

President's Message



"As the economy rebounds, I would expect foreign investment to make a comeback, and the dollar with it."

William Poole

PRESIDENT AND CEO,
FEDERAL RESERVE BANK OF ST. LOUIS

Tracking the U.S. Dollar

The dollar goes up, the dollar goes down. Recently, it's down. From Jan. 2, 2002, through March 7, 2003, the dollar fell by 20 percent against the euro, 10 percent against the pound sterling and 13 percent against the Japanese yen. Historically, such fluctuations are not unusual, though they are seldom easy to explain.

Ask an economist to describe the reasons for the greenback's recent decline, and the reply will include a furrowed brow. Few subjects are as complicated or confounding to us as the foreign currency exchange rate market—the deepest, most liquid and one of the least regulated markets in the world.

Each day, more than \$1 trillion in currency trades in the foreign exchange market. Many participants and factors affect the value of one currency versus another. The market consists of a worldwide cast of businesses, investors, speculators, governments and central banks acting and reacting based on a mix of forces such as trade patterns, interest rate differentials, capital flows and international relations.

As the dollar has recently undergone its worst slide against European currencies since 1987, the overarching reason can be attributed to a reduced

demand to place investment funds in the United States, a situation quite different from that of the late 1990s. Between 1995 and 2000, the attractiveness of U.S. capital markets resulted in the dollar rising 20 percent against other major currencies. But recently, with the decline in the U.S. stock market, as well as lower interest rates on U.S. government securities, outside investors have turned skittish. Other confidence crushers include last year's corporate accounting scandals and rising tensions with Iraq and North Korea.

A weakened dollar, despite the negative connotation, does carry certain benefits. Although American travelers and businesses are not able to stretch their money as far on foreign soil, the opposite is also true: Foreign consumers are able to purchase more U.S. goods with their own beefed-up currency. Such behavior, in theory, should help reduce the U.S. trade deficit, which swelled to a record \$44.2 billion in December 2002.

So which is preferable, a strong dollar or a weak dollar? To answer this question, let's distinguish "strong" from "rising" and "weak" from "falling." It makes no sense to interpret "strong dollar" to mean an exchange rate that is rising at a rapid pace forever. That

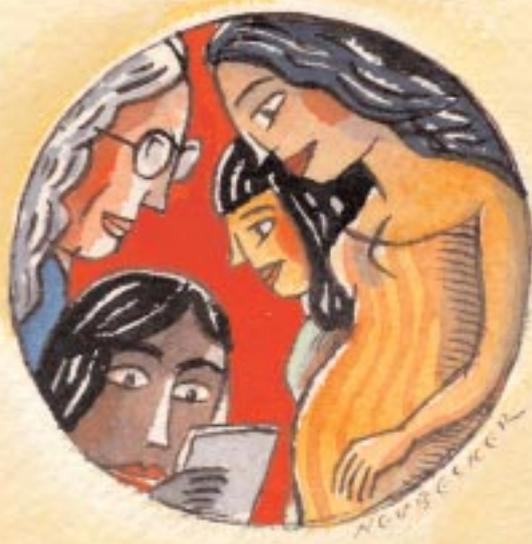
would take the currency far away from any reasonable equilibrium.

What we must mean by a strong dollar is an exchange rate that is on average relatively high, and perhaps trending gently upward. That is, in fact, the pattern most often associated with an economy that is performing well. An economy that is growing vigorously, generating many new jobs and creating enticing new opportunities is a good place to invest. That good place tends to attract investment from abroad, and one consequence is a strong currency.

If the dollar's recent decline can be attributed to the slowdown in the U.S. economy, along with corporate governance and geopolitical uncertainties, which I suspect it can, then recent weakness in the dollar is not a matter for serious concern. As the economy rebounds, I would expect foreign investment to make a comeback, and the dollar with it.

So, remember: The dollar goes up, the dollar goes down. These are normal fluctuations in a well-functioning and vigorously competitive market.

William Poole



Marriage, Motherhood and Money

How Do Women's Life Decisions
Influence Their Wages?

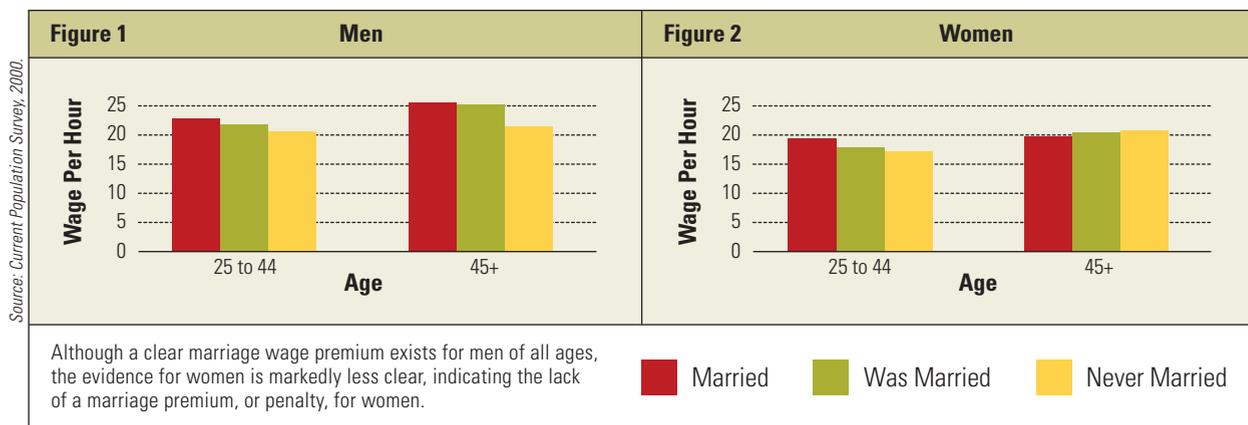


By Abbigail J. Chiodo and Michael T. Owyang

In the April 2002 issue of *The Regional Economist*, we discussed the relationship between men's wages and their marital status; specifically, married men earn more, on average, than otherwise identical unmarried men (Figure 1 provides some evidence of this phenomenon). We offered three explanations, which we will review, that might account for this phenomenon. Now, we pose the next logical question: Are women's wages and their marital status also correlated and, if so, are the theories used to explain the premium for men consistent across gender?

It turns out that marriage has little or no effect on women's wages after taking into account individual characteristics such as education and experience. Figure 2 shows that there is no clear-cut pattern for women across age groups. There are, however, indirect forces (including home production and children) related to mar-

unconsciously, favors married men over single men when determining raises and promotions. This discrimination could be the result of an employer's belief that married men are more stable, more responsible, or less likely to leave. Alternatively, the employer may be more willing to raise a married man's wage



riage that do affect a woman's lifetime earnings. In this article, we examine the relationships between women's wages, childbearing, childrearing and marital decisions. We consider these relationships in the context of the three theories used to explain the male marriage premium and find that, in general, these theories are inconsistent with the evidence for women's wages. Moreover, while we conclude that, for men, unobservable characteristics account for the marriage wage premium, this is not true for women. Instead, wage differences between married and unmarried women can be explained by observable factors related to marriage, most notably, childbearing and childrearing.

The Male Marriage Wage Premium

Studies have shown that married men make approximately 11 percent more than men who have never been married, while divorced men make about 9 percent more than single men.¹ This premium for marital status exists regardless of the presence of children. One of the most interesting characteristics about this wage premium is that, while it persists for all ages, it is larger for older men than for younger men.

Why does this phenomenon occur? In our previous article, we considered three possibilities: (1) Employers discriminate in favor of married men; (2) Marriage makes men more productive; or (3) More-productive men are more likely to be married.

Discrimination occurs when the employer, either consciously or

over a similarly qualified, single counterpart, knowing that the married man has to provide for his family. Such behavior, like most discrimination, is hard to substantiate with the available data. Economists McKinley Blackburn and Sanders Korenman reported in a 1994 study, however, that the marriage wage premium decreased by 10 percentage points between 1967 and 1988. Because the marriage wage premium has decreased over time, perhaps employer bias has, in fact, played a role and that changing social norms have led to a decrease in the premium. For example, if marriage no longer implies the responsibility of a man to solely support his family, an employer may be less likely to discriminate in favor of the married man for that reason.

A second possibility is that marriage itself makes men more productive and, thus, increases their wages via *specialization*. Some economists argue that it is efficient for one spouse to specialize in market production—a job that is paid a wage—while the other specializes in tasks relating to the household.² One spouse—typically the husband—can therefore devote more effort to work-related responsibilities—thus raising his wage—if the other spouse is responsible for managing the home. However, a 2000 study by economists Joni Hersch and Leslie Stratton found little difference between married and unmarried men in the time they spend on household responsibilities.

The third theory often used to explain the male marriage wage premium suggests that other factors make it more likely that a man is married and that he is a high wage earner. This *selection* hypothesis suggests that the attributes that lead to success in the workplace (responsibility,



honesty, etc.) overlap with the attributes that lead to success in finding and keeping a spouse. This hypothesis has the most empirical support in the economics literature.³

Women and Wages—The Evidence

The evidence for men is unmistakable: Married men make more. Does the same correlation appear for women? Not necessarily. Although single women ages 20 to 26 do earn approximately 17 percent more than their married counterparts, that's not the whole story.⁴ Age and marital status are only two factors that potentially can affect a woman's wages. Characteristics such as education, experience, job tenure and especially children are also key aspects affecting a woman's earnings. Once these factors are accounted for, the effect of marriage on women's wages becomes statistically insignificant. Several studies have indicated that marriage, in and of itself, has little or no effect on women's earnings.⁵ Therefore, there is no consensus regarding the link between marriage and wages for women, as there is for men.

There is, however, a correlation between the *timing of marriage* and the wages of women. A 1994 study by Timothy Chandler, Yoshinori Kamo and James Werbel showed that delaying marriage significantly increases women's wages. Although they concluded that the increase in earnings associated with a woman delaying marriage dissipates over her lifetime, this relationship could indicate that a period of career building early in life is critical to a woman's wage profile. This may indicate that human capital (education, training, etc.) is easier to acquire early in life and/or that firms believe that young, single women will be more committed to their careers over their lifetimes.

The Effect of Children

One of the complications that arises when considering women's wages is the timing and presence of children. While children do not appear to be a determinant of the male marriage wage premium, the same is not true when examining women's wages.⁶ For women, children introduce an entirely new complexity: Not only do children require a great deal of time and effort (traditionally borne by the mother), but women often leave the labor market when having children and while their children are young. Time spent away from work has a negative effect on a woman's wages because she sacrifices valuable experience. Even if a new mother continues to work, the child's demands might put her at a rela-

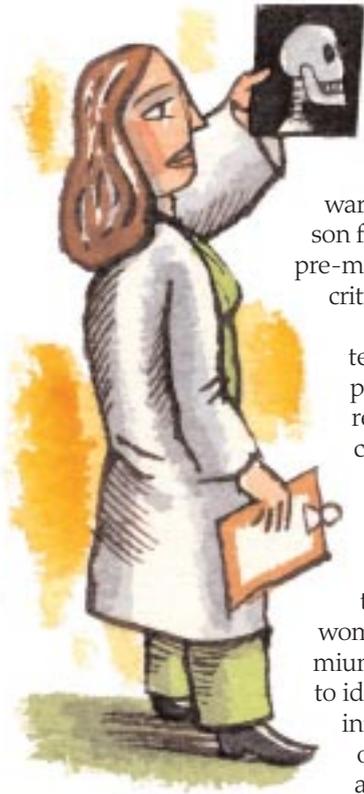
tive disadvantage in devoting time and energy to her career.

Over the past 40 years, women's labor force participation and their hours worked have increased dramatically. By 1990, the average adult female worked 43 percent more hours per week than in 1970. In contrast, over the same period, hours worked by men remained virtually constant. One possible explanation for the increase in women's labor hours is an increase in the monetary value of work experience for women. Economist Claudia Olivetti emphasized in a 2001 study that most of the increase in overall hours worked by women can be accounted for by the increase in hours of married women with young children. Single women worked, on average, 3 percent more in 1990 than they did in 1970. Married women, however, increased their hours worked by 96 percent over the same period. Among married women, the largest increase (134 percent) was among those with children under the age of 6. Olivetti suggested that the logic is straightforward: In the past, women cut back on work during childrearing years, which carried with it the cost of lost work experience. As the value of this experience increased, however, the cost of taking time off from work has increased. Since the cost of being away from work has become greater, then, more women opt to stay in the labor market during childrearing years.

At the same time, women have also tended to marry and have children later in life. In a 2002 study, economists Elizabeth Caucutt, Nezih Guner and John Knowles determined that women with the lowest wages have more children and have them earlier than do women with the highest wages. They found that the age at which women have their first child increases from 23 years for women with the lowest wages to 26.7 years for women with the highest wages.

A 1999 study by sociologist Hiromi Taniguchi considered whether the timing of childbearing affects wages. She studied groups of women who first gave birth between the ages of 20 and 27, inclusive, (whom she refers to as *early childbearers*) compared with those who first gave birth at age 28 or older (termed *late childbearers*). Taniguchi found that the adverse effect of children on wages is more dramatic for early childbearers than for late child-





bearers. She estimated that early childbearers see their wages go down by 3.7 to 4.2 percent, while late childbearers suffer a reduction of less than 1 percent. Taniguchi also found that experience gained before a woman's first child contributes more to earnings than experience gained afterwards. She suggested that a reason for this could be that the pre-motherhood period is a more critical period for career building. Of course, generalizing patterns in women's labor force participation and wages with regard to childbirth is very difficult. Men, on average, are less likely to leave the work force during their lives, regardless of when or whether they have children. Traditionally, this has not been the case for women. The marriage wage premium for men is, therefore, easier to identify but more difficult to interpret. For women, on the other hand, the complicated and diverse nature of the relationship between work and childrearing belies the presence of a marriage premium or penalty.

Are the Theories of Male Wages Gender-Specific?

The previous section establishes that, in contrast with the evidence for men, the presence of children may be a more important determinant of a woman's wages than her marital status. However, we would anticipate that the theories used to explain the male marriage wage premium should be consistent across gender. In other words, we can evaluate the theories used to explain higher wages for married men by comparing the implications for women to the actual evidence.

Employer Discrimination Revisited

If an employer believes that marriage is a signal of a more responsible, stable, permanent male employee, wouldn't this same rationale work in favor of married women? Not if marriage is taken as an entirely different signal for women. For instance, an employer could believe that a married woman is more likely to have additional household responsibilities that could interfere with her job, regardless of whether she has children. Indeed, Hersch found in her 1991 study that childless married women average five more hours per week on housework than childless single women.

Another possibility is that married female employees are more likely to leave

the labor force in the future for childbearing and childrearing than unmarried female employees. Thus, for women, marriage may signal that an employee has priorities other than work; so, an employer could interpret marriage as a signal that a woman is less reliable, less dedicated and less permanent. Alternatively, if we believe that an employer discriminates in favor of married men on the basis that a married man has a family to support, why is the same consideration not given to married women? Such a disparity could exist given that men's traditional role as the primary breadwinner may be what sparks the consideration in the first place.

The possibility that the male marriage wage premium exists because of employer discrimination does not necessarily contradict the patterns we see for women. If an employer lacks the incentive to discriminate in favor of married women, it could explain why we do not observe a female marriage wage premium. Employers need not discriminate *against* married women just because they see no need to discriminate in favor of them. Thus, employer discrimination could conceivably explain the male marriage wage premium without undermining the trends we see for women.

Marriage Causes Productivity?

Recall that the principle behind the specialization theory is that, because his wife will take care of their home, the husband has more time to focus on work outside the home—leading to an increase in his productivity and, thus, his wages. If we believe this story for men, we would expect the opposite for women. Specifically, the amount of time that she spends on housework would rise after marriage, leading to lower wages.

It turns out that the specialization theory does not appear to hold completely for men or women. According to Hersch and Stratton, there is no difference in the time that men spend on housework before and after marriage. Also, although married women without children do spend more time on housework than do single women without children, these two groups have roughly the same average wage.

One mitigating factor that may lend some support to this theory is that home production hours may not adequately reflect the effort spent on household production after marriage. While the number of hours of home production reported may not fall, the effort required by both men and women may decrease through division of labor, leaving additional energy for workplace production. This increased effort might explain both the increase in men's wages and the lack of a decrease in women's wages after marriage.

More-Productive People Marry?

If the set of qualities that make a man a high-wage earner overlaps with the set of qualities that make him more likely to get married, would not the same be true for women? Characteristics such as responsibility, honesty and communication skills are qualities desired of employees and are certainly important for both sides of a marriage. But, given that there is no correlation between marriage and wages for women, we cannot make any conclusions for women about the selection hypothesis. What might explain this apparent contradiction?

Caucutt, Guner and Knowles found some interesting trends in the data that could be interpreted as support for the selection theory. They showed that women with the highest wages have a lower divorce rate than women with the lowest wages, a fact that could lend support to the theory that productive people

Discussion

Studies have not consistently found evidence of a correlation between marriage and women's wages once other factors have been taken into account. Women's wages are affected by other factors associated with marriage, such as the presence of children and the amount of housework, but marriage itself seems to have little or no effect. Thus, the three theories often used to explain the phenomenon between men's marital status and wages offer little insight into the situation for women.

The real question here is why marriage is related to men's wages and not to women's wages. Perhaps there is a premium on marriage for women that is simply overshadowed by other factors, such as children and housework. Or, perhaps, it is unreasonable to expect that trends seen for men and women can be

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are more likely to succeed in marriage. On the other hand, one might conclude that, unlike women, the qualities *men* desire in a prospective mate (qualities associated with motherhood, such as nurturing, for example) are different from what an employer looks for in an employee.

Other Factors

Aside from children, there are a number of factors that can affect a woman's wages. Research has suggested that married women, particularly those with children, are more likely to take jobs in which they are able to maintain flexible, or part-time, schedules in order to better balance the responsibilities of work and family. To compensate, women might accept lower wages in exchange for greater flexibility. In other words, children themselves may not lower a woman's wages; rather, she might decide to sacrifice higher wages for more time for child-rearing activities. Indeed, Hersch and Stratton found in a 2002 study that the daily home production activities that have been traditionally a wife's responsibility are the kinds of chores which are most negatively associated with women's wages.⁷

explained by the same theories. After all, a woman's wage profile is complicated not only by her childbearing decisions (whether, when and how many) but also the amount of time she spends away from the labor market because of them.

Our analysis seems to offer the following interpretation: On average, men's wages are not caused by their marital status, but by other factors that are not readily observable. But women's wages are determined in part by observable factors, such as children, that are related to marriage. Therefore, the theories that explain the relationship between men's wages and their marital status are necessarily different from the theories that explain this relationship for women. In short, this is because, compared with the average married man, the average married woman faces much more dramatic tradeoffs between her career and her family responsibilities.

Abbigail J. Chiodo is a senior research associate and Michael T. Owyang is an economist, both at the Federal Reserve Bank of St. Louis.

ENDNOTES

- 1 See Korenman and Neumark (1991).
- 2 See Becker (1985) for a complete description of this theory.
- 3 See, for example, Nakosteen and Zimmer (2001).
- 4 Panel Study for Income Dynamics data taken from Caucutt, Guner and Knowles (2002).
- 5 See Korenman and Neumark (1992) for an overview of these studies.
- 6 However, Chandler, Kamo and Werbel (1994) find a positive relationship between delaying children and men's wages.
- 7 Taniguchi still finds evidence supporting a positive correlation between wages and delaying childbirth when taking unobserved characteristics into account.

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Consumer Confidence Surveys

DO THEY BOOST FORECASTERS' CONFIDENCE?

By Jeremy Piger



Every month, the two primary measures of U.S. consumer confidence, the University of Michigan's Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index, are released with much media fanfare. The attention these indexes receive often centers on the potential information they contain regarding current and future economic conditions. That is, changes in the indexes are often described as foreshadowing changes in economic conditions more broadly. This article discusses what these indexes measure and why they receive so much attention, and also investigates whether the facts justify the interest.

What Is Consumer Confidence and How Is It Measured?

Consumer confidence is a catch-all phrase for the opinions and attitudes of consumers about the current and future strength of the economy. A psychological concept, consumer confidence is difficult to measure. The University of Michigan and Conference Board both measure consumer confidence by asking a random sample of consumers five questions about current economic conditions and expected future conditions (see sidebar). Consumers also are asked to assess their personal financial situation.

After the surveys are conducted, the responses are aggregated into a single number, called an "index" of

consumer confidence. Variation in this index is meant to measure variation in overall consumer confidence.

The figure shows the Conference Board's Consumer Confidence Index along with shading that indicates the time periods during which the U.S. economy was in recession.¹ Two things are of interest from the figure. First, consumer confidence appears to be correlated with the strength of the economy at the time of the survey. In particular, when the economy goes into a recession, consumer confidence generally falls sharply; and when the economy is in an expansion, consumer confidence is generally at high levels. Second, consumer confidence often peaks before the economy enters a recession. That is, variation in consumer confidence appears to be followed by similar variation in the overall economy.

Why Does Consumer Confidence Receive So Much Attention?

A primary reason why people pay attention to consumer confidence indexes is because they are thought to provide an early signal regarding the strength of the broad economy. There are at least two reasons why this might be the case. First, as is suggested by the figure, consumer confidence is correlated with current economic conditions. This might be because consumers accurately portray current economic conditions with their answers to the survey questions.

It might also be the way consumers feel about the economy and their personal financial situation affects their willingness to spend. Here, consumer confidence would be a causal force for the economy.

In any case, if consumer confidence indexes accurately reflect current economic conditions, they would provide an early indication of how the economy was performing simply because they are released very quickly; in most instances, far before other data measuring the strength of the economy. For example, the consumer confidence indexes for a given month are generally released toward the end of that month. By contrast, the personal consumption expenditure report, which measures what consumers actually did that month, is not available until

The University of Michigan's Survey Questions²

- 1) We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?
- 2) Now looking ahead—do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?
- 3) Now turning to business conditions in the country as a whole—do you think that during the next 12 months we'll have good times financially, or bad times, or what?
- 4) Looking ahead, which would you say is more likely—that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?
- 5) About the big things people buy for their homes—such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?

the end of the following month. Thus, because consumer confidence is timely, it could be a useful early indicator of the economy's performance.

The second reason why consumer confidence might provide useful early information is if consumers' responses to the survey questions provide good forecasts of *future* economic activity. This would occur if consumer confidence has a causal influence on economic activity, but this influence takes several months before it is fully realized. It might also be that consumers are good at forecasting the economy. Consumer confidence serves as a convenient summary of the forecasts of many individuals based on a variety of different information. To the extent that these forecasts are useful for predicting economic activity, indexes of consumer confidence will be an important leading indicator of the economy's strength.

Is the Infatuation Justified?

There are many research studies that attempt to determine if consumer confidence is a useful early signal of economic activity. Much of this research has investigated the relationship between consumer confidence and consumption spending, as this is the type of economic activity that one would think is most closely connected to consumer confidence.

What does this research conclude about whether consumer confidence is correlated with current economic conditions, providing an early indication of the economy's strength because it is quickly available? Economist Phillip Howrey of the University of Michigan investigated this question. He tested whether predictions of current period consumption growth can be improved upon by using results from the Michigan confidence index from that period. For example, can the consumer confidence data for January, released at the end of the month, improve one's guess about the strength of consumer expenditures in that same month? If so, this would give us an early signal regarding consumer expenditures in January, data for which is not released until the end of February. Howrey concluded that the Michigan index does provide some useful information for predicting the value of consumption growth. However, this improvement is generally very small.

What about the possibility that consumer confidence might predict future economic activity? Christopher Carroll, Jeffrey Fuhrer and David Wilcox investigated this in a 1994 article. These authors tested whether the value of the University of Michigan index from a month, say, January, was able to improve projections

of February's consumption growth. Carroll, Fuhrer and Wilcox concluded that when consumer confidence is used as the only variable, it can significantly improve these forecasts. However, they also showed that once other widely available data are taken into consideration, consumer confidence makes only a small improvement for forecasting purposes. That is, consumer confidence does not appear to have much additional, useful information beyond that contained in other common forecasting data.

Super-Powerful Data?

The research discussed above suggests that today's consumer confidence does give a meaningful clue as to the economy's strength, both in the present and the future. Thus, if an economic forecaster were trapped on a desert island with only data on consumer confidence, use of the consumer confidence measures to

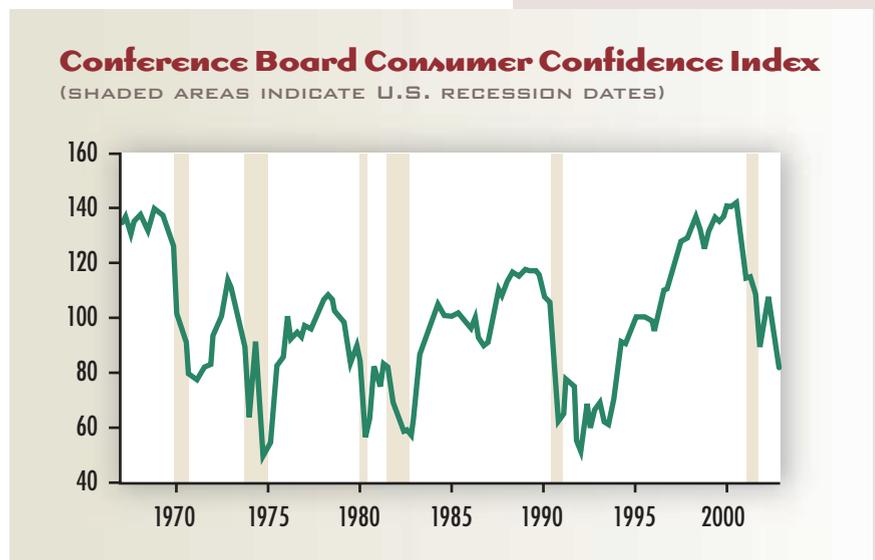
ENDNOTES

¹ The National Bureau of Economic Research, which is the official arbiter of business cycle dates, has not yet announced the end date of the recession that began in March 2001. The graph assumes that this recession ended in December 2001.

² Source: University of Michigan Surveys of Consumers, www.sca.isr.umich.edu/main.php

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educate her guess about the economy's strength more broadly would not be a bad idea. However, consumer confidence is not data with "super-forecasting" powers. Indeed, the ability of consumer confidence to improve forecasts of the economy is modest at best, especially when considered jointly with other forecasting information.

Jeremy Piger is an economist at the Federal Reserve Bank of St. Louis.



By Rubén Hernández-Murillo

How can innovation be measured? And how does the Eighth District’s level of innovation compare with the rest of the United States? To answer these questions, we analyzed data on patented innovations in the District during the 1990s, including the trends of innovation rates and the share of patent output by technological category. Then we compared these results with the national trends.

As economists have recently found, innovations play an important role in promoting economic activity and growth through *knowledge spillovers*—that is, the diffusion of new ideas and technological improvements. Some studies have also tried to identify the factors determining the rate of innovation. Their findings suggest that *spatial agglomeration*—the concentration of people and firms in cities and urbanized areas—generates positive external effects that facilitate the creation of new ideas.¹

Traditionally, the economics literature has acknowledged the role of the agglomeration of economic activity, especially for manufacturing: Firms value proximity to customers; they also value proximity to specialized inputs or to other firms. When agglomeration increases the productivity of all firms in a given location, industry clusters arise.² Economists Gerald Carlino, Satyajit Chatterjee and Robert Hunt found that densely populated areas in the United States are becoming more important as centers of innovation, rather than as locations for the production of goods. They also

found that other local demographic and economic factors, such as the distribution of skilled labor in a region, are important determinants of innovative activity. It is crucial, then, to understand the local demographic and economic conditions of regions to assess their potential for the creation and development of new ideas.

Patent Data

In the American patent system, an innovation has to meet three requirements to qualify for protection by a patent: It has to be novel; it has to be useful; and it has to represent more than a trivial advance over existing knowledge.

The number of patents granted can be used to measure innovation activity—with a caveat: Because all patented innovations are commercialized, it is difficult to assess the economic value of innovations merely by examining patent counts. Economists Bronwyn Hall, Adam Jaffe and Manuel Trajtenberg have recently compiled a rich database on patent citations.³ Citations can be used to construct measures of knowledge spillovers to assess the value of individual patents. The authors constructed measures of *generality* and *originality*, which illustrate the way knowledge spreads out across innovations. The generality index measures the impact an innovation has over future innovations. An innovation receives a high generality score if a patent receives citations from other innovations in a wide range of technological fields.⁴ If a patent receives citations from a narrow set of fields, the score is low. The originality index, on the other hand, indicates how an

innovation increases existing knowledge, using citations made to previous patents. If a given patent cites other innovations in a narrow range of technological fields, the originality score is low; if it cites patents in a wider range, the score will be high. The database includes the addresses of innovators, allowing us to trace patents geographically to measure the innovation output of regions.

Patent Activity in the Eighth District

To examine patent activity in the Eighth District, we aggregated patent counts at the county level over the years 1990 to 1999, then compared them with those of the previous decade.⁵ (The Eighth District includes all of Arkansas and parts of Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee.⁶)

Patents in the District represented about 2.3 percent of total patents granted in the United States during the 1980s. In the 1990s, this number fell to 2.1 percent.

When population is taken into account, it is clear that the District lags the rest of the country, as shown in Figure 1 below. Because most patent activity takes place in urban areas, we also examine the patent output in the region’s metropolitan statistical areas (MSAs), as shown in Figure 2. As these numbers reveal, compared with the 1980s, the District’s metro areas became more innovative during the 1990s, but still fell behind the rest of the country.⁷

Figure 1—Total patents granted per 100,000 people

	8th District	Nation
1980s	72	158
1990s	95	215
% Increase	32	36

Figure 2—Total patents granted per 100,000 people in MSAs

	8th District	Nation
1980s	110	168
1990s	140	231
% Increase	27	37

Figure 3 ranks individual metro areas in the District by the increase in their innovation rates. The highest increase was observed in the Jackson,

Tenn., MSA, where the rate rose from 25.3 to 81.0. The increase in patenting occurred mainly in the mechanical sector. The Fayetteville-Springdale-Rogers, Ark., metro area followed with a rate of 78.1 in the 1990s, up from 43.1 in the 1980s. In this case, the increase in patenting was spread across all categories. The Owensboro, Ky., MSA experienced the largest decline, from 89.5 in the 1980s to 42.6 in the 1990s. Unfortunately, the reason for the decline cannot be easily disentangled because the largest reduction in patenting occurred in the category labeled “others.” The Evansville-Henderson metro area, straddling the Indiana-Kentucky border, also had a large decline because of a reduction of about 200 patents in the chemical and drugs and medical industries, which followed the move of the Bristol-Myers Squibb research headquarters to New Jersey in 1990.

Originality of Eighth District Innovations

Overall, the average generality score for the Eighth District during the 1980s was 0.33; the score for originality was 0.34. The national average scores were, respectively, 0.38 and 0.35. During the 1990s, the generality score for the District fell to 0.24, indicating that innovations in the region received citations from a narrower set of technological fields. For the entire United States, the generality score during the 1990s averaged 0.29. One must consider, however, that innovations during the 1990s had a shorter span of time to allow for received citations, since the sample ended in 1999. For this reason, the originality score is of greater interest. During the 1990s, the score for the District increased to 0.41, and the national score was 0.42. The percentage increase in the District was slightly higher than the increase in the national average, about six-tenths of a percentage point. If we consider only metro areas, the increase in the District was almost four percentage points higher than the increase in the national average. These results suggest that the District is catching up with the nation in terms of originality of its innovations.

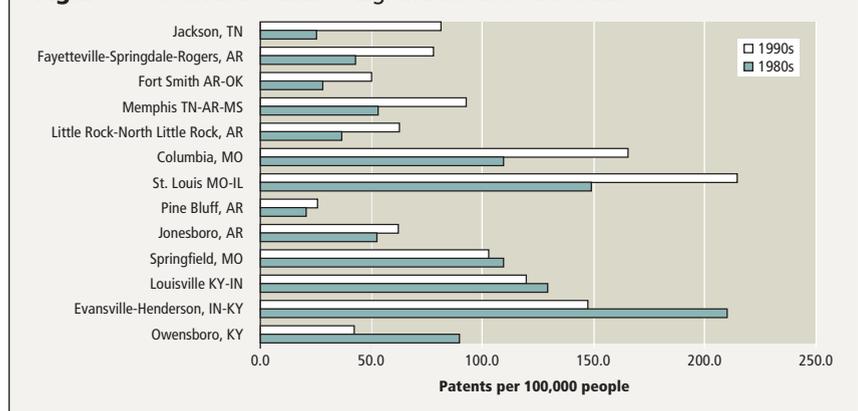
Innovation Activity across Technological Fields

California, Texas and Florida seem to be outperforming other states in terms of technological advances. Studies find, however, that all regions in the country are patenting more innovations than in the past.⁸ It is important, therefore, for economic development officials to identify the innovative potential of different regions in such a competitive innovative environ-

ment. For example, legislators in Missouri recently announced plans to exploit the state’s potential for innovation in the life sciences. Although governments undertake only a fraction of innovation, efforts to enhance research and development in new technologies will no doubt continue to be a major issue in state and local governments’ agendas during the coming years.

To identify the innovative potential of the region, it may help to examine how the composition of patent output in the District has evolved across technological fields. It turns out the District has followed the same behavior as the rest of the nation. The share of patents granted in the computers and communications industry almost doubled during the 1990s. This industry represented 2.6 percent of all patents granted in the region in the 1980s. During the 1990s, the share increased to 4.0 percent. Another sector that increased its share in patent output was the drugs and medical industry. The output share of this industry in the

Figure 3—Innovation Rates in Eighth District Metro Areas



District rose from 6.9 percent in the 1980s to 9.0 percent in the 1990s. At the national level, the share of patent output in the computers and communication industry rose from 8.2 percent in the 1980s to 14.8 percent in the 1990s, while the share of innovation output in the drugs and medical industry rose from 7.3 percent to 12.7 percent. The share of patent output for all other categories experienced declines both nationally and in the District.

Conclusion

Most regions in the country are patenting more now than in previous years, and the Eighth District is no exception, especially in high-tech sectors. Although the District’s innovation output is lagging other areas in the nation, during the 1990s the region experienced a recovery in the originality of its innovations.

Rubén Hernández-Murillo is an economist at the Federal Reserve Bank of St. Louis.

ENDNOTES

- 1 See Carlino et al. (2001).
- 2 See LaFountain (2002) and Hanson (2000).
- 3 See Hall, Jaffe and Trajtenberg (2001).
- 4 Patent counts are aggregated in Hall, Jaffe and Trajtenberg (2001) into the following categories: chemical, computers and communications, drugs and medical, electrical and electronics, mechanical and others.
- 5 We matched city names in the inventors address file to a list of places in the Federal Information Processing Standards Publication 55 from the National Institute of Standards and Technology. We used the Metaphone phonetic-matching algorithm developed by Lawrence Philips (1990) to allow for differences in spelling and typographical mistakes in the inventors source file.
- 6 Although the database includes a field for the state, some of the patents could not be matched to a city name in the District states. These patents were left out of the analysis.
- 7 This measure is sometimes referred to as the innovation rate.
- 8 See Ceh (2001).

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Image Makeover

By Stephen Greene

Starkville Shows There's a Place for High Tech in Mississippi

"I don't want to become Mississippi."

This jab at the Magnolia State was spoken by Texas Gov. Rick Perry as he addressed reporters in January about his state's tight budget conditions.

Frequently maligned for ranking at or near the bottom in areas like education, transportation and job growth, Mississippi has grown accustomed to disparaging comments such as Perry's. For years, states coping with their own problems have taken comfort in the words: "It could be worse. We could be Mississippi." But there are plenty of residents who no longer wish to put up with the put-downs. Many of them live in Starkville, where the assets of Mississippi State University (MSU) are helping to bury common stereotypes.

"There is often a negative image of Mississippi," says David Thornell, president and CEO of the Greater Starkville Development Partnership. "Around here, we have to prove that it's just an image. It's not reality. We do have a progressive community that would be a good home for progressive businesses."

Adds Starkville Mayor Mack Rutledge, "We feel that our future is in high technology, which would grow out of the expertise at MSU."

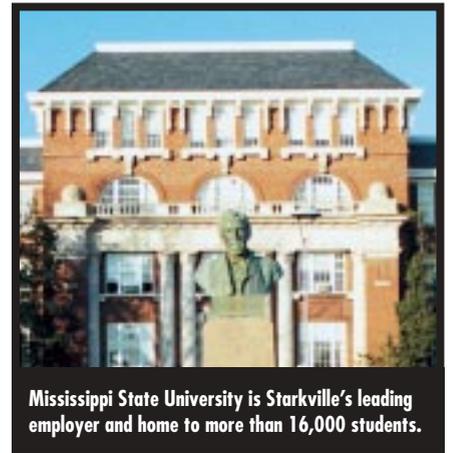
Progress at the Park

Reasons for the mayor's optimism are easily traced to the Mississippi Research and Technology Park. Situated on 220 acres near the university, the park is a joint venture of the city of Starkville, Oktibbeha County and the university. Ground has been broken or will soon be broken for three critical projects at the park:

1. The Ralph E. Powe Center for Innovative Technology: When this 25,000 square-foot small-business incubator is completed this November, it will replace the 3,000 square-foot Golden Triangle Enterprise Center, also located in the park.

"The current incubator is 95 percent filled, and we keep getting requests for space that we don't have," says Marc McGee, vice president of property development and research at the Development Partnership.

The anchor tenant in the Powe Center will be SemiSouth Laboratories,



Mississippi State University is Starkville's leading employer and home to more than 16,000 students.

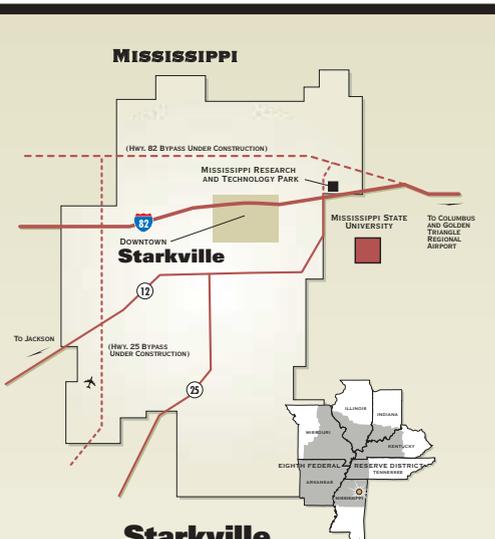
a maker of silicon carbide chips. The company will operate in what's called a clean room, an area that filters out airborne particles so that lab specimens can be kept in a sterile environment.

Another high-tech company, MPI Software Technology Inc., was one of the first businesses to move into the incubator in 1996. A developer of software for high performance computing, MPI outgrew the incubator in 1999 and bought a former bank building on Main Street downtown. The company employs 25 people locally.

MPI began as a spin-off of research at MSU by Anthony Skjellum, who still teaches computer science at the university. He and his wife, Jennifer, run the company, which has won several awards, including the Small Business Administration's Roland Tibbetts Award for technology excellence. The Skjellums credit the incubator program with helping them survive the start-up years before they were able to graduate from the facility.

Among MPI's clients today is the MSU Engineering Research Center (ERC), also located at the technology park. The center is home to one of the top 20 academic supercomputing clusters in the United States. Research at the ERC is supported by many agencies, including the National Science Foundation, NASA, the Department of Defense and the Department of Transportation.

2. The Center for Advanced Vehicular Systems (CAVS): This center is one of six research organiza-



Starkville

BY THE NUMBERS

Population	21,869
Labor Force	21,692
Unemployment Rate	3.5%
Per Capita Personal Income	\$18,799
Top Five Employers	
Mississippi State University	4,200
Service Zone (customer relationship management)	650
School District	600
Wal-Mart	480
Gulf States Manufacturers Inc. (fabricated metal products)	400

Notes: Population and per capita personal income are from 2000. Other data is from October 2002. Labor force, unemployment rate and per capita personal income numbers pertain to all of Oktibbeha County.

tions at the ERC, but the only one that will have its own building when completed this fall. Using resources from the university's industrial and mechanical engineering departments, CAVS will work closely, though not exclusively, with Nissan to perform automotive tests through the use of computer models. The Japanese automaker is opening a production plant in Canton, Miss., this year. By eliminating the need to build full-scale models for testing, automakers like Nissan will be able to shorten the process from conception to production.

"Doing all that work computationally saves a lot of time and money," says Wayne Bennett, dean of engineering at MSU.

3. Viking Range facility:

Greenwood, Miss., 85 miles west of Starkville, is the headquarters for Viking Range, a leading manufacturer of kitchen appliances. The company will begin construction this spring on a product development and research facility. Viking Range expects to employ 35 people at the site upon its completion in 2004.

"For Viking Range, we're able to locate our facility close to a university with a great engineering school," says Dale Persons, a spokesman for the company. "For the university, it will allow a place where professors can do hands-on research and students can do co-ops in a real business world atmosphere."

Engineering a Bright Future

A running theme in all of these projects is MSU's engineering school. Make that the just-renamed James Worth Bagley College of Engineering—emphasis on "Worth." Bagley last year presented his alma mater with a \$25 million endowment, the largest gift in Mississippi State's history. Bennett says Bagley's gift will "provide the resources needed to take our college to national prominence."

Bennett points out that one out of every eight students at Mississippi State is an engineering student. He adds that in 2002 the college enjoyed a 26.5 percent increase in research expenditures, which he expects will move the school into the top 30 in research out of 322 engineering schools nationwide. These statistics, combined with the lure of the engineering school's resources to prospective businesses, leads Bennett to declare: "We play a key role in the

economic development of this region and the entire state."

The momentum at both the technology park and the engineering school should counter the region's problems with "brain drain," as explained by Melvin Ray, special assistant to the university president: "We educate students; they're technology savvy; and then they're recruited to other states that end up competing against us. But now, we should be able to keep more of those bright young students here as employees with high-paying jobs."

Bennett agrees: "We're stemming the brain-drain tide. One of the first things a technology-based company looks for in an area is whether it can get the technical manpower it needs."

Choppers Ahead

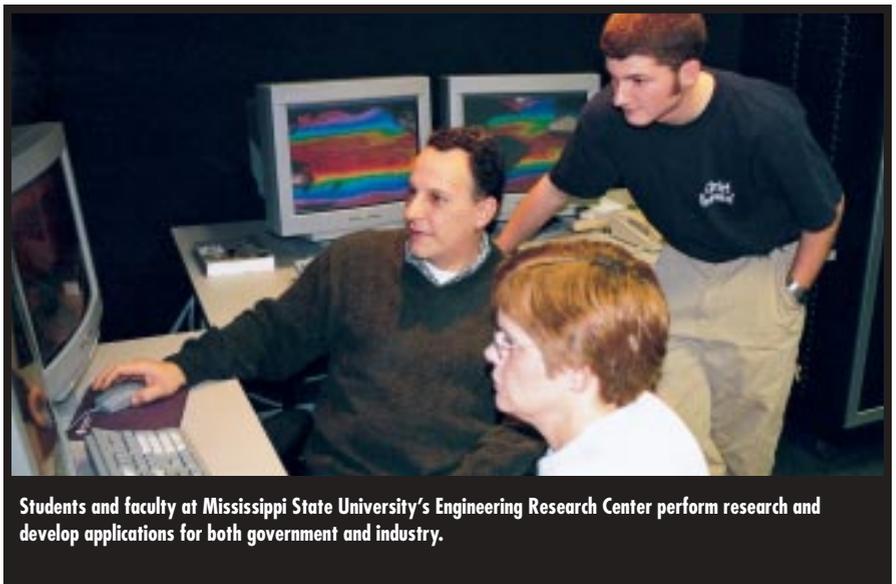
Starkville and the rest of the Golden Triangle region—which includes the cities of West Point and Columbus—landed an important

Ardillo says a key factor in the area's bid was the aeronautical engineering expertise at the Raspet Flight Research Lab at MSU. American Eurocopter will employ about 100 in the beginning.

Mayor Rutledge says: "One of the things that makes our eyes light up is the possibility that they may expand. That's what makes us feel that this was such a significant coup."

Attracting more retail dollars to Starkville would be another coup, Rutledge says. "Sales tax is our main source of revenue, and that's something that we're trying to grow, but it's not growing fast enough. We haven't yet become recognized as a regional shopping center."

Rutledge cites surrounding communities in the state like Tupelo, Columbus and Meridian that offer more attractive retail opportunities. He believes that help is coming in the form of a series of road construction projects underway. These include a State Road 25 bypass, to be completed



Students and faculty at Mississippi State University's Engineering Research Center perform research and develop applications for both government and industry.

chunk of business last year when American Eurocopter Corp. announced it will build a 100,000 square-foot helicopter assembly and manufacturing plant. A subsidiary of Eurocopter, the largest helicopter manufacturer in the world, American Eurocopter will build on 40 acres at the Golden Triangle Regional Airport.

Airport Executive Director Nick Ardillo led the multicomunity effort to bring American Eurocopter to the area. The company, he says, picked the Golden Triangle from an original list of 25 Mississippi communities.

"We had lost several low-tech manufacturing plants over the past couple years," says Ardillo. "So the region really needed this positive hit."

this spring, and a U.S. 82 bypass and State Road 12 extension, each scheduled to be completed in spring 2004.

If the economy improves once these roads are all completed, Rutledge expects a major upswing in Starkville's commercial and industrial growth.

"It's going to be like a rocket around here because we'll be better situated to capitalize," he says.

Stephen Greene is a senior editor at the Federal Reserve Bank of St. Louis.

National and District Data

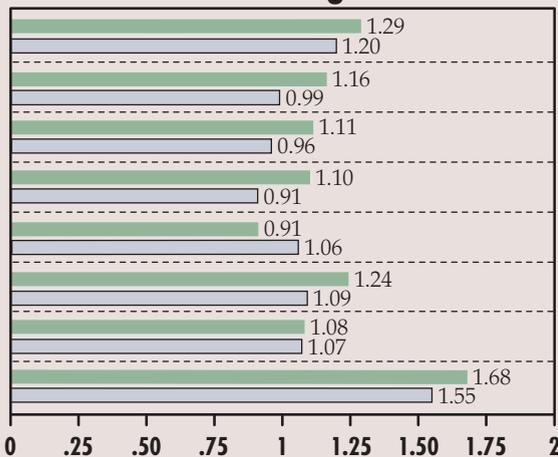
SELECTED INDICATORS OF THE NATIONAL ECONOMY AND BANKING, AGRICULTURAL AND BUSINESS CONDITIONS IN THE EIGHTH FEDERAL RESERVE DISTRICT

Commercial Bank Performance Ratios

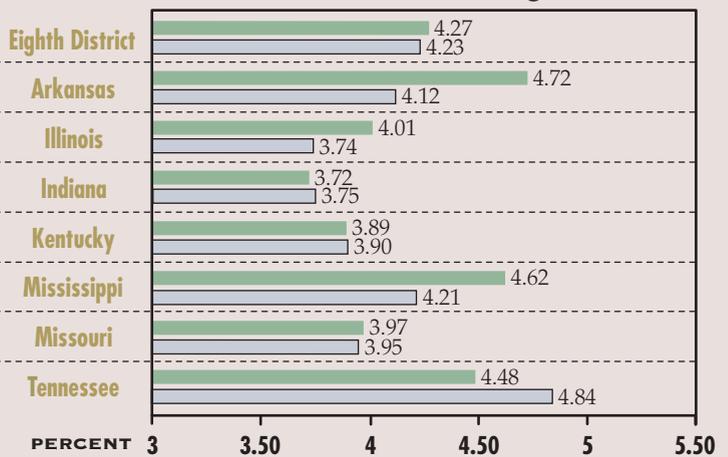
FOURTH QUARTER 2002

U.S. Banks by Asset Size	PERCENT							
	ALL	\$100 MILLION- \$300 MILLION	LESS THAN \$300 MILLION	\$300 MILLION- \$1 BILLION	LESS THAN \$1 BILLION	\$1BILLION- \$15 BILLION	LESS THAN \$15 BILLION	MORE THAN \$15 BILLION
Return on Average Assets*	1.35	1.22	1.15	1.26	1.20	1.45	1.32	1.36
Net Interest Margin*	4.24	4.68	4.67	4.60	4.64	4.38	4.51	4.11
Nonperforming Loan Ratio	1.46	0.98	1.01	0.91	0.97	1.05	1.01	1.68
Loan Loss Reserve Ratio	1.86	1.39	1.40	1.47	1.43	1.67	1.54	2.02

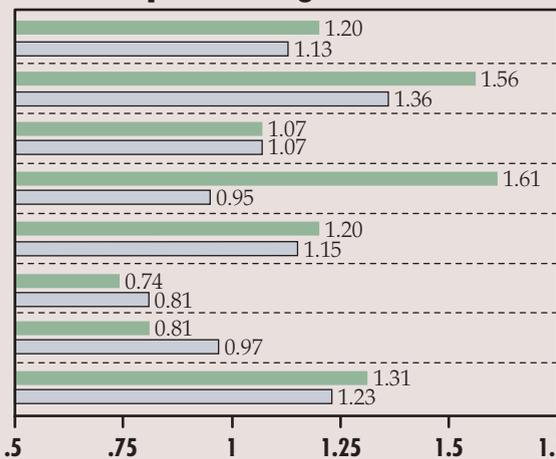
Return on Average Assets*



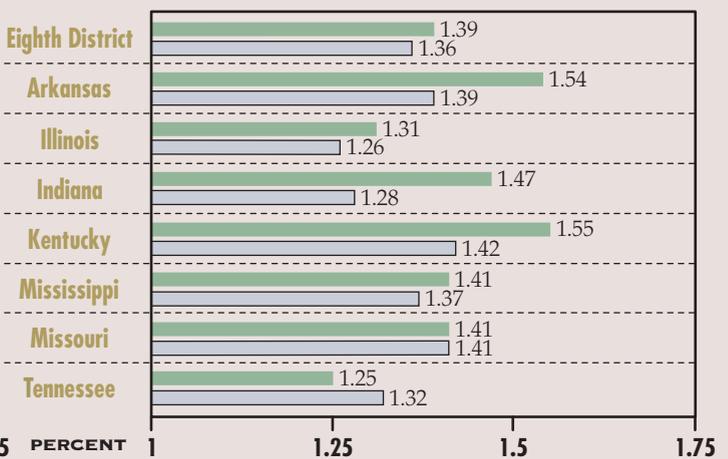
Net Interest Margin*



Nonperforming Loan Ratio



Loan Loss Reserve Ratio



● Fourth Quarter 2002

○ Fourth Quarter 2001

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
*Annualized data

For additional banking and regional data, visit our web site at:
www.research.stlouisfed.org/fred/data/regional.html

Regional Economic Indicators

Nonfarm Employment Growth

YEAR-OVER-YEAR PERCENT CHANGE

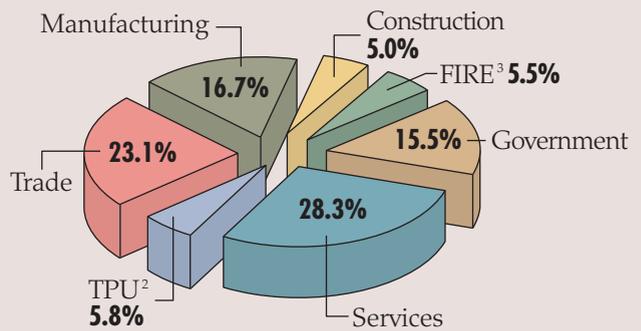
FOURTH QUARTER 2002								
	TOTAL	Goods Producing		Service Producing				
		MFG	CONS ¹	GOVT	TPU ²	FIRE ³	SERVICES	TRADE
United States	-0.3%	-3.8%	-1.4%	1.2%	-2.9%	0.8%	1.3%	-0.8%
Arkansas	0.0	-3.9	3.1	1.4	4.7	2.0	0.1	0.2
Illinois	-1.1	-2.2	2.1	-0.4	-2.7	-0.4	-0.9	-1.3
Indiana	-0.4	-1.4	-3.1	2.2	-3.2	0.3	0.5	-1.3
Kentucky	1.2	-0.5	3.1	1.9	-2.4	0.5	2.5	1.2
Mississippi	0.2	-1.2	2.8	3.0	-3.1	-5.0	1.1	-1.2
Missouri	-1.6	-2.1	-7.3	-0.2	-3.4	-2.0	-0.8	-1.3
Tennessee	-0.3	-2.2	-1.8	0.8	-3.8	-0.9	1.9	-0.8

Unemployment Rates

PERCENT

	IV/2002	III/2002	IV/2001
United States	5.9%	5.8%	5.6%
Arkansas	5.1	5.1	5.4
Illinois	6.6	6.4	5.9
Indiana	4.9	5.1	5.1
Kentucky	5.1	5.2	6.1
Mississippi	6.8	6.2	6.3
Missouri	5.0	4.9	4.9
Tennessee	4.5	4.8	4.8

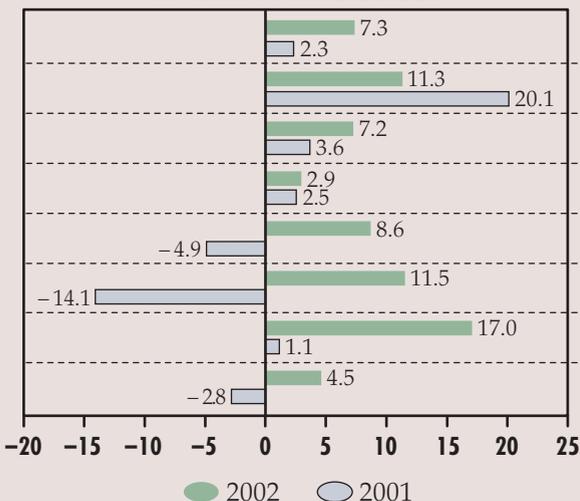
Eighth District Payroll Employment by Industry — 2002



FOURTH QUARTER

Housing Permits

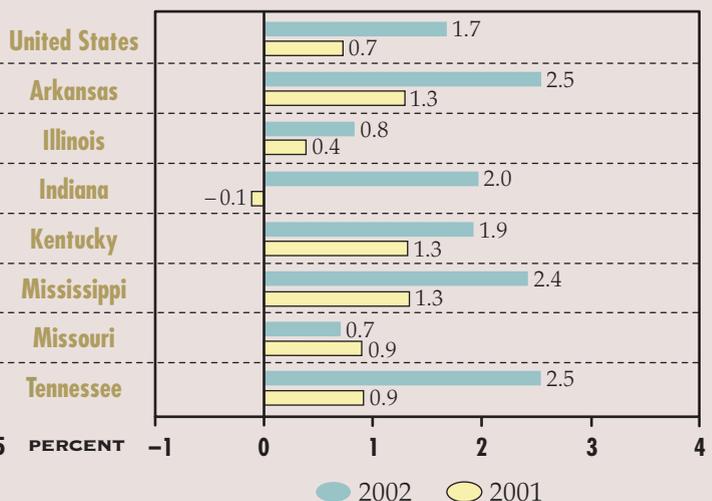
YEAR-OVER-YEAR PERCENT CHANGE IN YEAR-TO-DATE LEVELS



THIRD QUARTER

Real Personal Income*

YEAR-OVER-YEAR PERCENT CHANGE



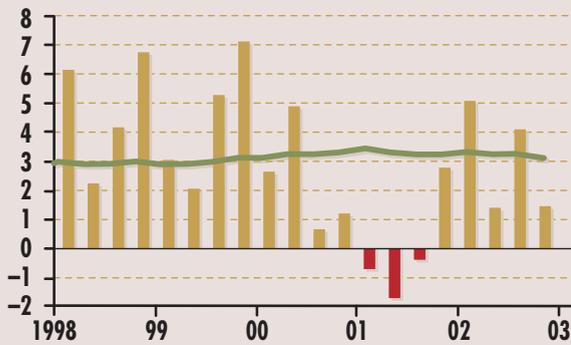
¹ Construction ² Transportation and Public Utilities
³ Finance, Insurance and Real Estate All data are seasonally adjusted.

* NOTE: Real personal income is personal income divided by the PCE chained price index.

Major Macroeconomic Indicators

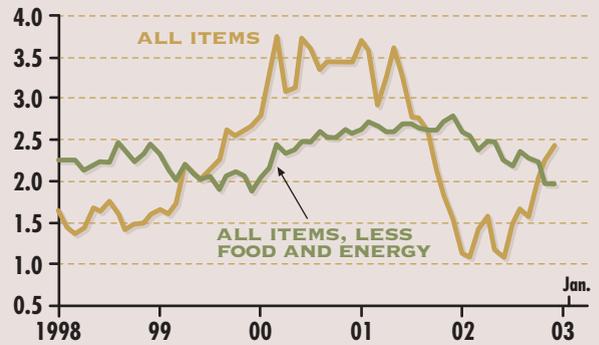
Real GDP Growth

PERCENT



Consumer Price Inflation

PERCENT



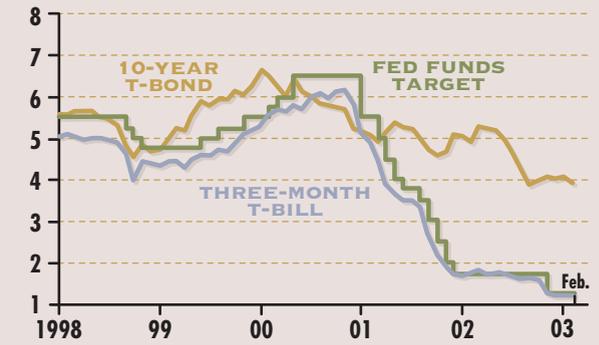
Civilian Unemployment Rate

PERCENT



Interest Rates

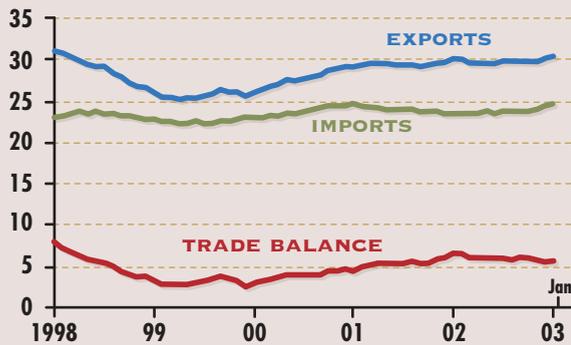
PERCENT



Farm Sector Indicators

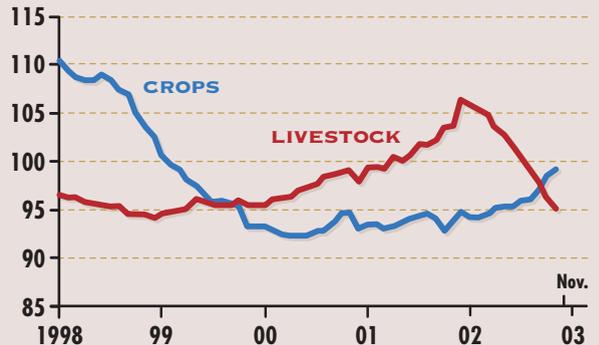
U.S. Agricultural Trade

BILLIONS OF DOLLARS



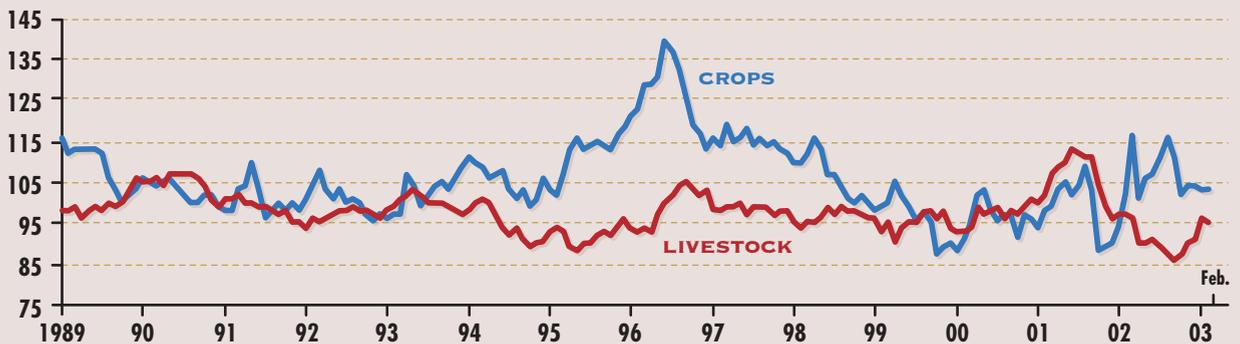
Farming Cash Receipts

BILLIONS OF DOLLARS



U.S. Crop and Livestock Prices

INDEX 1990-92=100



National and District Overview

THE U.S. ECONOMY: Between Iraq and a Hard Place?

By Kevin L. Kliesen

U.S. economic growth, as measured by the percentage change in real GDP, improved modestly in 2002 after roughly no gain in 2001. The pace of activity, however, faltered in the fourth quarter, and forecasters do not expect robust growth to take hold until the second half of 2003. Despite the recent spike in energy prices, most forecasters expect continued low inflation to persist this year. According to some economists, “geopolitical risks”—specifically, a possible war with Iraq—have significantly raised the level of uncertainty among businesses, households and financial markets. These economists argue that when the risks cease, the economic climate will become much more vigorous.

A Review of 2002

After rising by 0.1 percent in 2001, real GDP rose by 2.9 percent in 2002. Despite the faster growth, business capital spending fell modestly, and firms remained reluctant to bid for new employees. The stock market declined for the third straight year, and the growth of real consumer spending weakened for the fourth straight year. Bolstered by faster economic growth in Canada and Mexico, U.S. exports were a bright spot, rising by 4.3 percent after falling by 11.4 percent in 2001. The economic news was even better in other respects. Real after-tax consumer income growth remained strong (the 5.9 percent rise in 2002 was the largest since 1984), while inflation and market interest rates stayed low. These sources of strength helped keep the housing sector growing robustly: Sales of new and existing single-family homes in 2002 reached an all-time high. Moreover, the banking sector reported only a minor rise in loan delinquencies.

As recoveries go, the 2002 version was one of the weakest in the post-World War II period. However, the weak recovery probably reflected the mildness of the 2001 recession:



Mild recoveries tend to follow mild recessions.

Hunkering Down?

The economy ended 2002 on a sour note, as real GDP grew by only 1.4 percent at an annual rate during the fourth quarter. Despite little forward momentum, the consensus among forecasters seems to be that real GDP growth will gradually strengthen this year, and that price pressures will remain contained. For example, according to the Federal Reserve’s Monetary Policy Report to the Congress issued on Feb. 11, 2003, Fed policy-makers expect: real GDP to increase by between 3 percent and 3.75 percent in 2003; the personal consumption expenditure price index to increase by between 1.25 percent and 1.75 percent (after rising 1.9 percent in 2002); and the unemployment rate to average between 5.75 percent and 6 percent during the fourth quarter of 2003 (it averaged 5.9 percent in the fourth quarter of 2002).

In making these projections, the FOMC noted the positive influence of recent expansionary monetary and fiscal policies and the expectations of an improved economic climate overseas, lower energy prices, some restocking of business inventories, and an upswing in capital investment. But are there other developments that could derail this forecast? To some economists, the transition to faster growth might be delayed until the conflict with Iraq is successfully resolved. In their view,

the weakness that developed during the fourth quarter of 2002, which has carried forward into the first quarter of 2003, reflected this heightened climate of risk and uncertainty, which impeded the normal risk-taking activities that a market economy depends on. They believe that the economy will continue to under-perform until the threat is removed.

Are these economists correct? Have the economic developments in early 2003, in fact, been affected by increasing geopolitical risks? To some extent, they have: Equity prices have declined year-to-date, consumer confidence in February fell to its lowest level in more than nine years, and gasoline and natural gas prices have risen sharply. At the same time, despite these setbacks, the economy appeared to be gaining steam in January: Payroll employment, non-auto retail sales, sales of existing homes, and new orders to factories for capital goods all posted healthy increases. Meanwhile, the unemployment rate fell back nearly a quarter of a percentage point.

Despite declines in payroll employment and retail sales in February, which may have been partially related to severe weather, the pace of economic growth in early 2003 seems consistent with the forecast of an economy steadily gathering steam in the face of perceived headwinds caused by increased risk and uncertainty.

Kevin L. Kliesen is an economist at the Federal Reserve Bank of St. Louis. Thomas A. Pollmann provided research assistance.