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President's Message: What Does a Reserve Bank President Do?

John F. McDonnell

As you learned on this page last issue, the St. Louis Fed is currently seeking a new president, following Tom Melzer's recent resignation. As chairman of the Bank's board of directors, I am responsible for directing the nationwide search for a candidate to fill this important position. Which begs the question, what is it exactly that a Reserve Bank president does? The answer is twofold.

First, the president has a broad range of responsibilities as chief executive officer since, in practice, Reserve Banks are run much like private corporations. And, like the CEO of a private corporation, a Reserve Bank president is responsible for establishing the organization's direction, achieving its short- and long-term objectives and running an efficient operation. For these responsibilities, the president answers to a board of directors.

Also like other CEOs, the Reserve Bank president represents the institution before its core constituencies: bankers, business leaders, educators, community agencies, employees, the public. This largely involves communicating the Bank's key messages at public or Fed-hosted forums, in columns like this one, in talks with the media, at employee assemblies, in informal gatherings and so on.

The second area of responsibility for a Reserve Bank president is unique to the Fed: Presidents sit on the Federal Open Market Committee (FOMC), the Federal Reserve's chief monetary policymaking body. At FOMC meetings, members debate various prescriptions for monetary policy with the goal of achieving a stable, growing economy. All 12 Reserve Bank presidents participate in FOMC discussions, though only five presidents are voting members at any point in time. (The rest of the Committee consists of the seven-member Federal Reserve Board of Governors.)

To ensure that their participation in FOMC policy debates is well informed, Reserve Bank presidents spend much of their time studying the workings of the economy and becoming knowledgeable about their regions. They are supported in this effort by a team of research economists. Not surprisingly, some Reserve Bank presidents are economists themselves; others typically have banking or financial backgrounds.

Whatever their backgrounds, Reserve Bank presidents often make of their jobs what they will, emphasizing areas in which they have expertise or interest and delegating other responsibilities to their staff.

As our search for a new president narrows, we hope to find a candidate who will extend the successes of the past in both monetary policy and the efficient operation of the St. Louis Fed. Although I think we were particularly lucky to have had Tom Melzer as our president and CEO for more than 12 years, I'm confident that we will find an equally talented individual to perpetuate the fine tradition of this organization.

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A Brave New Economic World? The Productivity Puzzle

Kevin L. Kliesen

To hear many economists and policymakers tell it, U.S. economic performance is currently the best it has been in a generation—maybe even longer. Indeed, relatively low inflation, low unemployment and strong economic growth is a combination rarely seen over the past three decades or so. In fact, some analysts go so far as to insist that the U.S. economy has entered a new era. According to adherents of this view, businesses are finally harvesting the fruits from technological advancements related to the computer microchip, laser technology and fiber optic communications. Among the gains to the economy are better inventory management practices and improved productivity. Despite all the hoopla this economic performance has generated—much of it deserved—there are sound reasons to be concerned about future prospects for the U.S. economy. It all goes back to fundamentals.

Miserable No More?

My, how times have changed. A little more than five years ago, many economists were downright worried about the long-term prospects for increases in U.S. living standards.[1] Now, however, given the recent performance of several important economic indicators, many economists are wondering whether higher growth rates of real GDP and lower inflation rates are here to stay (see table). In fact, some believe that the current economic environment is reminiscent of the heady years (1950-70) in the aftermath of World War II, when the living standards of U.S. workers (real GDP per person) rose by almost 3.75 percent a year. This is more than double the nearly 1.5 percent a year gains seen from 1930 to 1950.[2]

Table 1

The Best of Times?
How current economic statistics stack up against history

Indicator	Performance/Level	Time Period	Best Performance Since
Inflation (CPI)	2.2%	1996:Q3 - 1997:Q3	1986:Q1 - 1987:Q1
Unemployment Rate	4.7%	1997:Q4	1970:Q1
Misery Index	5.7%	1997:Q3	1973:Q1
Stock Market Returns (S&P 500)	40.8%	1996:Q3 - 1997:Q3	1982:Q3 - 1983:Q3
New Home Sales (millions of units at an annualized rate)	824.0	1997:Q1	1978:Q4
Consumer Confidence (1985=100)	128.7	1997:Q4	1969:Q3
Unified Budget Deficit ($billions)	$22.6	Fiscal Year 1997	Fiscal Year 1974

NOTE: Inflation and growth of the S&P 500 are four-quarter percent changes; measures of the unemployment rate, the misery index, new home sales and consumer confidence are quarterly averages of monthly rates.

Few comparisons between today's economic environment and that seen between 1950 and 1970 are as apt as the absence of debilitating rates of price inflation and high and rising unemployment rates. These were the twin maladies that plagued policymakers for much of the late 1960s to the early 1980s, when living standards reverted to their prewar rates of growth. After averaging 5.4 percent a year from 1980 to 1991, inflation during the current business expansion has been about half of that.

Low and stable inflation has been a boon for the economy, providing businesses with a solid foundation for undertaking investment initiatives, expanding production and boosting employment. In fact, in the fourth quarter of 1997, the civilian unemployment rate averaged 4.7 percent, its lowest level in more than 25 years. Moreover, real GDP has grown at an exceptionally strong 3.3 percent annual rate over the past two years, which is well above its 10-year average growth rate of 2.5 percent. With inflation and unemployment low, and real GDP growth high, the misery index in the third quarter of 1997 was at its lowest point in nearly 25 years.[3]

Does the recent macroeconomic performance of the economy signal the beginning of a new economic era—one whose operating paradigm is no longer rooted in the ebbs and flows of the traditional business cycle? Moreover, what is the role for monetary policymakers in this new paradigm? Can they now show less vigilance against inflation? At first glance, it would appear so, since the U.S. economy has experienced only three quarters of negative real GDP growth in the past 15 years, and the flames of inflation appear to have been extinguished for good—or at least sufficiently doused to be only marginally worrisome. But is there more to the story?

The conventional view—the one held by most forecasters—is that the recent surge in economic activity is typical of the increased production that normally accompanies the greater demand for goods and services seen over the course of the business cycle. Those who believe that something more fundamental is taking place, however, ask the following: With aggregate demand for goods and services exceptionally strong, why

hasn't inflation accelerated as in previous expansions? Again, the conventional view holds that it eventually *will* once certain temporary factors that have been restraining inflation fade from view.[4]

There is, however, an alternative view, which has been looked upon favorably by Federal Reserve Chairman Alan Greenspan, among others.[5] At its core, this view holds that the considerable capital stock put into place by businesses over the past two to three years—augmented with impressive technological advancements related to the computer microchip—has boosted the economy's potential to grow over time. Strong growth and low inflation is simply the byproduct of this development.

For monetary policymakers, these two competing views offer an extraordinary challenge. The former view suggests that monetary policy, as in times past, has been perhaps too accommodating of this upsurge in demand. If this is true, then inflation will eventually accelerate, thus threatening the sustainability of the business expansion. The latter view, on the other hand, implies that the economy has entered a new economic era where inflation is permanently low and the capacity for growth is much higher than most thought possible. Why is the new paradigm story gaining sway with some very influential policymakers?

Know Your Fundamentals

Economists generally believe that economic growth can be measured by how fast living standards rise over time, which is usually defined as year-to-year increases in GDP per person (or per worker). A country's per capita GDP depends importantly on institutional factors that facilitate the production, distribution and sales of goods and services, otherwise known as the economy's "infrastructure."[6] Although many factors can come into play, a few crucial ones stand out—chief among them is the way a society organizes its form of government: Does the government encourage private ownership of the means of production and respect for the rule of law, including a willingness to stamp out corruption and enforce private contracts? Other crucial components of a healthy economic infrastructure are: an independent central bank that is committed to achieving price stability, an adherence to the principles of free trade, legal protection of copyrights and patents, and a regulatory system that effectively balances the costs and benefits of government intervention in the private sector. Economic infrastructure, then, appears to explain why per capita output in the United States is roughly seven times greater than that of Mexico, and nearly 10 times that of China.

If a country's economic infrastructure goes a long way toward explaining why U.S. citizens are much wealthier than those of Mexico or China—or every other country for that matter—it also directly influences those factors that determine how fast an economy grows over time. Two basic factors—labor intensity and labor productivity—determine this growth path over time, both of which can be affected by a wide variety of influences.[7] A country's labor intensity is determined by the number of people who are entering the labor force, and thus available to produce (and consume) goods and services. Labor intensity is mostly a function of population growth—which generally changes slowly—although immigration can have some effect.

It would be difficult to overstate the importance of labor productivity growth in determining future increases in living standards. Simply put, when economic resources (whether human beings, machines or land) are not very productive, the economy's potential to grow over time is severely constrained. To use a sports analogy, a running back who gains four yards per carry is much more productive than one who gains only two. Not surprisingly, the former is also paid much more than the latter. Thus, the more productive an economy's resources are, the more income they will produce, and the higher the nation's standard of living will be.

Labor productivity can be influenced by many factors. In general, though, it depends on a country's capital intensity, which comes in two forms—investment and human knowledge, or, what economists call, respectively, physical capital and human capital. The accumulation of physical capital (tangible investment) depends on such factors as a nation's saving rate, the return to investment and expectations of future economic growth. But capital intensity is also influenced by the accumulation of ideas, such as research and development (R&D)

efforts that both build upon previous discoveries and lead to inventions that can be copyrighted or patented. The transfer of new ideas and technological advances in a free and open international trading environment is also crucial. The U.S. auto industry, for example, benefited immeasurably from the competition offered by Japanese-produced cars and trucks in the early 1980s.

The government can also play a positive role in spurring labor productivity. For instance, some economists favor permanent R&D tax credits and/or lower capital gains taxes to spur increased saving and investment. Government policy can play a key role in boosting human capital, too. Although it is very difficult to measure, human capital depends crucially on educational attainment, which is why many economists favor universal subsidies for higher education, or policies that would promote competition among private and public schools. Others believe that human capital can be boosted by "technological spillovers," which occur when workers are given specific knowledge and training that enables them to operate equipment and machinery which embodies the latest technology, thereby leading to increased real wages and higher living standards.

In the final analysis, an economy grows over time because of tangible factors—what economists call "real things." These real things influence a country's productivity growth and, ultimately, its standard of living.

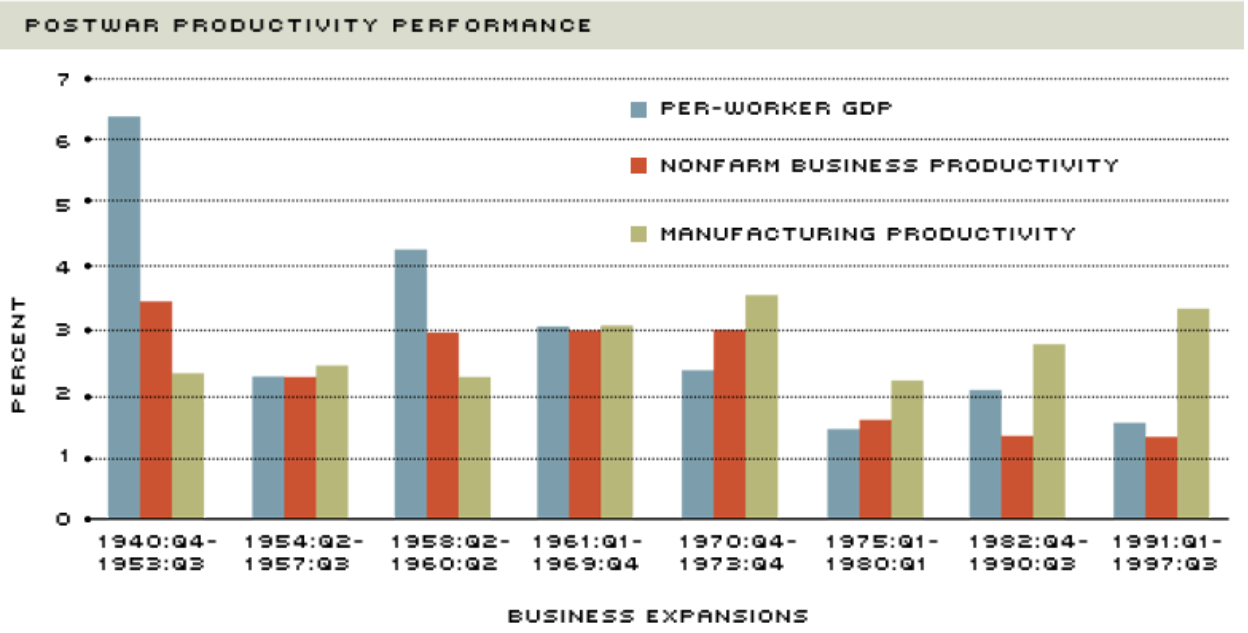
What's Wrong with This Picture?

One way that a firm can offset increases in input costs is through greater labor productivity, namely by producing more goods and services at a lower cost per unit. All other things equal, this would tend to increase the firm's profits—thereby increasing the wealth of shareholders—and raise workers' real wages. If enough firms were able to accomplish this to affect the aggregate economy, the result would generally be rising output and falling rates of inflation—in other words, a pattern that is broadly consistent with the above-average economic growth and falling inflation rates seen in the United States for the past couple of years.

The peak of labor productivity growth and increases in living standards during the postwar era occurred prior to 1973. Specifically, productivity growth averaged nearly 3 percent during the five business expansions from late 1949 to late 1973. At this rate, U.S. living standards doubled about every 24 years. Does the current economy measure up to this impressive performance? Hardly. Labor productivity during the current expansion has risen by a paltry 1.3 percent average annual rate (see chart). In fact, this growth rate is virtually identical to that seen in the previous expansion. At this pace, it would take about 55 years for living standards to double.

Chart 1

Better Now than Before?



NOTE: The short (three-quarter) expansion of 1980 is omitted.

Glimmers of a potential increase in the trend rate of labor productivity growth have recently emerged in the official statistics, however. For example, productivity grew at an impressive 2.7 percent rate through the first three quarters of 1997. But is it credible to assume that this growth is part of a dynamic that will return the U.S. economy to a time when labor productivity and living standards were roughly doubling every two generations? Economists do not yet have a good sense whether, as some have suggested, a fundamental shift has truly occurred, or, as others have claimed, that recent productivity gains are simply temporary developments associated with a strong, cyclical upsurge in U.S. output growth. Either way, it seems unwise to attach a great deal of importance to three quarters of—admittedly—exceptionally strong productivity growth. And, as Chairman Greenspan suggests, there may be two very important reasons why analysts should look beyond the productivity data as currently measured.

First, it is entirely possible that, despite their best efforts, government statistical agencies cannot adequately capture the rapidly changing makeup of the U.S. economy. The content of economic output, as Greenspan has noted, is becoming increasingly conceptual. That is, many firms—typically, service-oriented nonmanufacturing firms—create value by manipulating ideas or collecting and transmitting information. Measuring productivity improvements in these types of industries is difficult, to say the least. This problem is less acute in the manufacturing sector, though, where measuring physical quantities like cars and tons of steel is fairly straightforward. This is important because manufacturing productivity during this business cycle has increased by a little more than 3.25 percent a year, a gain that is surpassed only by that in the 1970-73 expansion. At the same time, though, productivity for the entire nonfarm business sector (manufacturing and nonmanufacturing) has grown by only about 1.5 percent this expansion. This large difference implies that nonmanufacturing productivity growth has been well below 1.5 percent.

Common sense would suggest that the manufacturing sector has seen its productivity improve considerably due to improved production processes brought about by technological gains. But if the manufacturing sector has been able to make better use of these advances, why hasn't the nonmanufacturing (services) sector been able to do the same? After all, both sectors have access to the same technology, and should therefore have equal opportunity to profit from these technologies. One reason why productivity gains may be underestimated in the nonmanufacturing sector is that it is very difficult to accurately measure the output of many services, which comprise roughly three-quarters of the U.S. economy. If output is mismeasured, then productivity is also mismeasured because productivity is simply output divided by inputs.

Many economists believe that current productivity data understate growth significantly because it is difficult to disentangle quality improvements captured within price changes. The technological advancements embedded within new automobiles or revolutionary medical procedures are good examples of this. This is important because a quality improvement should boost output (GDP), and thus productivity, while a price change should not. For example, if the CPI overstates the inflation rate by 1 percentage point a year, then, all other things equal, productivity growth would be biased downward by about 1 percentage point a year.8

Current productivity growth may be understated by that amount, or it may not. In short, it is anybody's guess as to how much current labor productivity growth is underestimated. Statistically speaking, though, an increasing share of output produced by the (hard-to-measure) nonmanufacturing sector may be biasing our estimates of economic growth and, as a result, the pace at which U.S. living standards are increasing. A recent Federal Reserve study provides some support for this view, concluding that the stagnant productivity growth measured in several service-oriented sectors is not consistent with the measures of profitability, output prices and wages in these sectors.9

The second reason why measured productivity gains may be elusive-despite the substantial amount of capital put in place by businesses in recent years-relates to the transition between technological eras. Stanford professor Paul David maintains that the productivity gains associated with the widespread use of electrical power that began in the late 1800s were very long in coming.10 David argues that significant productivity gains from the invention of the electric dynamo did not begin to emerge until the 1920s since old technologies, such as steam and water power, were not immediately discarded when electricity arrived on the scene. Moreover, new and innovative ways of using electricity in the manufacturing and production of goods also took time to develop.

The economy may currently be experiencing the same transition with the computer. As a share of GDP, investment in high-technology equipment is approaching 5 percent—a far cry from the approximately 1.75 percent from a decade earlier. It is just a matter of time, according to David and others, before firms learn how to fully adapt these technological advances to the production of goods and services.

Some Caveats

Measurement issues—which are admittedly important—aside, it is possible that the growth of worker productivity has slowed considerably over the past 25 years or so for more fundamental reasons. To begin with, the accumulation of physical capital over time largely depends on the saving behavior of a country's citizens. Simply put, the more a country saves, the more it invests. The more it invests, the more capital its workers have at their disposal and, in general, the more productive they will become. The end result is a higher standard of living. Perhaps one reason why recent productivity trends have been sorely disappointing is that the U.S. saving rate averaged just over 2 percent between 1983 and 1996, which pales in comparison to the more than 6 percent saving rate seen between 1946 and 1982.

Because ideas are important in promoting the technological process, R&D efforts can play a critical role in determining long-term increases in living standards. Another possible reason, then, why current productivity

growth does not measure up to previous periods is that there has been a significant drop in the amount of resources devoted to R&D. Spending on R&D fell from just under 3 percent of GDP in the early 1960s to about 2 percent in the late 1970s. Although it recovered strongly, rising to nearly 2.75 percent by 1985, it has started to wane once again, averaging about 2.5 percent of GDP in 1996.

Human capital is a key component of the production process—especially in a knowledge-based economy. Therefore, a final reason why worker productivity growth has slowed could be the performance of our education system, particularly at the elementary and secondary levels. According to a recent survey, U.S. students registered the lowest average test score from the Third International Mathematics and Science Study.11

And the Verdict Is...

As nearly all economists recognize, measuring productivity accurately is a difficult task. Still, a cursory look at economic fundamentals suggests there are reasons to believe that things are not as rosy as many insist. At the same time, there are also solid reasons to believe that technological improvements related to the computer microchip have changed the U.S. economy in fundamentally important ways—improved labor productivity growth and slowing rates of inflation, among them. Although signs of faster productivity growth have begun to emerge in the official statistics, it is too early to determine whether these gains are permanent, or, as others have claimed, simply temporary. Thus, while greater gains in labor productivity would be a welcome development for monetary policymakers, it remains true that inflation is ultimately determined by how fast the central bank creates money. By itself, therefore, faster productivity growth—if that is what is occurring—is not enough to keep inflation low and stable.

Daniel R. Steiner provided research assistance.

Endnotes

1. See Federal Reserve Bank of Kansas City (1992). [back to text]
2. See Mankiw (1997). [back to text]
3. The misery index is the sum of: the unemployment rate, the inflation rate, and the quarterly change in the long-term Treasury interest rate, less the deviation of quarterly real GDP growth from its 10-year average. [back to text]
4. The most commonly cited factor in this regard is the recent effort of businesses to rein in benefit costs (and in particular, health care costs). [back to text]
5. See Greenspan (1997). [back to text]
6. See Hall and Jones (1997). The term infrastructure, as used here, does not refer to a nation's roads, bridges, highways, tunnels or other structures. [back to text]
7. Broadly speaking, growth of per capita GDP (living standards) is the sum of output per hour (labor productivity) and the number of hours worked per capita (labor intensity). By this formula, the U.S. economy's potential growth rate appears to be between 2 percent and 2.5 percent, with labor intensity contributing about 1 percent of this growth and labor productivity contributing roughly 1 percent to 1.5 percent. A good discussion of this topic can be found in the Minneapolis Fed's 1996 Annual Report. [back to text]
8. See Kliesen (1996). [back to text]
9. See Slifman and Corrado (1996). [back to text]
10. See David (1990). [back to text]
11. U.S. students were compared with those from the other Group of Seven (G-7) countries: Canada, France, Germany, Italy, Japan and the United Kingdom [back to text] .

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Going Once, Going Twice, Sold: Auctions and the Success of Economic Theory

Adam M. Zaretsky

In 1994, the Federal Communications Commission (FCC) began auctioning electromagnetic spectrum bandwidth to firms interested in using it for personal communications services (PCS). Before that time, spectrum bandwidth had been given away to broadcasters through administrative hearings or lotteries—procedures that were not only inefficient, but also costly. According to the Commerce Department, the federal government in the 1980s gave away cellular phone licenses valued at $46 billion.1 Realizing the revenue potential, Congress turned to auctions as a way to both allocate spectrum more efficiently than it had in the past and to reap revenue that could be used to help offset the budget deficit. Economists were called upon to aid in the design and implementation of these auctions, which have proven quite successful.

Why Auctions Are Better

In a word, auctions are better at allocating spectrum than administrative hearings or lotteries because auctions enable market forces to designate who will receive how much of the resource. As with all other resources in the economy, there is a limited amount of spectrum bandwidth; thus, scarcity exists. And like other scarce goods and services in the economy, prices are the best allocator.2

But *unlike* many other goods in the economy, which are abundantly available and frequently purchased, spectrum bandwidth is difficult to price because, until 1994, it hadn't been sold before. Auctions overcome the pricing problem through their bidding mechanisms, which let potential buyers reveal their individual values of an item. Moreover, because sellers can set the rules of the selling process and announce them upfront, all auction participants know exactly what is expected of themselves and others. In other words, auctions are orderly, organized mechanisms through which market-clearing prices can be determined.

So Why Were Economists Involved?

In many ways, bidding for an item at an auction is a lot like playing poker. With each hand, a player has to decide whether to call, raise or fold. He bases this decision on two factors: the cards in his own hand and his best guess as to the cards in the other players' hands. At the same time, he must also try to figure out how the other players might react to his decisions. The understanding and explanation of this behavior is called *game theory*.

Game theory examines the strategic interaction and decision-making behavior of players in a game, accounting for what they know, what they think others know, and how they think others will act on this knowledge. A well-known example of the theory is the simple two-person game called the Prisoners' Dilemma. In this game, Bud and Lou commit a crime. Although there is little evidence against them, they are still arrested. The two are separated and told their options. If both confess, each will get four years in prison. If neither confesses, each will be charged with a lesser crime and get a two-year sentence. But if, for instance,

Bud cooperates and rats on Lou, who says nothing, Bud will get one year, while Lou will get eight. If Lou rats on Bud, and Bud keeps quiet, the sentences will be reversed.

What should Bud and Lou do? The best option would be for them to agree not to confess so both can get off with only two years in prison. But this strategy requires Bud and Lou to collude and trust each other to uphold their end of the bargain. The trust is tested, though, once the two are separated.

If Bud truly believes that Lou will keep quiet, he can cut his sentence from two years to one by taking the deal and confessing. If Lou is thinking exactly the same thing, though, both will end up confessing and, therefore, each will get four years.

As the accompanying table shows, Bud's best strategy is actually to confess irrespective of which strategy Lou chooses (confessing or keeping quiet).3 Why? Because if Lou chooses to confess, Bud's options are either to also confess and serve four years, or to keep quiet and serve eight. If Lou chooses to keep quiet, then Bud's options are either to confess and serve one year, or to also keep quiet and serve two. The choice is obvious: Always confess. In this game, confessing is the *dominant* strategy because it prevails over all other choices. Neither player becomes better off by switching strategies and keeping quiet.

Table 1

What Should Bud and Lou Do? The Prisoners' Dilemma

		Bud's Strategies	
		Confess	**Keep Quiet**
Lou's Strategies	**Confess**	Bud: 4 years Lou: 4 years	Bud: 8 years Lou: 1 year
	Keep Quiet	Bud: 1 year Lou: 8 years	Bud: 2 years Lou: 2 years

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Game theory, then, models players' best responses to opponents' actions, assuming that each player always acts in his own best interest. The models also assume that any action taken by a player is the best strategy available, given the anticipated action of his opponent.

Understanding this type of strategic interaction was important for the FCC because it needed to know how bidders would behave during the spectrum auction. Moreover, the commission also needed to design a set of auction rules that would accomplish Congress' goals. Therefore, the FCC called upon game theorists to aid in the design of the auction rules, giving economists a chance to test their theories in a real-world setting.

Economics in Action—Designing an Auction

Every auction suffers from a number of potential problems. By defining a proper set of rules for all participants to follow, however, such problems can be minimized. For example, a common problem in an English auction—in which an auctioneer invites oral bids until the last bid made goes unchallenged—is that participants can collude, thereby reducing the final price of the item. Agreements can be made beforehand, determining who will win and at what price. Cheating (breaking the agreement) is checked because others in the pact will see it occur.

A simple solution to collusion is to hold an auction in which all participants submit sealed, written bids, and the highest bid wins. With sealed bids, effective collusion cannot occur because breaking the pact is now easy. This type of auction, however, can lead to the *winner's curse*—a situation in which a winning bidder pays more for an item than he thinks it's worth because he has no information about what others might think it's worth. If bidders are aware of this possibility, they might lower their offers, thereby reducing the seller's revenue.

To avoid the winner's curse, a Vickrey auction—a sealed-bid auction in which the highest bidder wins, but pays the amount of the second-highest bid—could be used.4 This type of auction eliminates the winner's curse because bidders are now motivated to reveal their true valuations of the item at hand through their bids. Why? If a player bids less than his valuation, he risks losing the item; if he bids more, however, he may end up paying too much. The player's incentive, therefore, is to bid his valuation.

In practice, however, Vickrey auctions don't always go as planned. In 1990, for example, a New Zealand firm that bid NZ$100,000 for spectrum ended up paying the second-highest bid, NZ$6. And in another case, a firm that bid NZ$7 million paid NZ$5,000. These situations occurred because New Zealand's government failed to require a minimum bid. Not surprisingly, the government has since amended its auction rules.

The FCC had to plan for other considerations as well: for instance, the likelihood that firms bidding on spectrum would want to aggregate licenses in certain areas. In other words, the company bidding on the Los Angeles license would most likely also want to own the licenses for the city's surrounding communities because of economies of scale. If the firm could not secure the Los Angeles license, the other licenses would be worth less to it, prompting the firm to reduce its bid and, hence, the government's revenue. With this in mind, the FCC decided to auction all licenses simultaneously in multiple rounds, enabling firms both to aggregate as they chose and to withdraw from regions in which bids were getting too large.5 Auctions end when no new bids are submitted for any license on the block.

An Overwhelming Success

The proof of game theory's success is in the pudding. By carefully designing rules to avoid the potential pitfalls of auctions, economists have helped the FCC raise more than $23 billion since 1994, far exceeding the $10 billion in revenue the Office of Management and Budget had originally projected.6 But this success needn't be limited to spectrum or the FCC. Oil and mineral rights, foreclosed homes, and even landing rights at airports are just a few examples of other potential candidates for auctions. And if the overall success enjoyed by the FCC can be repeated in some of these other areas, the potential economic gains to everyone could truly be large.

Gilberto Espinoza provided research assistance.

Endnotes

1. See U.S. Department of Commerce (1991). [back to text]
2. See Zaretsky (1997) for another example of market solutions to scarcity. [back to text]
3. Because Bud's and Lou's strategies and options are identical, the following analysis also holds true for Lou. [back to text]
4. The Vickrey auction was named for Nobel laureate William Vickrey, who introduced the concept in 1961. [back to text]
5. If a high bidding firm withdraws its bid during the auction, and the final bid is lower, the withdrawing firm has to pay the difference between the two, which both guarantees revenue to the FCC and prevents superfluous bids. For more information about the details of the FCC spectrum auctions, see McMillan (1994) or McAfee and McMillan (1996). [back to text]
6. See McAfee and McMillan (1996). [back to text]

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Both a Lender and a Borrower Be: Banks Cope with a Deposit Shortage

Michelle Clark Neely

Over the course of the current U.S. economic expansion, commercial banks have prospered by significantly increasing loans to businesses and consumers. Indeed, since mid-1994, loans outstanding at U.S. commercial banks have risen almost 29 percent. Eighth District loan growth has been even stronger over the period, rising almost 35 percent.1 And the growth shows little sign of tailing off: Anecdotal reports from bankers around the District indicate that loan demand remains fairly strong.

That said, bankers—especially community bankers—also report that they are having increasing difficulty obtaining deposits, traditionally the major source of loan funding. Indeed, over the last three years, deposits have risen about 19 percent—roughly half the growth of loans—at both U.S. and District banks. Moreover, most of the growth occurred early in the period; deposit growth has been anemic and even negative for many banks in recent quarters. To meet loan demand in the absence of strong deposit growth, District banks have had to turn to both traditional and newer funding sources, namely investment securities, fed funds and borrowings from Federal Home Loan Banks.

All Loaned Up

A strong economy and healthy bank balance sheets can be credited with much of the increase in loans during the past three years. Loans have performed so well lately that banks have been able to dramatically reduce the amount of reserves they set aside to cover possible defaults. And record earnings have led to large increases in bank capitalization, further increasing banks' ability to make loans.

As a result of these favorable developments, the loan to deposit ratio at District banks rose from 73 percent in mid-1994 to 82 percent in mid-1997. The growth in loans has been broadly based, with all major loan categories showing substantial gains over the past three years. In the District, for example, commercial and industrial loans have risen 30.8 percent, real estate loans have jumped 42.2 percent, and consumer loans have increased 18.2 percent.

Deposit growth has failed to keep up with the torrid pace of loan growth. Several explanations have been offered to account for this disparity, particularly the notion that retail depositors are leaving the banking system in search of higher yields—a phenomenon termed disintermediation. Some analysts believe this is just a cyclical trend, and that deposits will come back when retail deposit interest rates start rising. Others, however, believe the slowdown is part of a long-term trend, as small investors become increasingly comfortable with putting their money into the stock market and other assets. On the supply side, a number of banks have grown less aggressive in trying to attract deposits, refusing to compete in CD rate wars with other financial institutions, for example. Some analysts have interpreted this behavior by banks as price discrimination in their funding activities, saying that banks have a strategy of paying low rates on retail deposits, exploiting the small

depositors who put a high value on federal deposit insurance, and attracting the rest of their funds in other markets.2

Shedding Securities

Banks do, however, have a number of options besides deposits to fund loan demand. One ready source of liquidity is a bank's investment portfolio. Investment securities and loans are substitutes among bank assets; banks can easily sell or decide not to renew most of the securities they tend to purchase to fund loan demand. Since mid-1994, the securities portfolio at District banks that have average assets of less than $1 billion has shrunk 10 percent.

In addition to shrinking the size of the overall portfolio, these banks have also altered its composition, reducing substantially their holdings of both Treasury securities (–38.4 percent) and mortgage-backed securities (–16.9 percent), and replacing them with other types of government and government-backed securities (+28.5 percent), such as debt securities issued by the Small Business Administration and Fannie Mae and Freddie Mac. These composition changes can be explained by a number of factors, including: a need to fund loan demand with liquid securities (those from the Treasury tend to be the most liquid); a desire to increase portfolio returns (Treasury securities tend to yield less than other types of securities); strength in the real estate sector, which heavily influences the return on many government-backed securities; and a low interest rate environment, which made mortgage-backed securities less attractive since low rates tend to increase prepayment of mortgages, thereby lowering returns.

Borrowing from Peter to Lend to Paul

Banks can also create nondeposit liabilities to fund loans and other assets. One of the more popular sources of liquid funds is the fed funds market, in which banks with excess funds on hand lend them to other banks. The funds are generally sought and received on the same day and must be repaid the next at a rate determined daily in the money market. The bulk of loans made in the fed funds market are designed to meet banks' reserve requirements, though many banks also borrow longer-term funds from this market (called term fed funds) to meet loan demand.

Another source of ready liabilities that is available to an increasing number of banks is the Federal Home Loan Bank (FHLB) System. Banks first became eligible to join this previous thrift-only, government-sponsored enterprise in 1989. In the past several years, commercial bank membership has soared, with commercial banks currently making up about two-thirds of the system's 6,000 plus members. Through the 12 FHLBs, member institutions can obtain either overnight, short-term (one week to six months) or longer-term loans—all of which are called advances—to meet a variety of funding needs. Long-term advances, available in maturities of up to 20 years, are used by many banks to fund residential mortgages. Advances are available at both fixed and adjustable rates and are almost always cheaper than other wholesale funding sources.3

District banks have clearly become big fans of the FHLB System: District-wide, almost 50 percent of them are members (see table).4 Within the District's borders, FHLB membership ranges from 37.9 percent in Illinois to 71.9 percent in Indiana. Overall, almost two-thirds of District member banks had outstanding FHLB advances as of June 30, 1997, and in Kentucky and Tennessee, all District member banks were borrowing at mid-year 1997. In several District states, especially Mississippi (34.7 percent) and Indiana (25.7 percent), FHLB advances make up a significant portion of banks' total nondeposit liabilities, indicating how much banks—especially community banks that have experienced actual *declines* in deposits—have come to rely on other funding sources.

Table 1

Federal Home Loan Banks Advance in the District (Data as of June 30, 1997)

District Portion of State	Number of FHLB Members	FHLB Members as a Percent of Total Banks	Percent of FHLB Members Borrowing	FHLB Advances as a Percent of Nondeposit Liabilities
Arkansas	124	53.2%	50.8%	15.6%
Ilinois	72	37.9	50.0	4.4
Indiana	41	71.9	43.9	25.7
Kentucky	97	59.5	100.0	12.8
Mississippi	24	45.3	79.2	34.7
Missouri	100	42.6	48.0	10.6
Tennessee	47	56.0	100.0	16.3
District Total	**505**	**49.8**	**65.0**	**13.8**

SOURCES: Federal Home Loan Banks of Chicago, Cincinnati, Dallas, Des Moines and Indianapolis; and FFIEC Reports of Condition

The bulk of FHLB loans made to District banks are longer term in nature, with almost three-quarters of total District borrowings carrying maturities of a year or more. There is quite a bit of variance across states, however. In Missouri and Indiana, for example, more than 50 percent of borrowings are for terms of less than one year, compared with the District-wide average of 27.3 percent.

Liquidity Trap?

To date, District bankers have been able to satisfy a surprisingly sustained level of loan demand, despite a significant amount of disintermediation. Although many banks continue to maintain flexibility by holding large amounts of liquid securities that can be sold to meet loan demand, an increasing number are also finding that they can gain "instant liquidity" through wholesale funding sources, like the Federal Home Loan Banks.

Although this strategy has certainly helped banks post record profit levels in recent years, it's not without risks. So far, loans have performed extremely well, and loan losses have been minimal. However, if credit quality deteriorates unexpectedly, and loan portfolio returns start to fall, the burden of interest payments from FHLB advances and other borrowings could pinch earnings significantly. In a worst-case scenario, a significant downgrading of a bank by supervisors could force it to immediately pay back all FHLB advances and halt all further borrowing, potentially causing a liquidity crisis. Although the industry is exceedingly well-capitalized at this time, and liquidity is readily available, there may be more than a few District banks that will wish they hadn't made that last loan when the next economic downturn arrives.

Thomas A. Pollmann provided research assistance.

Endnotes

1. District loan and deposit figures for 1994 through 1997 exclude the former Boatmen's banks, which were merged into NationsBank of Charlotte, N.C., in mid-June 1997. [back to text]
2. See Gilbert (1997). [back to text]

3. See Newkirk (1996) and Faulstitch (1997) for further detail on the operation of FHLBs, membership requirements and program offerings. [back to text]
4. Banks in Missouri are eligible to join the FHLB of Des Moines; banks in Kentucky and Tennessee belong to the FHLB of Cincinnati; banks in Arkansas and Mississippi join the FHLB of Dallas; banks in Illinois belong to the FHLB of Chicago; and banks in Indiana join the FHLB of Indianapolis. [back to text]

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Pieces of Eight: News Bulletins from the Eighth Federal Reserve District

The Regional Economist Online

The next time you're surfing the Internet, be sure to check out the online version of *The Regional Economist* via the St. Louis Fed's web site (www.stls.frb.org). All of the publication's features are there—the three articles, the president's message (Eighth Notes), news briefs (Pieces of Eight) and the district data pages—in a user-friendly format. You can access back issues (there's a list of topics already covered on *The Regional Economist* home page), drop us an e-mail or sign up a colleague to receive the publication through our online order form.

Starting with the January 1998 issue, we've made some improvements to make the site easier to access and navigate. For example, all current articles are now available in HTML (Hypertext Markup Language) format, which means you can get to them quicker and copy them into word processing documents or e-mail messages. There are also more links, which make it easier to navigate both within the publication and throughout the St. Louis Fed's overall web site.

To get directly to *The Regional Economist* online, set your browser for https://www.stlouisfed.org/publications/regional-economist.

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North and South: Unions Divide District (1996)

District State	Rank among 50 States	% of Workers Covered by Unions
Illinois	8	21.5%
Missouri	21	16.8
Indiana	23	16.1
Kentucky	25	14.1
Tennessee*	34	11.1
Arkansas*	44	8.4
Mississippi*	45	8.1
National Average		**16.2**

*right-to-work state

SOURCE: Bureau of National Affairs, based on data from the 1997 Current Population Survey

New Year Brings New Format for Monetary Trends

Monetary Trends, a St. Louis Fed publication that reports monthly data on the money supply, interest rates and commercial bank loans and investments, now boasts an expanded format. The revamped publication features both a broader selection of data and additional charts, making the information easier to comprehend and interpret.

The changes to *Monetary Trends* are similar to those made last year to its sister publication, *National Economic Trends*. For a free subscription to either publication, contact Debbie Dawe of the St. Louis Fed's Public Affairs Department by phone at (314) 444-8809 or by e-mail at Debbie.J.Dawe@stls.frb.org.

The publications, as well as their underlying data, are also available electronically through the St. Louis Fed's home page, which is at www.stls.frb.org.

District Data

Selected economic indicators of banking, agricultural and business conditions in the Eighth Federal Reserve District

Commercial Bank Performance Ratios

U.S., District and State

	All U.S.	U.S. <$15B[1]	District	AR	IL	IN	KY	MS	MO	TN
Return on Average Assets (Annualized)										
3rd quarter 1997	1.30%	1.38%	1.34%	1.32%	1.14%	1.36%	1.29%	1.46%	1.28%	1.60%
2nd quarter 1997	1.31	1.34	1.33	1.30	1.27	1.34	1.27	1.48	1.27	1.53
3rd quarter 1996	1.24	1.33	1.31	1.34	1.03	1.29	1.26	1.50	1.32	1.45
Return on Average Equity (Annualized)										
3rd quarter 1997	15.75%	14.82%	15.11%	13.99%	12.92%	15.19%	14.85%	15.26%	15.42%	17.85%
2nd quarter 1997	15.86	14.46	14.55	12.15	14.40	15.09	14.69	15.66	14.18	17.38
3rd quarter 1996	15.24	14.68	14.80	14.07	10.22	14.25	14.36	15.62	15.90	17.33
Net Interest Margin (Annualized)										
3rd quarter 1997	4.36%	4.89%	4.46%	4.44%	4.35%	4.34%	4.38%	5.00%	4.48%	4.46%
2nd quarter 1997	4.36	4.85	4.43	4.43	4.34	4.36	4.34	5.09	4.39	4.46
3rd quarter 1996	4.38	4.81	4.39	4.51	4.23	4.41	4.53	4.97	4.15	4.41
Nonperforming Loans[2] ÷ Total Loans										
3rd quarter 1997	0.98%	1.06%	1.00%	0.99%	1.04%	0.60%	0.70%	0.59%	0.83%	1.96%
2nd quarter 1997	0.99	1.06	1.01	0.93	0.94	0.53	0.71	0.58	0.98	1.93
3rd quarter 1996	1.10	1.11	0.78	0.81	1.15	0.71	0.74	0.73	0.72	0.77
Net Loan Losses ÷ Average Total Loans (Annualized)										
3rd quarter 1997	0.64%	0.80%	0.37%	0.20%	0.54%	0.15%	0.33%	0.28%	0.31%	0.63%
2nd quarter 1997	0.62	0.77	0.37	0.20	0.53	0.17	0.34	0.26	0.35	0.59
3rd quarter 1996	0.57	0.70	0.31	0.20	0.39	0.23	0.39	0.29	0.27	0.40
Loan Loss Reserve ÷ Total Loans										
3rd quarter 1997	1.88%	1.88%	1.42%	1.35%	1.43%	1.30%	1.51%	1.47%	1.38%	1.43%
2nd quarter 1997	1.90	1.88	1.46	1.38	1.44	1.28	1.53	1.50	1.52	1.41
3rd quarter 1996	1.96	1.84	1.51	1.34	1.56	1.35	1.51	1.54	1.62	1.50

[1] U.S. banks with average assets of less than $15 billion are shown separately to make comparisons with District banks more meaningful, as there are no District banks with average assets greater than $15 billion.

[2] Includes loans 90 days or more past due and nonaccrual loans

NOTE: Data include only that portion of the state within Eighth District boundaries.

SOURCE: FFIEC Reports of Condition and Income for all Insured U.S. Commercial Banks

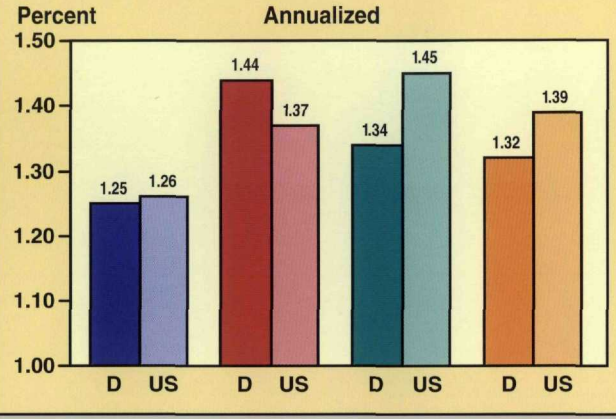
Commercial Bank Performance Ratios

by Asset Size

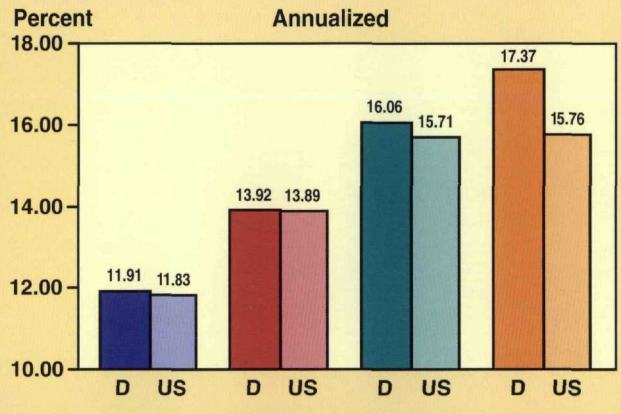
3rd Quarter 1997

Earnings

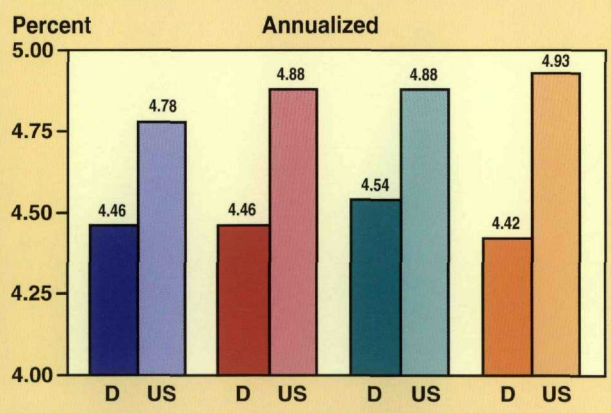
Return on Average Assets



Return on Average Equity

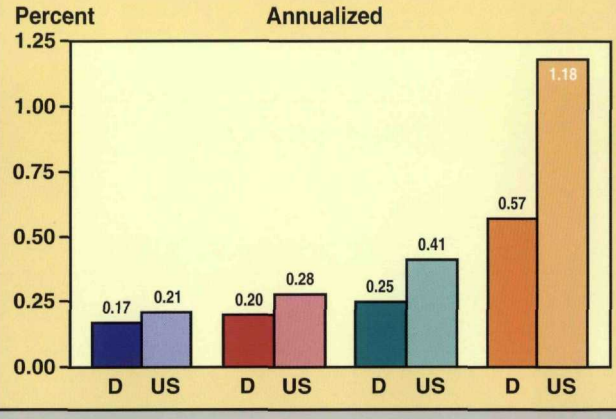


Net Interest Margin[3]

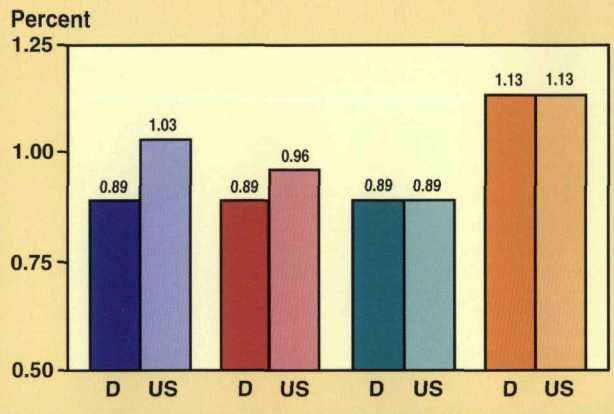


Asset Quality

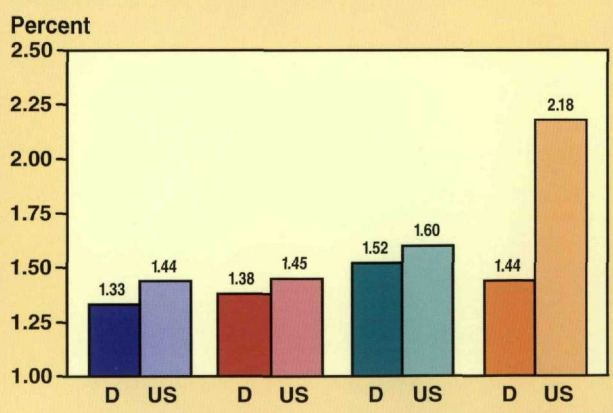
Net Loan Loss Ratio[1]



Nonperforming Loan Ratio[2]



Loan Loss Reserve Ratio



D = District
US = United States

< $100 Million
$100 Million – $300 Million
$300 Million – $1 Billion
$1 Billion – $15 Billion

[1] Loan losses are adjusted for recoveries.

[2] Includes loans 90 days or more past due and nonaccrual loans

[3] Interest income less interest expense as a percent of average earning assets

NOTE: Asset quality ratios are calculated as a percent of total loans.

SOURCE: FFIEC Reports of Condition and Income for all Insured U.S. Commercial Banks

Agricultural Bank Performance Ratios

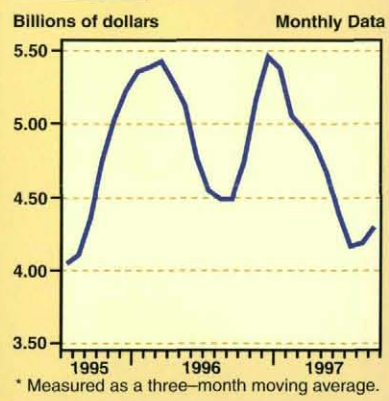
	U.S.	AR	IL	IN	KY	MS	MO	TN
Return on average assets (annualized)								
3rd quarter 1997	1.33%	1.42%	1.31%	1.26%	1.46%	1.55%	1.31%	1.36%
2nd quarter 1997	1.32	1.41	1.32	1.27	1.47	1.55	1.31	1.38
3rd quarter 1996	1.30	1.43	1.25	1.31	1.49	1.65	1.33	1.40
Return on average equity (annualized)								
3rd quarter 1997	12.70%	13.13%	11.83%	12.57%	13.62%	16.53%	12.36%	13.58%
2nd quarter 1997	12.53	12.71	12.00	12.99	13.84	16.62	12.45	12.56
3rd quarter 1996	12.64	13.25	11.44	14.08	14.36	18.02	12.91	13.27
Net interest margin (annualized)								
3rd quarter 1997	4.62%	4.46%	4.16%	4.56%	4.60%	5.08%	4.48%	4.43%
2nd quarter 1997	4.59	4.42	4.18	4.44	4.56	5.03	4.47	4.63
3rd quarter 1996	4.53	4.40	4.14	4.55	4.62	5.32	4.53	4.55
Ag loan losses ÷ average ag loans (annualized)								
3rd quarter 1997	0.15%	0.08%	–0.05%	–0.61%	0.15%	0.24%	0.11%	0.02%
2nd quarter 1997	0.15	0.05	–0.04	–1.00	0.17	0.32	0.24	–0.03
3rd quarter 1996	0.30	0.07	0.14	0.12	0.24	0.79	0.32	0.23
Ag nonperforming loans[1] ÷ total ag loans								
3rd quarter 1997	1.33%	0.68%	0.71%	3.43%	1.70%	0.89%	1.65%	0.34%
2nd quarter 1997	1.59	0.97	0.77	0.21	1.64	1.16	1.59	0.42
3rd quarter 1996	1.63	0.54	1.06	2.22	1.26	1.87	0.85	0.04

[1] Includes loans 90 days or more past due and nonaccrual loans

NOTE: Agricultural banks are defined as those banks with a greater than average share of agricultural loans to total loans. Data include only that portion of the state within Eighth District boundaries.

SOURCE: FFIEC Reports of Condition and Income for Insured U.S. Commercial Banks

U.S. Agricultural Exports*



* Measured as a three–month moving average.

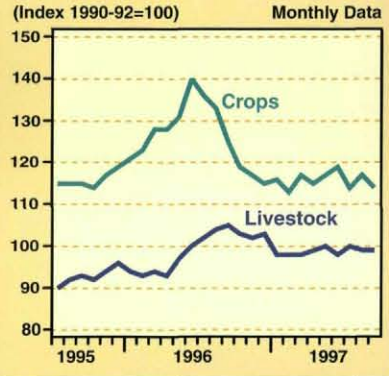
U.S. Agricultural Exports by Commodity

Dollar amounts in billions

Commodity	Jul	Aug	Sep	Year-to-date	Change from year ago
Livestock & products	.94	.99	.92	10.89	–0.7%
Corn	.29	.42	.42	6.11	–27.0
Cotton	.19	.17	.11	2.74	–10.0
Rice	.06	.05	.05	.96	–4.0
Soybeans	.20	.31	.34	6.95	10.0
Tobacco	.06	.07	.09	1.61	16.0
Wheat	.38	.50	.50	4.12	–40.0
TOTAL[1]	4.00	4.43	4.49	57.37	–4.0

[1] Includes commodities not listed here

U.S. Crop and Livestock Prices



Indexes of Food and Agricultural Prices

	Level			Growth[1]	
	III/97	II/97	III/96	II/97-III/97	III/96-III/97
Prices received by U.S. farmers[2]	107	107	117	0.0%	–8.5%
Prices received by District farmers[3]					
Arkansas	141	143	143	–5.5	–1.4
Illinois	113	120	144	–21.4	–21.5
Indiana	112	122	144	–29.7	–22.0
Missouri	107	111	119	–13.7	–10.1
Tennessee	N.A.	N.A.	143	N.A.	N.A.
Prices paid by U.S. farmers					
Production items	116	117	116	–3.4	0.0
Other items	116	117	115	–3.4	0.6
Consumer food prices	158	157	154	3.6	2.4
Consumer nonfood prices	161	161	158	1.8	2.2

[1] Compounded annual rates of change are computed from unrounded data.
[2] Index of prices received for all farm products and prices paid (1990-92=100)
[3] Indexes for Kentucky and Mississippi are unavailable.
[4] N.A. — Not Available

NOTE: Data not seasonally adjusted except for consumer food prices and nonfood prices.

Selected U.S. and State Business Indicators

United States

	III/1997	II/1997	III/1996
Labor force (in thousands)	136,412	136,157	134,118
Total nonagricultural employment (in thousands)	122,575	121,854	119,898
Unemployment rate	4.9%	4.9%	5.3%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$4,264.6	$4,224.3	$4,130.4

Arkansas

	III/1997	II/1997	III/1996
Labor force (in thousands)	1,246.0	1,241.5	1,237.8
Total nonagricultural employment (in thousands)	1,096.8	1,097.6	1,086.7
Unemployment rate	5.3%	4.8%	5.6%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$31.3	$30.7	$30.4

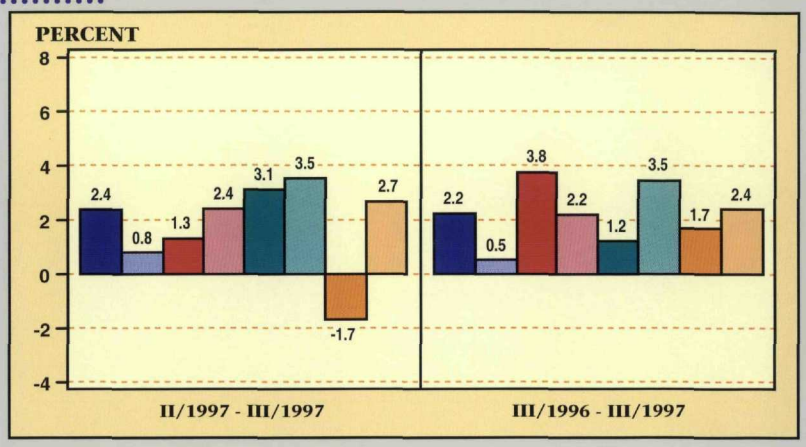
Illinois

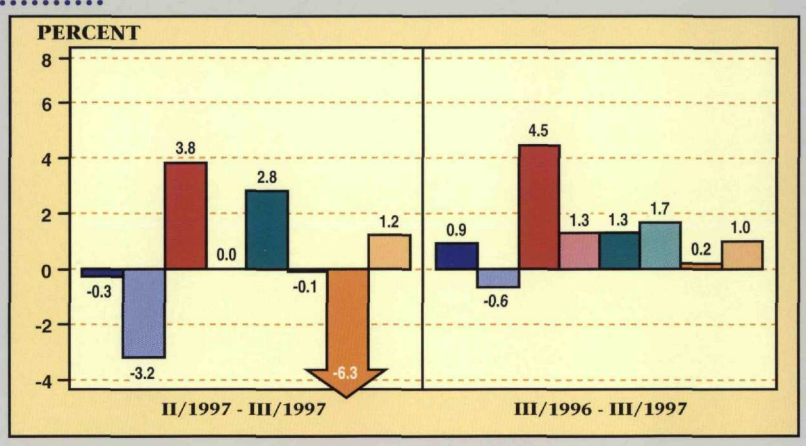
	III/1997	II/1997	III/1996
Labor force (in thousands)	6,141.1	6,126.1	6,105.6
Total nonagricultural employment (in thousands)	5,757.5	5,742.9	5,697.5
Unemployment rate	4.6%	4.5%	5.3%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$208.8	$206.5	$202.2

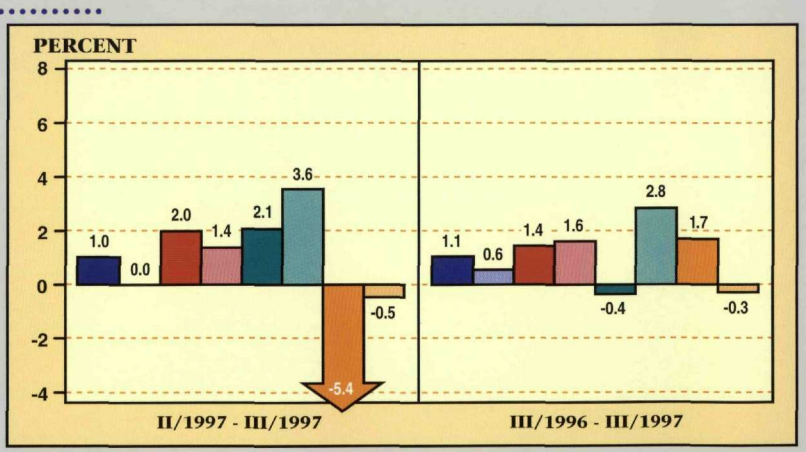
Indiana

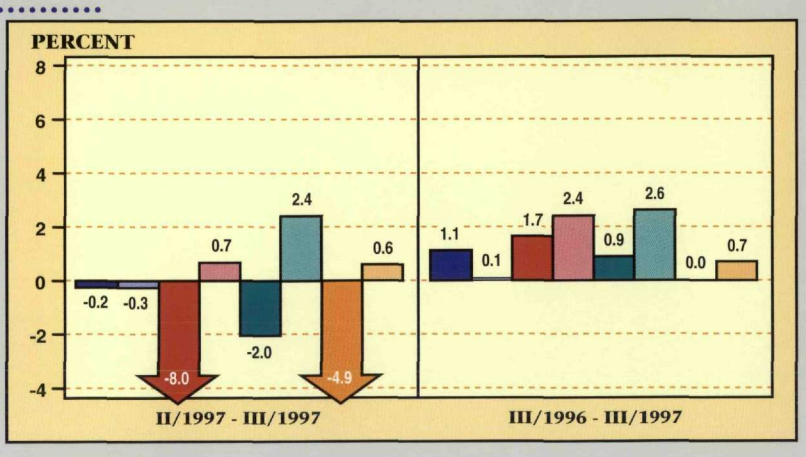
	III/1997	II/1997	III/1996
Labor force (in thousands)	3,121.5	3,104.2	3,062.6
Total nonagricultural employment (in thousands)	2,847.1	2,848.8	2,815.4
Unemployment rate	3.4%	3.2%	4.0%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$86.2	$85.3	$84.0

Compounded Annual Rates of Change in Nonagricultural Employment



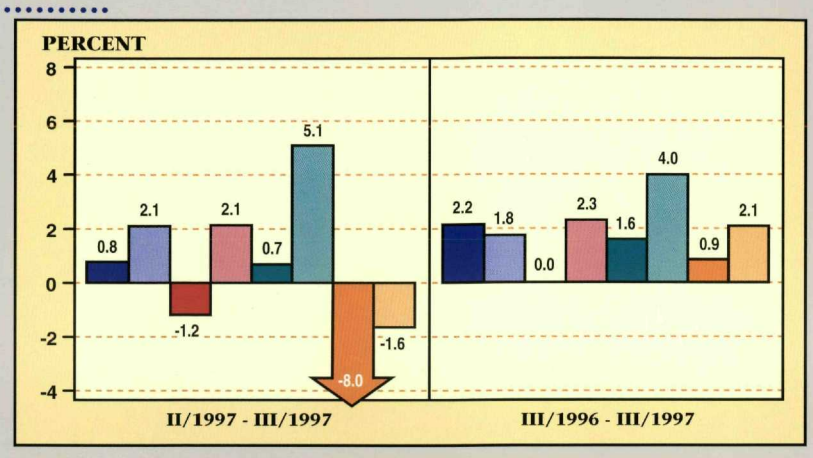






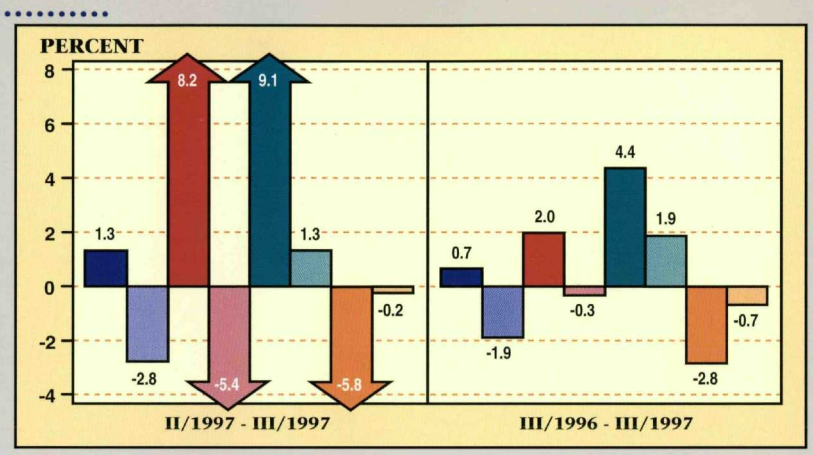
Kentucky

	III/1997	II/1997	III/1996
Labor force (in thousands)	1,926.4	1,921.6	1,867.2
Total nonagricultural employment (in thousands)	1,710.9	1,707.6	1,674.9
Unemployment rate	5.3%	5.2%	5.6%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$50.5	$50.0	$48.9



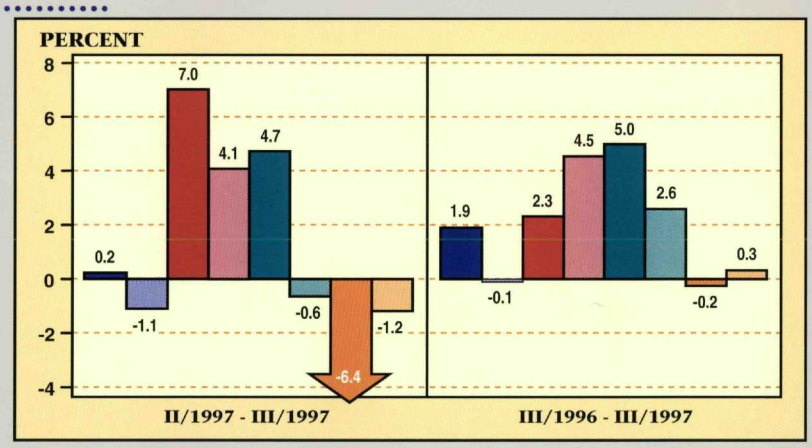
Mississippi

	III/1997	II/1997	III/1996
Labor force (in thousands)	1,276.6	1,270.4	1,260.5
Total nonagricultural employment (in thousands)	1,103.1	1,099.5	1,095.8
Unemployment rate	5.5%	5.0%	6.0%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$31.1	$30.8	$30.4



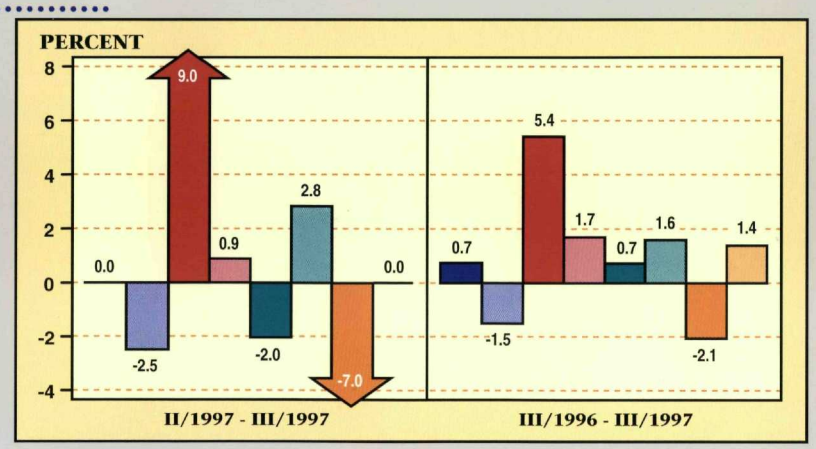
Missouri

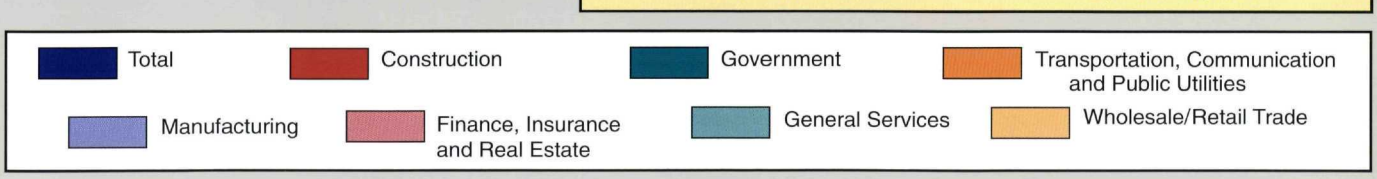
	III/1997	II/1997	III/1996
Labor force (in thousands)	2,857.4	2,860.7	2,900.8
Total nonagricultural employment (in thousands)	2,607.8	2,606.3	2,559.0
Unemployment rate	3.7%	4.1%	4.6%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$81.1	$80.4	$78.5



Tennessee

	III/1997	II/1997	III/1996
Labor force (in thousands)	2,764.4	2,757.9	2,754.1
Total nonagricultural employment (in thousands)	2,552.4	2,552.5	2,533.5
Unemployment rate	5.3%	5.1%	5.0%
	II/1997	**I/1997**	**II/1996**
Real personal income* (in billions)	$76.8	$76.0	$74.3





NOTE: All data are seasonally adjusted. The nonagricultural employment data reflect the most current benchmark revision.
* Annual rate. Data deflated by CPI, 1982-84=100.