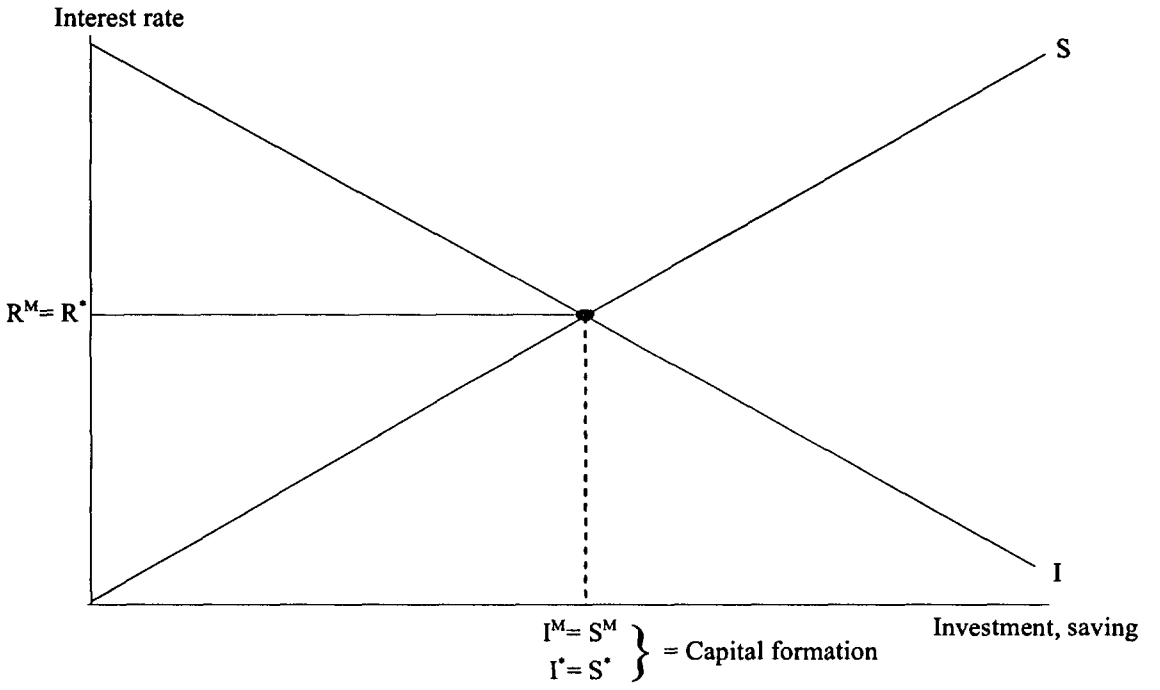
While the new growth theories imply a constructive role for economic policy in raising growth, they do not imply that policy should focus on attaining the highest possible rates of growth and capital formation. Because capital formation requires foregoing current consumption, raising economic growth is not always in society's best interest. This section shows what determines the socially optimal amount of capital formation in the absence of economic distortions. The next section discusses how economic distortions cause capital formation to fall short of the social optimum.

Capital formation depends on the demand for and supply of funds (Figure 1). To concentrate on the essential elements determining capital formation, Figure 1 excludes the role played by government in capital markets and focuses on the private demand for and supply of funds. The demand for funds is represented by the demand for investment goods (I) by firms. The investment schedule relates a firm's investment spending to interest rates (R). Along the schedule, other factors that affect investment are held constant, such as production techniques, the market environment in which goods are sold, and the level of business confidence.[9]

The investment schedule shows that investment spending increases as the interest rate falls. The downward slope of the investment schedule follows from the assumption that, when faced with an array of projects, firms will first invest in the most profitable ventures. Because the initial projects are more profitable, firms are willing and able to pay a higher interest rate to borrow funds. As investment continues, the returns from the remaining projects decline. As a result, firms will

Figure 1

Capital Formation: The Social Optimum



invest in them only at a lower interest rate. Thus, whether a project is attractive cannot be determined without reference to the prevailing interest rate.

The supply of funds is represented by the desired saving of households.[10] The saving schedule (*S*) relates household saving to the level of interest rates. Along the saving schedule, other household characteristics that affect saving are held constant. These characteristics include the level and variability of income, age, marital status, the expected inflation rate, and the access of foreigners to U.S. capital markets.[11]

The saving schedule shows that desired saving increases with interest rates. The response of saving to an increase in the interest rate is more complicated than in the case of investment because households are affected by two forces that pull in opposite directions. On the one hand, an increase in the interest rate today will raise the return on previous savings, raising the amount of funds available tomorrow. To the extent households have a target for the amount of funds needed tomorrow—for example, retirement—this "income effect" will lower saving today. On the other hand, the reward for saving increases with the interest rate and, by itself, this "substitution effect" will make households want to save more. The relative importance of the income and substitution effects on private saving is a topic of much dispute. If these effects were equally potent, saving would be completely unresponsive to the interest rate, and the saving schedule would

be vertical. As shown in Figure 1, this article assumes the saving schedule has a positive slope, reflecting the assumption that the substitution effect dominates the income effect.

The intersection of the investment and saving schedules determines the market equilibrium amount of capital formation (denoted by the "M" superscript in Figure 1). At the intersection, there is a unique interest rate, R^M, that equates the amount of investment willingly undertaken by firms and the amount of saving willingly undertaken by households (I^M=S^M=capital formation). In equilibrium, capital formation will remain unchanged unless the investment or saving schedules are disturbed by a change in one or more of the underlying factors—for example, changes in business confidence or expected inflation.

This market equilibrium corresponds to the socially optimal amount of capital formation when the saving and investment schedules accurately represent all of the benefits and costs of capital formation. An important assumption in economics is that households and firms will make decisions in their own self interest. In the context of saving and investment, households will choose to save and firms will choose to invest in a way that maximizes their own benefits. When the saving and investment schedules are not distorted, these individual decisions will also determine the most favorable amount of capital formation from society's perspective in the sense that no other outcome would lead to a higher level of satisfaction. In other words, in the absence of economic distortions, the market equilibrium amount of capital formation equals the socially optimal amount of capital formation (denoted by the "*" superscript).[12]

HOW ECONOMIC DISTORTIONS REDUCE CAPITAL FORMATION

The amount of capital formation determined by the market is socially optimal only in a world free of economic distortions. In the actual economy, economic distortions cause the market-determined amount of capital formation to fall short of the socially optimal amount. This section considers three sources of distortions: capital income taxation, government budget deficits, and externalities.[13]

Capital income taxation

The need for revenues and considerations of fairness have led governments to tax the income from capital assets. Capital income taxation distorts the saving and investment schedules, causing the amount of capital formation determined by the market to fall short of the amount that is socially optimal.[14]

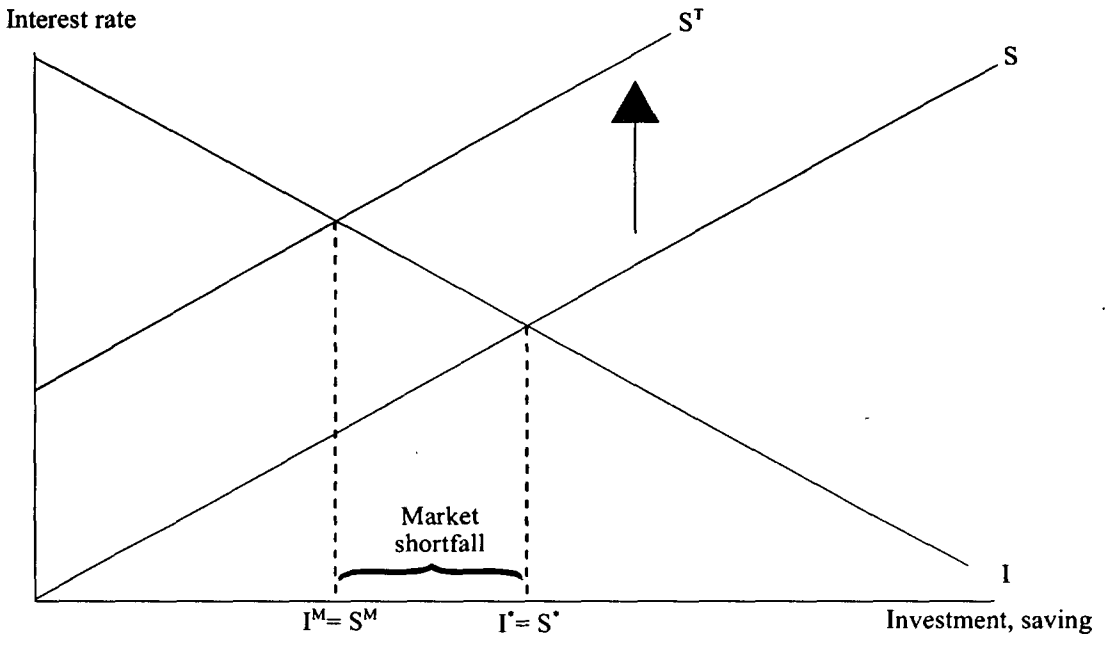
Capital taxes on households reduce the benefits of saving because they lower the post-tax return earned by households (Figure 2).[15] Households' capital income is taxed in a number of ways. Periodic dividend and interest payments are taxed at a rate depending on the households' adjusted gross income. Capital gains are taxed when assets are sold, even if the gain merely reflects the effects of inflation. Such taxes reduce households' returns. As a result, households require a higher pre-tax return to supply a given amount of saving, which is shown in Figure 2 as an upward shift in the saving schedule to S^T.

Capital taxes on households create a market shortfall in capital formation.[16] With the shift from S to S^T, the return required by households is greater than the return to investing at the initial amount of capital formation. To satisfy the higher interest rate required by savers, firms must cut back their investment projects to those with higher returns. In this new equilibrium, capital formation is less than the socially optimal amount.[17]

Capital taxes levied directly on firms also lead to a market shortfall, but by reducing the net return to investment rather than to saving. For example, taxes are assessed on business profits after allowance has been made for production and financing costs. These and other capital in-

Figure 2

Capital Income Taxes on Households



come taxes reduce the net returns earned by firms on all investments. This reduction in returns is represented in Figure 3 (which removes the effects of any household taxes) as a downward shift in the investment schedule from I to I^T. With the shift to I^T, the return to investing is less than the return required by households at the initial amount of capital formation. Consequently, firms must cut back their investment projects to those with higher returns, which creates a market shortfall relative to the social optimum.[18]

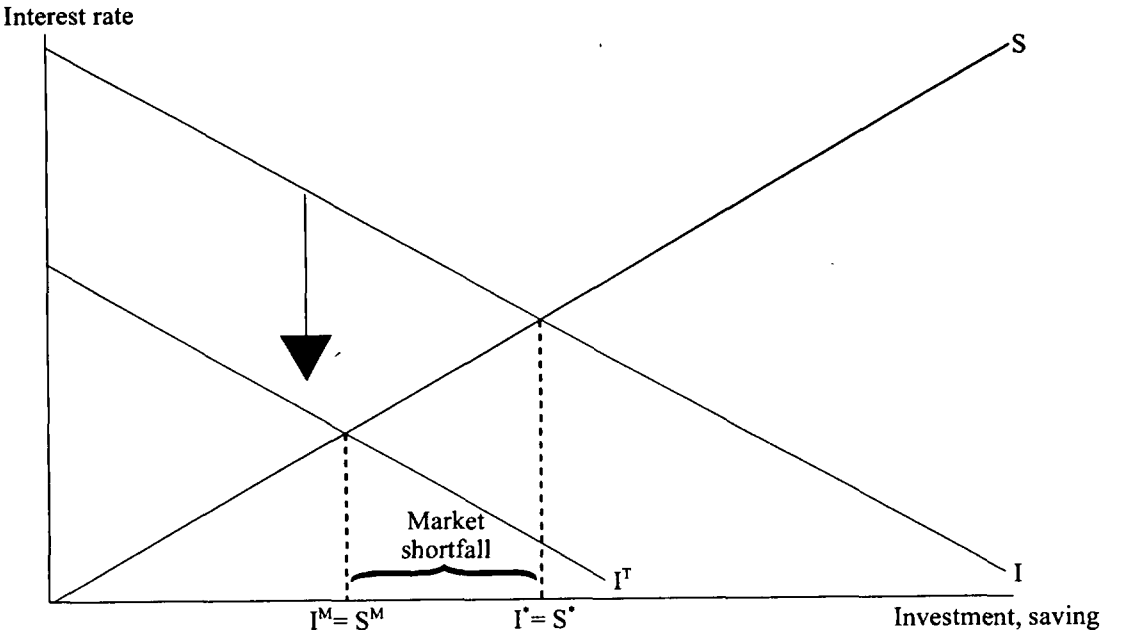
The degree to which capital income taxation creates a market shortfall in capital formation depends critically on the slopes of the saving and investment schedules. For example, suppose the saving schedule is nearly flat because saving is very responsive to interest rates. In this case, taxing households' capital income would have a large effect on capital formation. On the other hand, if the investment demand schedule is very steep, then, even if the saving schedule is as pictured in the figures, shifts in the saving schedule would have only a modest effect on the equilibrium amount of capital formation. Unfortunately, no consensus has yet to emerge on the empirical slopes of the investment and saving schedules.

Government budget deficits

The size of the federal government budget deficit has been a major topic on the policy agenda for a number of years. Government deficits

Figure 3

Capital Income Taxes on Businesses

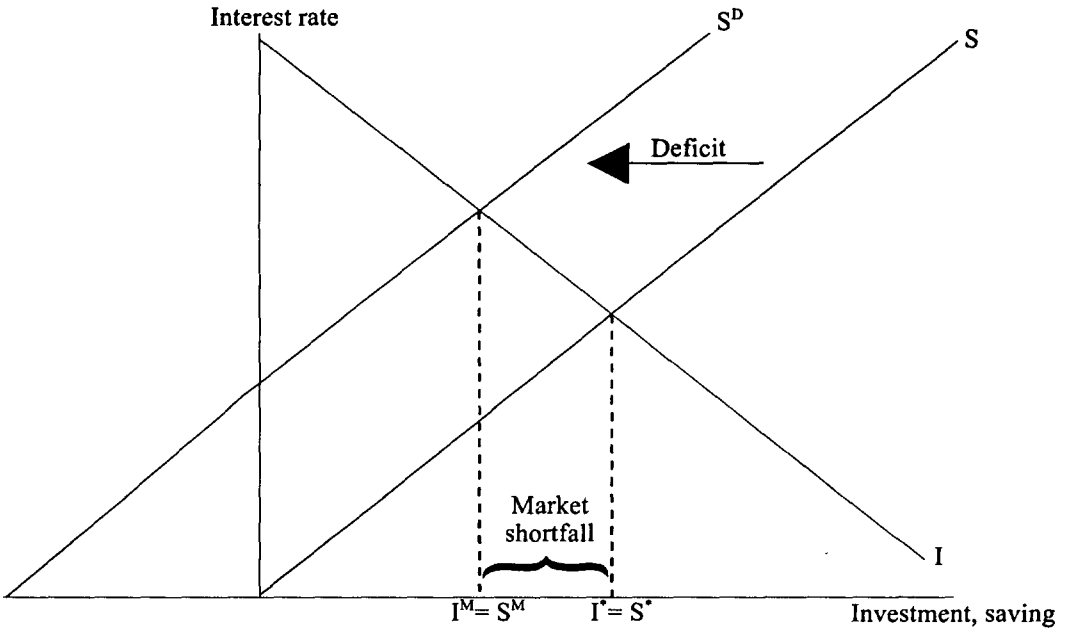


create a shortfall in private capital formation by reducing the pool of saving available for private sector borrowers, thus "crowding out" private capital formation (Figure 4). To the extent that deficits are not used for investment purposes, total capital formation is reduced.[19] An important feature of government borrowing is that it is insensitive to interest rates. That is, the government will borrow whatever it needs to finance its deficit no matter what the interest rate because its budget deficits are always financed. As a result, deficits reduce the funds available for private capital formation, and the saving schedule shifts leftward from S to S^D. This shift equals the size of the deficit. With the shift from S to S^D, the return to investing is less than the return required by households at the initial amount of capital formation. Faced with a higher required return, firms are now more selective in choosing projects and cut back their investment. At the new equilibrium, private investment is crowded out, reducing capital formation below the socially optimal level.

The size of the shortfall in capital formation due to government deficits depends on the slopes of the saving and investment schedules, as well as on two other key and controversial assumptions. First, because current deficits must eventually be paid off with higher taxes, households might increase their saving somewhat to help pay the higher taxes. In that case, the saving schedule would lie between S^D and S in Figure 4. In the extreme, if households increased their saving by enough to fully pay off

Figure 4

Government Deficits



future taxes, government deficits would have no effect on capital formation.[20]

The second factor that might mitigate the effects of government deficits is international capital flows. To the extent that funds flow across national borders, the higher interest rates induced by government deficits would attract foreign funds, replacing the funds lost to the government. In the extreme case of perfectly integrated world capital markets, international capital flows would surge whenever domestic interest rates differed from world interest rates, and the differential between the two rates would disappear quickly. As a result, government deficits would not affect interest rates or capital formation.[21]

Externalities

A key assumption in the analysis of the socially optimal amount of capital formation is that firms and households realize all of the costs and benefits associated with their investment and saving decisions. A "positive externality" occurs when households or firms do not realize all of the benefits created by their actions. Externalities are another type of distortion that creates a market shortfall in capital formation.[22]

Positive externalities may exist in capital formation. Indeed, such positive externalities are one of the key assumptions in many of the new growth theories. Some empirical evidence indicates

that investment in machinery and equipment plays a particularly pivotal role in stimulating growth through learning externalities or as a stimulant to innovation. For example, calculations by DeLong and Summers indicate that the social return to investment in machinery and equipment is much higher than the private return, perhaps as high as 30 percent.

Other types of investment may also generate positive externalities. Some have argued that small firms generate benefits in the form of new ideas and new jobs in excess of the returns accruing to entrepreneurs and venture capitalists. Viewed from the perspective of the aggregate economy, capital formation by small firms yields social benefits that exceed private benefits. In these and other cases, investment generates a positive externality not appreciated fully by private market participants.

Positive externalities produce a market shortfall in capital formation (Figure 5). If investment produces a positive externality, then the socially optimal investment schedule (I^E) lies to the right of the investment schedule faced by market participants (I). The I^E schedule shows the amount of investment firms would undertake if they considered both the private and external benefits from investing. At a given interest rate, firms would be willing to invest more if they actually faced this hypothetical investment schedule. Thus, the socially optimal amount of capital formation—the intersection of I^E and S—exceeds the private market outcome, and there is a market shortfall in capital formation.

POLICIES TO SPUR CAPITAL FORMATION

The distortions that produce shortfalls in capital formation, and therefore in economic growth, suggest a natural framework for assessing policies to spur capital formation. Specifically, policies should be evaluated by the extent to which they reduce the distortions that disrupt capital formation.[23] It is often difficult to evaluate policies, however, because policies that reduce one distortion often produce other distortions as side effects.[24] This section discusses four of the more popular policies that have been proposed to raise capital formation and identifies some of the side effects that might accompany them.

Reducing the federal budget deficit

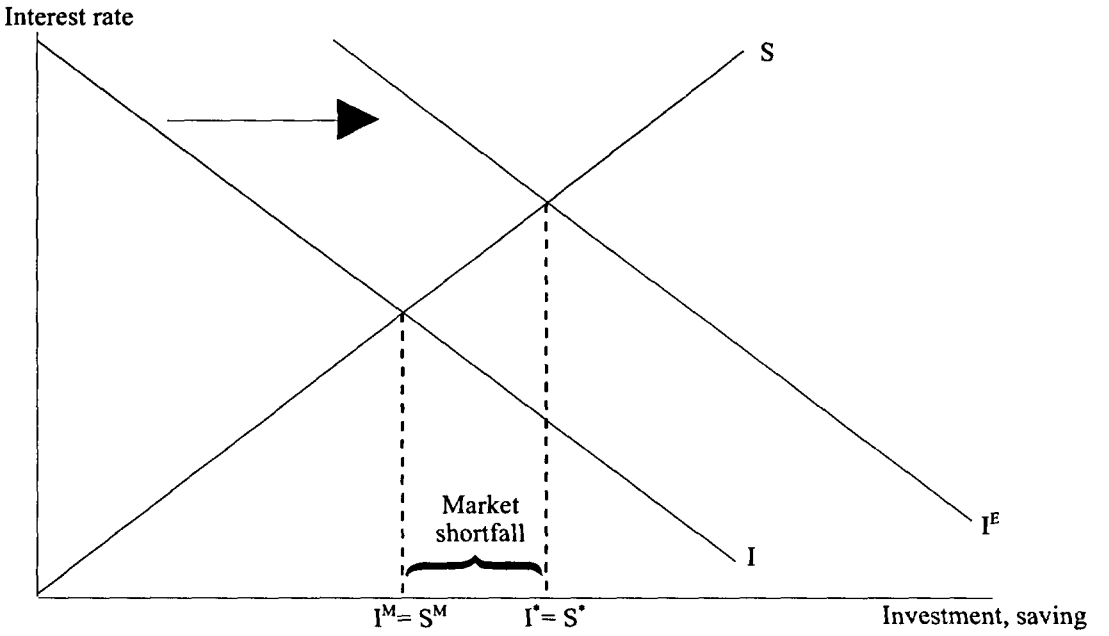
Deficit reduction has been the policy action receiving the most recent attention for stimulating capital formation. The federal deficit has swelled since the late 1970s, rising from just 11 percent of private saving in the latter half of the 1970s to 31 percent in 1992. The focus on deficit reduction is in response to the widely held view that high (and growing) federal budget deficits increase competition for the scarce pool of private saving, raise interest rates, and crowd out private investment (Figure 4). Viewed in isolation, reducing the budget deficit will raise capital formation if the absorption of resources by the government is a major distortion.

The extent to which a lower deficit will raise capital formation, however, depends on how the reduction is financed. For example, suppose the deficit is reduced by raising capital income taxes on households and firms. Raising capital income taxes will lower the post-tax return to saving by households (Figure 2) or investment by firms (Figure 3). Thus, tax financing magnifies one distortion and, all else being the same, lowers capital formation.

The way deficit reduction is financed can also affect the distribution of capital formation across different markets. For example, a tax change that discourages investment in residential real estate will have a favorable effect on the market for business plant and equipment, as investors withdraw some of their funds from the relatively less attractive housing market.

Figure 5

Externalties



The existence of multiple effects is common in evaluating public policies. An analysis of multiple effects is similar to that contained in the above figures, except that many markets would be considered simultaneously and the saving and investment schedules in each market would depend on circumstances in other markets. Reducing the deficit to stimulate capital formation is based on the judgment that the response to lower interest rates is sufficiently strong to counteract the effects of higher capital income taxes.

Reinstituting the investment tax credit

The investment tax credit has been a frequently used instrument of tax policy. An investment tax credit subsidizes investment by allowing businesses to deduct a percentage of their investment from their taxes.[25] Starting in the 1960s, the investment tax credit has been set at various rates, removed, resurrected retroactively, and then eliminated completely in the Tax Reform Act of 1986. Reinstituting the investment tax credit was part of the Clinton Administration's initial economic proposal to Congress, but it was not part of the 1993 budget bill enacted into law.

A key motivation for an equipment investment tax credit is the evidence suggesting there are positive externalities associated with equipment investment that benefit the entire economy (Figure 5). In the presence of such externalities, business equipment investment will fall short of

its socially optimal amount. Thus, subsidizing this type of capital formation is the appropriate policy.[26]

As with deficit reduction, financing the investment tax credit creates additional distortions that temper capital formation. On the one hand, if there is no compensating tax increase, the budget deficit will rise. On the other hand, if the subsidy is financed by increasing some other tax, then there will be an additional distortion that lowers capital formation. Subsidizing equipment investment with a tax credit is based on the judgment that the gains from exploiting the favorable externality exceed the costs from adding distortions elsewhere in the economy.

Lowering the capital gains tax rate

The 1993 budget bill did not include an investment tax credit, but it did lower the capital gains tax rate for specific types of saving. In general, lowering taxes on capital gains increases the return to savers. More specifically, the capital gains tax cut in the 1993 budget bill was targeted at savers that supply capital to small businesses. This policy is motivated by the perception that small businesses generate a positive externality. In the presence of positive externalities, capital formation by small businesses will fall short of its socially optimal amount (Figure 5). Thus, a subsidy targeted at small business capital formation is the appropriate policy.

Choosing between a saving or investment subsidy to stimulate small business capital formation depends on several considerations. Because a given market shortfall in capital formation can be remedied by subsidizing either saving or investment, it is unclear which subsidy is appropriate. Thus, the choice of tax instrument will depend on other considerations, such as administrative simplicity, income redistribution, political feasibility, or interactions with other aspects of the tax code. The latter is perhaps most important in choosing to lower capital gains tax rates because many small firms will have little if any profits with which to use an investment tax credit. Since the investment tax credit is not refundable, firms without any profits would obtain no immediate benefit from an investment credit. Targeting savers who can respond to the incentives provided by a tax cut may be a much more effective way of stimulating small business capital formation.

The desirability of subsidizing small businesses by a targeted cut in the capital gains tax rate is based on two judgments. First, lowering the capital gains tax rate is the most effective tax instrument for directing funds to small businesses. Second, as with the other policies considered above, the gains from exploiting the favorable externality exceed the costs from adding distortions that arise from financing the cut in capital gains taxes.

Replacing capital income taxation by consumption taxation

Replacing the income tax with a consumption tax is a policy favored by many economists. The taxation of capital income retards capital formation because, as illustrated in Figures 2 and 3, the returns to saving and investment are distorted. If the taxation of capital income is the problem, then the solution is simply to choose a tax system that does not tax capital income.

Avoiding the taxation of capital income can be accomplished by taxing only the income spent on consumption. A consumption tax can be implemented in various ways. For example, expanding the tax benefits of IRAs to all forms of saving and eliminating the requirement that the funds can be used only for retirement is one way of replacing the income tax with a consumption tax. Alternatively, the income tax could be replaced by imposing a national sales tax or national value-added tax. In all cases, the net effect is to exempt income from taxation until it is used

for consumption. Concerns with equity and transition problems in moving from an income to a consumption tax have resulted in only modest political interest for this policy initiative.[27]

CONCLUSIONS

Heightened concerns that the U.S. economy has been growing by less than its long-run potential have spurred fiscal policy proposals to raise long-run economic growth through increased capital formation. This article presents a framework for examining fiscal policies aimed at raising capital formation. Three sources of market shortfalls in capital formation are capital income taxes, government budget deficits, and externalities associated with investment in capital goods. Given these distortions, the ultimate success of growth-oriented policies—such as deficit reduction, investment tax credits, capital gains tax rate cuts, and consumption taxation—depends on whether they reduce the economic distortions responsible for the market shortfalls in capital formation.

While the criterion for successful growth-oriented policies is easy to articulate, it is more difficult to evaluate because of interactions among markets and uncertainties about the responsiveness of investment and saving to interest rates and other factors. Quantitative analysis is needed to get a firmer understanding of these market interactions and empirical magnitudes important in determining capital formation. Nonetheless, the important lesson to be drawn from this article is that public policy discussions should focus on those distortions that disrupt the capital formation process and are amenable to policy actions.

ENDNOTES

1 In general, capital formation will be less than investment because of depreciation, the amount of existing capital that "disappears" due to normal wear and tear or to obsolescence as technology improves. Depreciation is not considered in this article because it would complicate the analysis without changing any of the conclusions.

2 See Mankiw and Plosser for more complete discussions of the Solow growth model and its policy implications.

3 The data are from Summers and Heston. The real investment share of real GDP was averaged over the years 1950 to 1988. The growth rate of per capita real GDP was averaged over the years 1951 to 1988 because 1950 was the first year the level of per capita real GDP was available. Guyana was excluded from Chart 1 even though data were available from 1950 to 1988 because it was clearly an outlier the average real investment share of real GDP was 31 percent and the average growth rate of per capita real GDP was -0.7 percent. Including Guyana does not change the qualitative results (see endnote 6).

4 The data were purged of the effect of the initial level of income by regressing the average growth rate of per capita real GDP (y) and the real investment share of real GDP (I) on the initial level of per capita real GDP. The average of y across countries was then added to the residuals from the growth equation, and the average of I was added to the residuals from the investment share equation.

5 This discussion assumes that causality runs from investment to growth. Of course, part or all of the positive relationship between growth and investment may be because there are more investment opportunities in countries with strong economic growth. An example from industry that demonstrates this point is the relative investment and growth of Wal-Mart and Sears. Specifically, a high rate of investment probably is not the source of Wal-Mart's growth relative to Sears; rather, strong growth and the resulting investment opportunities probably are the source of Wal-Mart's high rate of investment.

6 The coefficient on investment is 0.13 and is statistically significant at less than the 0.1 percent level. When Guyana is included in the regression, the coefficient on investment falls to 0.10 but is still statistically significant at less than the 0.1 percent level.

7 Some researchers believe that the evidence in Chart 1 does

not contradict the standard growth model because the average growth rates do not adequately represent long-run growth (Mankiw, Romer, and Weil). Instead, they believe it can take an economy more than 40 years to reach its long-run equilibrium level of output. According to this view, the growth rates in Chart 1 represent temporary differences in growth that occur as the countries move toward their long-run equilibrium level of per capita output. Thus, under this interpretation, the evidence does not contradict the standard model's prediction that growth and the investment share are unrelated.

8 The new growth theories are called *endogenous* growth theories because growth is generated "inside" the model rather than "outside" the model as in the Solow model with *exogenous* growth. See Plosser for a survey of the varieties of endogenous growth models.

9 Chirinko provides a detailed analysis of the investment schedule.

10 Firms also contribute to aggregate private saving but, for the sake of expositional simplicity, their role is ignored. In this article, all saving is done by households, and all investment is done by firms.

11 Kotlikoff provides a detailed analysis of the saving schedule.

12 The socially optimal amount of capital formation is defined in terms of economic efficiency. This definition ignores other factors, such as equity, the distribution of resources, and other noneconomic factors, which may cause society to desire a different amount of capital formation. This article only focuses on economic efficiency, though other considerations are important, if not paramount, in deciding actual outcomes. See Rosen for a more complete discussion of the complicated subject of welfare economics.

13 See Auerbach or Rosen for more detailed discussions of the topics discussed in this section. Our analysis of market shortfalls focuses on only *private* capital formation, thus ignoring the role of and shortfalls in government infrastructure investment (for example, highways and roads, water and sewer systems, mass transit networks, and airports). Recent policy discussions (see Munnell) suggest that the government has been insufficiently vigorous in funding public infrastructure and, as a consequence, the social returns from additional infrastructure investment are large. Thus, shortfalls amenable to policy actions may also exist with respect to *public* capital formation.

14 Given the complexity of the tax code, it is difficult to be definitive about the impacts of capital income taxation on capital formation. For example, while increasing the corporate income tax rate will usually lead to a decrease in investment incentives, highly leveraged firms during inflationary times may actually be tempted to increase investment because of the tax deductibility of nominal interest payments. See Pechman or Rosen for an extended discussion of various tax provisions.

15 These returns must be compared to those available from other assets (for example, housing). Decreases in the returns on alternative assets (perhaps due to changes in tax rates) will shift the supply curve downward.

16 The analysis in this section focuses on just the immediate effect of taxation. A more detailed analysis would take into account that the extra tax revenues obtained from savers could be used to reduce taxes elsewhere in the economy. These additional factors are discussed below when evaluating policies to spur growth.

17 "Market shortfalls" should be distinguished from the related concept of "capital shortages." In many discussions, "capital shortages" refer to an excess demand for investment relative to the supply of saving. However, as shown in Figure 1, such a "shortage" would be eliminated in a market economy by movements of the interest rate until all market participants were satisfied. However, insofar as "capital shortages" refer to a divergence between the market equilibrium and the social optimum, then it is similar to the "market shortfalls" concept used in this article.

18 The "market shortfalls" displayed in Figures 2 and 3 are identical. This equality follows from the result in the public finance literature that the incidence of the tax in terms of equilibrium values for the interest rate (net of the tax) and capital formation is the same whether levied on households or firms.

19 While the deficit may affect the economy in a variety of ways, the focus here is on the role of deficits in creating a shortfall in private capital formation. Among other important issues about the deficit not discussed here are how it should be measured, its effects on current macroeconomic activity, and its consequences for future generations. See Eisner and Friedman for further discussion of these issues. The text also ignores that government spending may be directed toward socially worthwhile ends (for example, aiding flood victims in the Midwest) or investment in public infrastructure (for example, roads and bridges). Consequently, Figure 4 contains only a partial analysis of the effects of deficits.

20 That forward-looking households completely anticipate future taxes to pay for today's deficit and increase saving appropriately is labeled the "Ricardian Equivalence" proposition. This proposition is named after the classical econo-

mist David Ricardo (who did not believe that it would hold as an empirical proposition), and has been introduced into recent debates about the deficit by Robert Barro. See B. Douglas Bernheim for a critical review of the theory and evidence for Ricardian Equivalence.

[21] The empirical debate over capital mobility was initiated by Martin Feldstein and Charles Horioka, who concluded that capital was relatively immobile and hence domestic saving was important for domestic capital formation. This conclusion is as controversial as it is crucial. See Feldstein and Bacchetta for some recent evidence.

[22] Frequently proposed solutions to externalities are for the government to modify market incentives or impose regulations. Economists prefer the former solution because it attacks the externality problem directly by exploiting economic incentives. Some have argued that externalities do not require government intervention and that self-interested individuals can reach an efficient outcome once property rights are established. This solution, introduced by Ronald Coase, becomes less applicable the more substantial are negotiating costs and the less reliable and more restricted the flow of pertinent information.

[23] As noted above, the reader should bear in mind that the impacts of the three distortions on capital formation depend on several assumptions that are implicit in the figures, especially the slopes of the demand and supply schedules.

[24] A complete evaluation would require a quantitative analysis of market interactions and the empirical responsiveness of saving and investment to changes in interest rates and other factors. In addition, when the economy has multiple distortions, removing one capital market distortion may not necessarily lead to an improvement in the welfare of the economy. In light of these "second best" considerations, piecemeal changes in the tax code are generally undesirable and need to be evaluated in a more detailed model than is presented in the figures.

[25] There are two general types of investment tax credits. A unilateral credit applies to all equipment investment and has been the method adopted in previous U.S. legislation. An incremental investment tax credit applies to all equipment investment above a prespecified level of past expenditures. While both types of tax credits provide an incentive to increase investment, the government loses less revenue from the incremental credit.

[26] Since it is unlikely that each type of equipment capital will generate the same level of externalities, the argument in the text suggests that the investment credit should vary across equipment types. While such variation may be the correct policy in principle, administrative and political concerns might dictate a uniform investment credit in practice.

[27] See McClure and Zodrow, and Miller for further discussion of the difficulties in implementing a consumption tax system.

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Economic Review

First Quarter 1994, Vol. 79, No.1

The *Economic Review* (ISSN0161-2387) is published quarterly by the Federal Reserve Bank of Kansas City, 925 Grand Boulevard, Kansas City, Missouri 64198-0001. Subscriptions and additional copies are available without charge. Send requests to the Public Affairs Department, Federal Reserve Bank of Kansas City, 925 Grand Boulevard, Kansas City, Missouri 64198-0001. Second-class postage paid at Kansas City, Missouri.

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Economic Review
Federal Reserve Bank of Kansas City
Kansas City, Missouri 64198-0001
First Quarter 1994, Vol. 79, No. 1