

FEDERAL RESERVE BANK OF KANSAS CITY

Economic Review



May/June 1991

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The Quiet Revolution in the U. S. Food Market

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The Treasury plan has two parts. One part would reform deposit insurance by varying deposit insurance premiums with risk, by reducing coverage, and by enforcing capital requirements more strictly. A second part would restructure the financial system by allowing full interstate banking, permitting banks to affiliate with any financial company, and letting commercial firms own banks indirectly. According to Treasury, both sets of reforms are needed: the deposit insurance reforms to protect the taxpayer and allocate credit more efficiently, and the restructuring proposals to protect the taxpayer and restore the long-run health of the banking industry.

Keeton argues that the Treasury plan contains a number of useful proposals. However, the plan can be criticized for being too cautious in some respects and too bold in others.

The Quiet Revolution in the U.S. Food Market

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By Alan Barkema, Mark Drabenstott, and Kelly Welch

A quiet revolution in the U.S. food market is underway that may change the way farmers and food processors deliver food to consumers. While consumers will still see grocery shelves stocked with the foods they want, the revolution will significantly alter the way producers and processors do business.

Driving this revolution are changes in both consumer tastes and technology. Today's consumer wants nutrition, convenience, and an ever-widening variety of food products. Meanwhile, advances in production and processing technology are enabling farmers and food processors to target specific consumer niches more precisely than ever before. Combined, these changes in consumer demand and food technology are changing the way the food market links producers, processors, and consumers.

Barkema, Drabenstott, and Welch examine the changing U.S. food market. The authors find that the changes may encourage lower food prices, bigger farms, fewer viable rural communities, and an overhaul of farm policy.

Agricultural Biotechnology: Dividends and Drawbacks

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By Julie A. Stanley

Biotechnology is changing the face of agricultural production. Several biotech products are already used in the United States, and many others are in late stages of development. These biotech products could offer substantial dividends but could also have potential drawbacks. All groups associated with production agriculture, therefore, will need to prepare themselves for both the positive and negative effects of biotechnology.

Stanley reviews the biotech products in the agricultural industry. The author then examines the possible dividends and drawbacks of the use of biotechnology on such groups as farmers and ranchers, policymakers, agribusinesses, agricultural bankers, and consumers.

Forecasting Consumer Spending: Should Economists Pay Attention to Consumer Confidence Surveys?

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By C. Alan Garner

The invasion of Kuwait in August 1990 took virtually all Americans by surprise. Rising oil prices in the second half of the year and uncertainty about a possible Mideast war dramatically weakened consumer confidence in domestic business conditions. Many analysts believe the decline in consumer confidence worsened the U.S. recession. But after the Allied victory in the Persian Gulf War, consumer confidence rebounded strongly, leading some analysts to predict an early end to the recession.

The question at issue is whether consumer confidence surveys warrant such predictions. Some economists believe consumer confidence can reliably predict future consumer spending and thus the course of the economy. Others are more skeptical, arguing, "consumers cannot spend confidence."

Garner argues that consumer confidence indexes are seldom very useful in forecasting economic performance, although they may be useful in exceptional instances like the Persian Gulf conflict.

The Treasury Plan for Banking Reform

By William R. Keeton

The recent problems of the banking industry have prompted calls for major reform. The high rate of bank failures has nearly depleted the FDIC's reserves, arousing fears of a taxpayer bailout similar to that for S&Ls. And according to some critics, FDIC protection has encouraged banks to specialize in risky ventures like commercial real estate development, distorting the allocation of investment in the economy. Also, recent declines in bank profits and the shrinking role of banks in the financial system have sparked concern about the long-run health of the banking industry.

Responding to these concerns, Congress ordered the Treasury Department in August 1989 to undertake a comprehensive study of banking reform. This study was completed in February 1991 and has become the focus of an intense debate over banking reform. One part of the Treasury plan would reform deposit insurance by varying deposit insurance premiums with risk, reducing coverage, and enforcing capital requirements more strictly. A second part would restructure the financial system by allowing full interstate banking, permitting banks to affiliate with any financial company, and letting commercial firms own banks indirectly. According to Treasury, both sets of reforms are needed: the deposit insurance reforms to protect the taxpayer and allocate credit more efficiently, and the restructuring proposals to protect the taxpayer and restore the long-run health of the banking industry.

This article argues that the Treasury plan contains a number of useful proposals. However, the plan can be criticized for being too cautious in some respects and too bold in others. The first section reviews Treasury's justification for reform. The second section

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focuses on Treasury's proposals for deposit insurance reform, while the last section examines Treasury's proposals for financial restructuring.

The Need for Reform

Most observers agree that the system of deposit insurance and bank regulation established in the 1930s served the nation well for many years. But the banking industry and deposit insurance funds now face serious problems. To justify reform, the Treasury study describes these problems and then argues they have specific causes that can be corrected through new legislation.¹

The most obvious problem with the current system is that taxpayers may have to pay for deposit insurance losses. The failure of hundreds of S&Ls in the 1980s bankrupted the S&L insurance fund and forced Congress to pass a massive bailout bill. Although the banking industry has been healthier, the rate of bank failures in the nation has been high by historical standards, and a few states like Texas have been particularly hard hit. The high failure rate has raised the FDIC's costs above the premiums paid by banks. As a result, the bank insurance fund has declined from \$18 billion in 1987 to \$8 billion in 1990, with a further decline expected this year. Because the U.S. government stands behind federal deposit insurance, taxpayers may have to bail out the FDIC if it eventually becomes insolvent.²

A second problem with the current system is that investment is being misallocated toward unproductive uses. In a few highly publicized cases, banks and S&Ls have spent depositors' money on lavish perquisites for owners and managers. But even more important, many banks and S&Ls have invested too heavily in risky projects--projects with a high potential

payoff but also a high chance of failure. Critics often charge, for example, that the current excess supply of office space is partly due to banks and S&Ls investing too heavily in high-risk commercial real estate loans during the 1980s. According to this view, the nation's productive capacity would be higher if banks and S&Ls had used the same funds to finance safer projects.

A third problem with the current system, in Treasury's view, is that the long-run health of the banking industry has eroded. The average profitability of the industry has decreased noticeably since the mid-1980s. For example, bank profits fell from 0.77 percent of assets in the 1970s to 0.69 percent in 1980-84 and 0.55 percent in 1985-89 (Department of Treasury 1991a, Chapter I, Table 6). The share of total financial sector assets held by commercial banks has also shrunk over the last ten years. Finally, Treasury points out that U.S. banks have become less important internationally, with far fewer banks ranking among the largest in the world.

What accounts for these problems? One cause, Treasury believes, is increased competition from other financial firms and securities markets. Many borrowers that used to rely solely on banks for credit now borrow in the open market or from such nonbank intermediaries as finance companies. This loss of business has reduced bank profits. According to Treasury, one way banks might have made up for the loss of business was by offering new financial services, such as insurance and securities underwriting. But banks were prohibited by law from offering such services. Instead, banks shifted to commercial real estate lending and other risky activities that promised high payoffs if successful.³

Another cause of the current crisis, in Treasury's view, is the expansion in the scope of deposit insurance. This expansion has come

partly through an increase in de jure coverage, the protection to which depositors are legally entitled. In 1980, for example, Congress increased the statutory limit on each account from \$40,000 to \$100,000. But there has also been an increase in de facto coverage, the protection the FDIC provides uninsured depositors through its method of handling bank failures. In most recent bank failures, the FDIC has fully protected uninsured depositors—for example, by arranging a merger with a healthy bank. Indeed, at banks with over \$1 billion in assets, the FDIC has never allowed uninsured depositors to suffer a loss—a policy known as “too big to fail.” According to Treasury, the growth in de jure and de facto coverage has raised the cost to the FDIC of resolving each bank failure. And higher coverage has increased risk-taking by reducing depositors’ incentive to discipline risky banks by withdrawing their funds or demanding higher rates.

A third cause of the current banking problems is inadequate supervision and regulation by government. In Treasury’s view, increased competition and higher coverage induced banks to shift to riskier activities. But regulators could have done a better job of controlling bank risk-taking. For example, Treasury argues that regulators should have closed insolvent S&Ls more quickly and imposed more restrictions on banks and S&Ls that failed to meet minimum capital requirements. And the government could have improved upon the current system of flat-rate premiums, under which all banks pay the same premium regardless of how much risk they take.

Treasury proposes to solve the crisis in banking and deposit insurance by attacking all three causes. One set of proposals would reform the deposit insurance system by reversing the expansion in coverage and improving the regulation and supervision of banks. A

second set of proposals would restructure the financial system by making it easier for U.S. banks to compete with securities markets, other financial institutions, and foreign banks.⁴

Deposit Insurance Reform

Treasury proposes to reform the deposit insurance system in three principal ways. First, deposit insurance premiums would depend partly on banks’ estimated risk. Second, the scope of deposit insurance would be reduced by limiting the coverage to which depositors are legally entitled and by protecting uninsured depositors less often when banks fail. And third, current capital standards would be enforced more strictly through a program of prompt corrective action against undercapitalized banks. According to Treasury, all three reforms would help reduce taxpayer risk and prevent misallocation of investment to unproductive uses.

Risk-based premiums

Under the Treasury proposal, a bank’s deposit insurance premium would depend on its capital, credit risk, and interest rate risk. Because risk would be measured imperfectly, the new system would not solve all problems. However, it would improve upon the current system of flat-rate premiums.

Rationale. All banks now pay a premium equal to a fixed percentage of their domestic deposits. Treasury argues that premiums should also depend on banks’ estimated risk to the insurance fund. In theory, such a system would reduce each bank’s incentive to take risk and would make it harder for risky banks to outbid safe banks for deposits. Thus, bank failures would decline, reducing taxpayer exposure. At the same time, the allocation of investment would improve because banks

would choose safer investments.

Description. The specific measure of risk proposed by Treasury is one recently adopted by regulators to determine each bank's capital requirement. As of this year, banks must maintain a minimum ratio of capital to risk-adjusted assets, which are computed as a weighted sum of assets in four risk categories. Under the Treasury plan, banks would still have to satisfy this requirement, but those with higher ratios of capital to risk-adjusted assets would pay lower premiums. The weights assigned to the four risk categories now reflect only the relative default risk of different assets—for example, business and consumer loans have a weight of one, while Treasury securities have a weight of zero. However, another part of the Treasury plan would require regulators to come up with a new measure of risk-adjusted assets that also reflected banks' exposure to interest rate changes.

The Treasury proposal leaves it up to the FDIC to decide how much premiums should vary with risk-based capital ratios. However, Treasury notes that it would be counterproductive for the FDIC to charge a significantly higher premium to a bank whose risk-based capital ratio fell below the minimum requirement due to unexpected losses. Charging such a bank a significantly higher premium would impede its recovery and increase its chance of failure. Presumably, then, Treasury believes risk-based premiums should be used mainly to reward banks for holding more capital than required rather than to penalize banks for holding less.

Evaluation. Although risk-based premiums are no panacea, the Treasury proposal would be an improvement over the current system. An important strength of the proposal is that it would use an ex ante measure of risk rather than an ex post measure. But because that measure is highly imperfect, Treasury is wise

to recommend that risk-based premiums supplement minimum capital requirements rather than replace them.

Ex ante measures of risk are more effective in controlling risk-taking than ex post measures. Ex ante measures of risk reflect a bank's chance of suffering problems in the future, while ex post measures reflect problems that have already occurred. A bank whose loans and investments have performed poorly will have a high chance of failing, suggesting it should be charged a high premium to cover the FDIC's costs. But telling banks they will be charged a higher premium if they suffer heavy losses may do little to discourage them from making risky loans and investments. Suppose, for example, that a bank is considering a group of risky loans that will yield high profits if repaid but wipe out the bank's capital if not repaid. In this case, knowing the premium will increase if the loans default will not deter the bank from making the loans. Since the owners will lose their entire investment if the loans default and the bank fails, the owners will not care if the bank is charged a higher premium when the loans default. A more effective way to discourage risk-taking is to base premiums on ex ante measures of risk so that banks are penalized before they get into trouble.

The risk-adjusted capital ratio, the measure of risk proposed by Treasury, would reflect ex ante risk in three ways. First, the four categories used to compute risk-adjusted assets would measure an asset's inherent risk of default rather than its past performance. Second, risk-adjusted assets would be redefined under the Treasury plan to reflect a bank's exposure to future interest rate swings. Finally, capital would measure ex ante risk by indicating a bank's cushion against future losses and its incentive to make

risky investments.⁵

To be sure, the risk-adjusted capital ratio is far from perfect as a measure of *ex ante* risk. For example, the proposed measure of capital could hide declines in net worth due to bad interest rate gambles or unrecognized loan losses. And the four risk categories are very broad, lumping all business and consumer loans together regardless of the borrower's creditworthiness. Crude as the risk-adjusted capital ratio is, however, it is still preferable to the purely *ex post* measures in some other plans.⁶

Given the flaws in the risk-adjusted capital ratio, Treasury is wise to propose that risk-based premiums complement minimum capital requirements rather than replace them. If the FDIC were to rely solely on risk-based premiums to control risk-taking, some banks could hold less capital than they should to guard against failure. Suppose, for example, that a bank had unusually risky business loans. Such a bank would have more chance of failing than banks with safer business loans. As a result, the bank's owners would have more incentive than the owners of safer banks to protect their wealth by reducing their investment. With risk-based premiums, the risky bank would have to pay a higher premium as its capital declined. But because the Treasury proposal would treat all business loans the same in calculating premiums, the risky bank's premium would not increase any more than a safe bank's premium. Thus, without a minimum capital ratio, the bank with risky loans could end up holding less capital than banks with safer loans—the opposite of what is needed to limit the rate of bank failures.⁷ A more prudent approach is the one suggested by Treasury—retain a floor on capital and use risk-based premiums to reward banks for exceeding the floor.

Reduction in coverage

Treasury proposes to reduce both *de jure* and *de facto* coverage of bank deposits. But under the proposal, regulators could continue to provide *de facto* coverage whenever financial stability was threatened. Thus, the proposal does not resolve the crucial issue of whether it is more important to protect the taxpayer and prevent misallocation of investment to risky uses or to preserve financial stability.

Rationale. As noted earlier, depositors now enjoy two forms of protection—the *de jure* coverage to which they are entitled by law and the *de facto* coverage they enjoy due to the FDIC's method of handling bank failures. Treasury argues that reducing *de jure* and *de facto* coverage would yield two important benefits. The first would be to reduce the FDIC's total liability to depositors, thereby limiting taxpayer exposure. The second benefit would be to increase depositor discipline by giving depositors more reason to worry about the safety of their funds. Like risk-based premiums, an increase in depositor discipline would force banks to pay more of the cost of their risk-taking. For example, lower coverage would force risky banks to increase their deposit rates further above those of safe banks to avoid losing funds. Thus, bank risk-taking would decline, reducing taxpayer risk and improving the allocation of investment.

Treasury also argues that coverage could be significantly reduced without threatening financial stability. Treasury acknowledges that deposit insurance has promoted stability by discouraging bank runs and preventing bank failures from spilling over to other banks. But Treasury believes stability could be preserved at much less cost to the taxpayer by having regulators determine on a case-by-case basis when uninsured depositors need protection. In

this view, full de facto coverage is necessary only in exceptional cases, as when a failing bank has incurred large debts to other banks through interbank deposits or the payments system.

Description. The Treasury plan contains two proposals for reducing de jure coverage. The first is to limit each depositor to two insured accounts of \$100,000 or less per bank, with one of the two accounts for retirement. Under current rules, an individual can obtain more than \$200,000 in coverage at a single bank. For example, a family of three can obtain \$1.2 million in total coverage by opening 12 separate accounts at the same bank.⁸ Treasury would also require the FDIC to study the feasibility of a systemwide limit on coverage—a measure that would be much more effective in reducing total coverage but also costlier to administer.

The second way the plan would reduce de jure coverage is by eliminating coverage for brokered deposits and most deposits of employee pension plans. Under current law, wealthy investors can fully insure large amounts of money by using deposit brokers to spread their money among different banks in lots of \$100,000. Such deposits are fully insured because coverage “passes through” to each of the deposit broker’s customers, no matter how large the broker’s total investment in a bank. Pension plans also benefit from such pass-through coverage. No matter how much a pension plan invests in a bank, each member of the plan enjoys full coverage as long as his own share of the total does not exceed \$100,000. The Treasury plan would prohibit all coverage of brokered deposits and most coverage of pension plan investments.⁹

The Treasury plan also contains several proposals for reducing de facto coverage. To understand these proposals, it is necessary to know how the FDIC resolves bank failures.

The FDIC uses four methods: purchase and assumption (P&A), open-bank assistance, payoffs, and insured deposit transfers. The main difference is that uninsured depositors suffer no loss under a P&A or open-bank assistance but at least a partial loss under a payoff or insured deposit transfer. In a P&A, the FDIC pays a healthy bank to take over all the failed bank’s deposits and some or all of the assets. With open-bank assistance, the FDIC injects enough new funds to keep the bank open. In a payoff, the FDIC pays the bank’s insured depositors and then shares the proceeds from the bank’s assets with uninsured depositors. Finally, an insured deposit transfer is the same as a P&A except that the acquiring bank takes over the insured deposits only.

The first proposal for reducing de facto coverage would require the FDIC to resolve failures in the least costly manner whenever financial stability was not at stake. To protect uninsured depositors through a P&A or open-bank assistance, the FDIC now has to show only that these methods are cheaper than a payoff; it does not have to show they are cheaper than an insured deposit transfer. But an insured deposit transfer is usually the cheapest way to resolve a bank failure. Unlike a P&A or open-bank assistance, an insured deposit transfer forces uninsured depositors to bear some of the bank’s losses, reducing the cost to the FDIC. And unlike a payoff, it preserves the bank’s customer relationships, helping the FDIC extract favorable terms from the acquiring bank. Thus, under Treasury’s revised cost test, the FDIC would find it harder to justify transactions that protected uninsured depositors.

The second proposal is to let the Fed and Treasury decide when to waive the cost test. Under current law, the FDIC can waive the cost test if it believes the failing bank’s unin-

sured depositors must be protected to preserve financial stability. Under the Treasury plan, the cost test could be waived only if the Treasury and Fed jointly determined that failing to protect uninsured depositors would have a “severe adverse impact on the financial system.” In theory, giving Treasury more say in the decision would help limit protection of uninsured deposits because Treasury is directly accountable to taxpayers.¹⁰

The last proposal is for the FDIC to make a “final settlement payment” to uninsured depositors whenever it resolves a failure through a payoff or insured deposit transfer. This measure is designed to make the reduction in de facto coverage more palatable by reducing disruption to uninsured depositors. As soon as the bank was closed, each uninsured depositor would receive a one-time payment based on the FDIC’s average recovery rate on assets of failed banks. Thus, uninsured depositors would have immediate access to their funds. And they would not have to worry about losing their entire investment if the bank’s assets turned out to be worthless. Treasury notes that, based on the FDIC’s recent recovery rate, the final settlement payment would be about 80 percent of the uninsured portion of the deposit.

Evaluation. The main problem with the Treasury proposals is that they assume the benefits of reduced coverage can be achieved without any decrease in financial stability. Despite Treasury’s hopes, the risk of a banking panic could increase if regulators rarely protected uninsured depositors of failed banks. To prevent such instability, it would suffice to provide full de facto coverage at large banks, since they are the banks that rely heavily on uninsured deposits. But then nothing would be achieved except a further shift in uninsured deposits from small banks to large banks.

Could financial stability be preserved by

protecting uninsured depositors only in isolated cases, as Treasury suggests? This approach would make sense if the main way depositor losses could disrupt the financial system were by spilling over to other banks. In some cases, for example, a failing bank might owe large amounts of money to other banks in the form of interbank deposits or overdrafts on the large-dollar payments network. Allowing these creditor banks to suffer losses could set off a chain reaction of failures and disrupt the payments system. Thus, full de facto coverage might be justified to preserve financial stability. But other times, a failing bank might owe little to other banks. In these cases, it could be argued, full de facto coverage would be unnecessary because depositor losses would have no adverse effect on the financial system as a whole.¹¹

The problem with this view is that it ignores an even more important source of financial instability than spillover effects—a general loss of confidence by all uninsured depositors. If regulators seldom protected uninsured depositors of failed banks, all uninsured depositors would have more reason to worry about the safety of their funds. This greater exposure would increase depositor discipline—a major goal of the Treasury proposal. At the same time, however, the increased exposure would make the banking system more vulnerable to a “flight to quality” that could severely disrupt the economy.

To see how such a panic could occur, suppose some uninsured depositors came to doubt the condition of many bank loan customers. For example, the economy could show signs of slipping into recession. Or many businesses and households could appear overextended. At banks with large amounts of suspect loans, some uninsured depositors would withdraw their funds out of fear the loans would never be repaid. Other depositors might

then withdraw their funds in the belief the first group had received unfavorable news about the banks' loans. And still other depositors might join the panic, not because they doubted the underlying quality of the banks' loans, but because they knew the loans were illiquid and could be sold to meet withdrawals only at a heavy loss.¹²

A flight to quality would not only inconvenience depositors but also hurt the economy. The funds withdrawn from banks with suspect loans would be invested in safer assets like Treasury bills or shifted to banks that invested heavily in such assets themselves. Rather than switch into safer assets, some banks might try to stem the outflow by raising interest rates on uninsured deposits. But to the extent banks raised their deposit rates, they would also have to increase their loan rates or tighten their credit standards. As that happened, fewer borrowers would be willing and able to obtain loans, forcing banks to shift to other assets. Sooner or later, therefore, the flight to quality would lead to a decline in total bank lending. If severe enough, such a contraction in bank lending could push the economy into recession, justifying depositors' initial doubts about the quality of bank loans.¹³

Given the threat to financial stability from a flight to quality, the Fed and Treasury could make a strong case under the Treasury plan for retaining the too-big-to-fail policy—that is, for continuing to protect uninsured depositors whenever a large bank failed. The regulators could argue that a loss of confidence by uninsured depositors of large banks would be especially harmful to the financial system because large banks rely heavily on uninsured deposits for funds. In 1990, for example, uninsured deposits accounted for 56 percent of total deposits at banks over \$10 billion, versus 13 percent at banks under \$1 billion (GAO, p. 158). And the two regulators could argue that

the only way to prevent a loss of confidence by uninsured depositors of large banks would be to provide them full de facto coverage.

In contrast, the Fed and Treasury would have a hard time arguing that uninsured depositors of small banks had to be protected to preserve financial stability. Without blanket protection, uninsured depositors of small banks would be just as likely to lose confidence as uninsured depositors of large banks. But since small banks rely mostly on insured deposits, a loss of confidence by their uninsured depositors would cause little disruption to the financial system.

Thus, if the Fed and Treasury strictly interpreted their mandate to preserve financial stability, total coverage would not change. De facto coverage would remain unchanged at large banks but fall at small banks. Given this increased disparity in coverage, uninsured depositors at small banks would have even more reason than now to shift their funds to large banks. As a result, the Treasury proposal would encourage a further shift in uninsured deposits to large banks without reducing total coverage at all.¹⁴

The reason the Treasury plan does not resolve the coverage issue is that it avoids choosing between two competing goals of bank regulation. The first goal is to limit taxpayer exposure and prevent misallocation of investment to risky uses. The second goal is to preserve financial stability. Ultimately, policymakers will have to decide which goal is more important. If protecting the taxpayer and preventing excessive risk-taking are the overriding concern, then uninsured depositors should always be allowed to suffer a loss regardless of the size of the bank or the effect on other banks. That is, no exception should be made for systemic risk. On the other hand, if preserving financial stability is the first priority, deposits should enjoy full de jure

coverage at all banks.¹⁵ The two approaches are very different. But both would make the rules of the game clear and ensure that banks competed on the same terms.¹⁶

Stricter enforcement of capital requirements

The Treasury plan would enforce existing capital requirements more strictly. Treasury is correct to emphasize the benefits of high capital. But stricter enforcement would likely have more benefits and fewer costs if combined with a gradual increase in capital requirements.

Rationale. Treasury proposes to enforce capital requirements more strictly by reducing forbearance—the practice of allowing a bank to operate below the minimum. Few would advocate zero forbearance—immediately shutting down a bank when its capital falls below the minimum. But Treasury believes the system has gone too far in the other direction. One way Treasury believes forbearance should be reduced is by closing banks before their capital is totally depleted. Under the current system, banks are usually not closed until their reported capital falls below zero. But a bank's true capital may be highly negative by that point, requiring the FDIC to incur large losses. If banks were closed earlier, when their reported capital was still positive, their true capital would be less likely to be negative. Thus, FDIC losses would decline, reducing taxpayer exposure.

A second way Treasury believes forbearance should be reduced is by regulating undercapitalized banks more strictly and making them restore their capital faster. According to Treasury, the current system gives banks that fall below the minimum too much opportunity to go for broke by taking big risks. Forcing banks to recapitalize more quickly would

reduce the number of banks that face this temptation to gamble their way out of trouble. And tightly restricting the activities of undercapitalized banks would make it harder for them to act on the temptation. Thus, undercapitalized banks would take fewer risks, decreasing taxpayer exposure and improving the allocation of investment.

Description. Under the Treasury plan, the regulation and supervision of banks would vary with their capital. Specifically, the plan would establish five zones based on banks' ratios of capital to risk-adjusted assets and capital to total assets. Zones 1 and 2 would include banks with capital higher than the minimum, while Zones 3-5 would include banks with capital below the minimum.

Banks in Zones 1 and 2 would include all those that meet minimum capital requirements. Banks in Zone 1 would have significantly more capital than required and would be allowed to undertake new activities through affiliates (these activities are spelled out in the financial restructuring proposals of the plan). Banks in Zone 2 would be treated the same as currently.

Banks in Zones 3-5 would include all those failing to meet minimum requirements. These banks would face prompt corrective action in the form of progressively stricter supervision and regulation. Banks in Zone 3 would have to file a recapitalization plan, and the parent company would have to satisfy minimum capital requirements. Other measures, such as restricting dividend payments, would be at the discretion of regulators. Banks in Zone 4 would face the same restrictions as banks in Zone 3 and also would not be allowed to pay any dividends. Finally, Zone 5 would include all banks with capital below a critical level specified by regulators. These banks would be put into receivership or conservatorship even if they still had positive capital. It should be

noted that all these sanctions, including the early closure requirement for banks in Zone 5, would be presumptive rather than mandatory. That is, the requirements could be waived if the FDIC and the bank's primary regulator agreed.¹⁷

Evaluation. While reduced forbearance would have important benefits, it would also have a cost--regulators could close some banks that would be viable if given enough time to recover. This cost could be reduced by raising minimum capital requirements in addition to closing banks early. Combining early closure with higher capital requirements would also help protect the taxpayer and curb excessive risk-taking.

Why might the early closure rule prove costly? In a world of perfect information, banks suffering only temporary losses would never be forced out of business by an early closure rule. They could always raise enough capital from outside investors to meet the minimum requirements. In reality, however, outside investors may refuse to invest in a bank suffering temporary losses because they cannot determine whether the losses are temporary or permanent. If regulators allowed a bank suffering only temporary losses to remain open, the bank could gradually rebuild its capital through retained earnings and meet the minimum capital requirement again. If instead regulators forced the bank to close, some of the bank's intangible assets could be permanently lost, such as its long-term relationships with borrowers. To be sure, closing troubled banks early might reduce the FDIC's losses and protect the taxpayer. But society as a whole could still be worse off through the loss of the bank's intangible assets.

Given this cost, the Treasury's early closure proposal could have the perverse effect of increasing government ownership of banks.

Even under the current system, concern about the premature closing of banks has led to calls for greater government assistance. The FDIC can already invest in troubled banks through its open-bank assistance program. And many observers are now advocating a new fund for investment in weak banks along the lines of the Depression-era Reconstruction Finance Corporation. Under the Treasury plan, pressure for such government intervention would likely increase. Thus, instead of troubled banks being closed earlier, more banks could end up being partly owned by the government—an outcome most people would find distasteful.

The best way to avoid these problems would be to combine the Treasury plan with a substantial increase in minimum capital requirements. The higher a bank's initial capital, the bigger and more sustained the losses the bank would have to suffer before its capital reached the critical closure level. Thus, with higher capital requirements, the banks shut down under the early closure rule would be more likely to be inefficient or reckless rather than just temporarily troubled due to bad luck.¹⁸

Higher capital requirements would also help protect the FDIC against losses by insolvent banks and discourage excessive risk-taking by banks that exceed current requirements. Because capital is measured imperfectly, Treasury's early closure rule would not ensure that troubled banks were closed before they became a burden to the FDIC. If banks had to meet higher capital requirements, banks could not become insolvent as quickly. Thus, regulators would have more chance of identifying reckless and badly managed banks in time to prevent them from running up big losses. Furthermore, while the Treasury plan would curb risk-taking by undercapitalized banks, it would have little effect on banks that satisfy current requirements. While these

banks have less reason to gamble than insolvent or undercapitalized banks, deposit insurance still encourages them to gamble more than they should. With higher capital requirements, many of these banks would have to hold more capital, reducing their incentive to take risk.

To be sure, higher capital requirements would also have costs. Some experts believe bank deposits have unique transactions features that make them cheaper than equity. For example, by combining NOW and money market accounts with check-clearing services, banks may be able to attract such funds at a relatively low interest rate. If this argument is correct, forcing banks to substitute capital for deposits could increase their cost of funds, making it harder for them to compete with securities markets, other financial firms, and foreign banks.¹⁹ Also, with the economy in recession and bank profits low, now would be an especially difficult time for banks to raise more capital. Nevertheless, given the study's emphasis on the benefits of capital, it is surprising Treasury did not recommend at least a gradual move to higher capital standards rather than rely solely on stricter enforcement of current standards.

Financial Restructuring

The Treasury plan contains three sets of proposals for restructuring the financial system. The first set would allow full interstate banking. The second would allow banks to affiliate with other financial companies such as securities firms and insurance firms. The last set would end the separation of banking and commerce by allowing commercial firms to own banks indirectly. The main purpose of these proposals is to protect the taxpayer and increase bank profitability. Treasury believes the proposals would also improve the allocation of investment by reducing pressure on

banks to shift into risky activities and by helping banks attract new capital.

Interstate banking

Treasury proposes that banks have complete freedom to expand across state lines, including the right to establish branches. By helping banks diversify their loan portfolios, this proposal could significantly reduce FDIC losses from bank failures.

Rationale. Along with other banking experts, Treasury believes full interstate banking would protect the taxpayer by sharply reducing the rate of bank failures. According to this view, nationwide banking organizations would be less vulnerable to regional economic downturns because such organizations could offset losses in depressed regions with profits in prosperous regions.

Treasury also argues that full interstate banking would increase bank profitability. Some bank holding companies (BHCs) have already expanded to a limited degree by establishing subsidiaries in other states. According to Treasury, allowing BHCs to replace these subsidiaries with branches would boost profits by eliminating costly duplication of management and overhead.

Description. The Treasury plan contains two interstate banking proposals. The first proposal would repeal the Douglas Amendment to the Bank Holding Company Act, which prohibits bank holding companies from acquiring banks in another state unless explicitly authorized by that state. Most states have already acted on their own to allow some kind of entry by outside holding companies. However, some of these states allow entry only from neighboring states or from states with reciprocal agreements. The Treasury plan would hasten the day when BHCs can establish subsidiaries anywhere in the nation.

The second, and more important, proposal would repeal the prohibition against interstate branching in the McFadden Act. National banks would be allowed to open branches in any state. Also, state-chartered banks would be allowed to open branches in any state as long as they were authorized to do so by their home states. Although interstate branching would be allowed, states could continue to restrict branching within their boundaries, as a few do now.

Evaluation. To the extent the industry moved to full interstate banking, Treasury's proposals could do more to protect taxpayers than any other part of the plan. In the 1980s, most bank failures occurred in states specializing in energy or agriculture. More recently, banking problems have shifted to states in the Northeast with sluggish growth and slumping real estate markets. A nationwide banking organization that avoided concentrating all its loans in a single region would have a much greater chance of surviving such downturns. Thus, many banks would find it in their interest either to merge with a nationwide organization or to expand on their own. As that happened, bank failures would decline.²⁰

Some might argue that the Treasury proposals would not cause a dramatic change because most states already allow entry by BHCs from other states. But as noted above, not all these states allow entry by holding companies from anywhere in the nation. Even more important, allowing interstate branching should make geographic expansion more attractive because opening a branch is often less costly than setting up a subsidiary. Finally, even if no new expansion occurred, the Treasury plan could still increase bank profits by allowing BHCs that had already expanded to replace subsidiaries with branches.

Affiliation with financial companies

The Treasury plan would allow well-capitalized banks to affiliate with any financial company. While this proposal would not be as harmful as some critics believe, it would be unlikely to achieve the benefits Treasury suggests.

Rationale. Current law generally prohibits banks from offering services like insurance and securities underwriting. The law also severely restricts BHCs from offering such services through separate subsidiaries. Although Treasury opposes letting banks offer new financial services directly, it believes well-capitalized banks should be allowed to affiliate with any company offering financial services. In other words, BHCs should be allowed to offer a full range of financial services, provided their banks are well capitalized and the new activities are conducted in nonbank subsidiaries. And any financial company should be allowed to own and operate well-capitalized banks.

Treasury believes affiliation with financial companies would increase bank profits due to synergies between banking and other financial services. According to this argument, affiliation with financial companies would make it easier for banks to sell their traditional products. For example, a large firm that had been raising its short-term funds on the open market would be more willing to borrow from a bank if the bank's affiliates could help the firm meet its other financial needs, such as selling equity or buying insurance. Such one-stop shopping could save the firm considerable time and effort. And because the bank and its affiliates could share information about the firm's financial condition and future prospects, they could provide the needed services at lower total cost.

Treasury believes its proposal would also reduce taxpayer risk by attracting new capital to banks. Treasury argues that BHCs would be willing to inject more capital in their banks in order to qualify for the new financial powers. Also, some insurance and securities firms would acquire poorly capitalized banks and inject capital into them in order to get into banking. Finally, even if insurance and securities firms purchased only well-capitalized banks, the price of bank stocks would rise, making it cheaper for poorly capitalized banks to raise additional capital. The extra capital would cushion banks against failure and reduce their incentive to gamble. Thus, the rate of bank failures would fall, reducing taxpayer risk.

Finally, Treasury argues that new financial powers would reduce taxpayer risk by helping BHCs diversify. According to this argument, a BHC offering new financial services would be unlikely to suffer simultaneous losses on its bank and nonbank operations. Thus, if the BHC's banks fell on hard times, the BHC could use the profits from its nonbank operations to cover the banks' losses and keep them from failing.

At first glance, it would seem the benefits claimed by Treasury could be achieved more simply by letting banks offer new financial services directly. This system is common in Europe, where so-called universal banks offer a wide variety of financial products. However, Treasury believes the FDIC and the taxpayer would be better protected by confining the new services to affiliates and restricting transactions between banks and affiliates. That way, the federal safety net would not be extended to new activities. In particular, a BHC's banks would be less likely to be dragged down at FDIC expense if the company suffered heavy losses on new financial services.²¹

Description. The Treasury proposal

would create a new type of company that could engage in both banking and other financial activities. BHCs whose banks significantly exceeded minimum capital requirements would be allowed to offer new financial services through nonbank subsidiaries. And companies that already offered these services could acquire banks as long as they added whatever capital was needed to make the banks well capitalized. The new activities would include selling and underwriting insurance, underwriting securities, and establishing mutual funds. For most banks, these activities have either been banned or confined to nonbank affiliates whose primary business is closely related to banking.²²

The definition of "well capitalized" would be based on the same zones as in Treasury's proposal for stricter enforcement of capital standards. Specifically, a BHC's banks would qualify as well capitalized if at least 80 percent of the company's banking assets were held by banks in Zone 1 and the rest by banks in Zone 2. If a BHC's banks suffered losses that ceased to qualify them as well capitalized, the BHC would have to recapitalize the banks or terminate the new financial activities.²³

To insulate banks from losses by their new affiliates, all existing "firewalls" between banks and affiliates would be maintained. These firewalls include strict quantitative limits on loans from banks to affiliates and a requirement that all business deals between banks and affiliates be at arm's length. The Treasury plan would also allow regulators to impose any special restrictions on interaffiliate transactions they deemed necessary to prevent abuse of deposit insurance.

Despite the strong firewalls in the plan, regulation of BHCs would be relaxed in one important sense. BHCs must now satisfy consolidated capital requirements for the whole

organization in addition to individual capital requirements for each bank. The Treasury plan would eliminate consolidated capital requirements for any BHC whose banks satisfied the individual capital requirements.

Evaluation. Letting banks affiliate with financial companies would be unlikely to boost bank profits or significantly protect the taxpayer. Exploiting synergies between banking and financial services would not address the main cause of the decline in bank profitability. Also, little capital would be injected into banks because BHCs would have too little incentive to offer new financial services and because insurance and securities firms would have too little incentive to get into banking. Finally, while new powers would make BHCs safer, they could still refuse to aid their troubled banks, leaving the taxpayer at significant risk.

Why might affiliation with financial companies do little to boost bank profits? While some synergies between banking and other financial activities undoubtedly exist, there is little empirical evidence that these synergies are large (Litan). More importantly, the Treasury proposal would not attack the primary cause of the decline in bank profitability. According to Treasury, the main cause is overcapacity—too many banks chasing too few good lending opportunities. The proposal would neither expand banks' investment opportunities nor allow them to lend freely to their new financial affiliates. Thus, banks would continue to lack an adequate outlet for their funds.²⁴

It is also doubtful that the Treasury proposal would induce companies to inject large amounts of new capital into banks to earn the right to diversify. Until banking becomes more profitable, insurance and securities firms are unlikely to be interested in acquiring banks. Furthermore, the insurance and securities industries have experienced

problems of their own in recent years, suggesting BHCs would have little to gain by expanding into those areas (Dudley). To be sure, both BHCs and other financial companies could still profit from offering a wider array of services if synergies were large. But there is little evidence synergies are large enough to make companies willing to accept Treasury's terms for diversification.

Finally, Treasury overstates the extent to which BHC diversification would reduce FDIC losses. Most studies have found that returns to new financial services are neither highly correlated with the returns to banking nor exceptionally risky by themselves (Saunders). Thus, Treasury is probably correct that expansion into new services would make BHCs safer, in the sense of reducing the variability of their profits. It does not follow, however, that the risk of bank failures would fall. Treasury assumes diversified BHCs would use their profits on new financial services to cover the losses of their troubled banks. But a BHC might well prefer to let its troubled banks fail. To be sure, the company would have to give up its right to offer both banking and other financial services. But on the positive side, the company could saddle the FDIC with the banks' losses and keep all the profits from other financial services to itself. Thus, if the losses were big enough, a BHC might choose to abandon its troubled banks.²⁵

While new financial powers would do little to reduce FDIC losses, it is only fair to note that new powers would probably not increase FDIC losses as much as some critics claim. These critics worry that new powers would expand opportunities for risk-prone BHCs to gamble, just as product deregulation in the early 1980s made it easier for undercapitalized S&Ls to gamble. But a key difference between the two situations is that BHCs would have to exercise new powers outside their banks and

with strict firewalls, whereas S&Ls were allowed to pursue new activities directly. Also, under the Treasury proposal, only BHCs with well-capitalized banks could pursue new activities. In contrast, many of the S&Ls that took advantage of product deregulation in the 1980s were severely undercapitalized.

The Treasury proposal could still increase the risk of FDIC losses in another way—by eliminating consolidated capital requirements for most BHCs. A BHC that suffered heavy losses on its nonbank operations might be tempted to gamble in its traditional banking operations to stay alive. By forcing a BHC to maintain a cushion against nonbank losses, consolidated capital requirements would reduce the chance of the BHC's net worth falling to the point where it faced this temptation. Thus, if new powers are granted, consolidated capital requirements should be retained.²⁶

Indirect ownership of banks by commercial firms

The last of Treasury's restructuring proposals would allow commercial firms to acquire BHCs with well-capitalized banks. Like new financial powers, commercial ownership of BHCs would be unlikely to help banks. At the same time, commercial ownership of BHCs would be more likely than new financial powers to increase taxpayer risk.

Rationale. Under current law, banks and BHCs can neither engage in commercial activities nor affiliate with commercial firms. While opposing a complete end to the separation of banking and commerce, Treasury believes commercial firms should be allowed to own BHCs with well-capitalized banks. According to Treasury, this change in ownership rules would decrease taxpayer risk by attracting new capital to banks. Some commer-

cial firms would acquire BHCs with poorly capitalized banks and inject enough capital in the banks to qualify them for commercial ownership. More generally, efforts by commercial firms to acquire BHCs would drive up the price of BHC stock, making it cheaper for all BHCs to raise capital to channel to their banks.

Description. Under the Treasury plan, a commercial firm could acquire any BHC that was strong enough to qualify for new financial services. Thus, any BHC with at least 80 percent of its banking assets held by banks in Zone 1 and the rest held by banks in Zone 2 would be eligible.²⁷ To avoid extending the federal safety net, the plan would also impose especially strong firewalls to insulate banks and BHCs from losses by their commercial parents. A BHC and its subsidiaries would be prohibited from extending any form of credit or financial guarantee to the commercial firm and from purchasing any financial asset from the firm. Other transactions between the commercial firm and the BHC or its subsidiaries would be subject to the same firewalls as between banks and affiliated financial companies.

Evaluation. Allowing commercial ownership would probably do little to attract new capital to the banking industry. At the same time, commercial ownership could increase taxpayer risk due to the difficulty of enforcing firewalls.

While Treasury is correct that many banks need to attract more capital, allowing commercial ownership would be unlikely to help. Like financial firms, commercial firms would be deterred from investing in banks by the low level of bank profits. And commercial firms would have even less reason than financial firms to invest in banks because banking has fewer synergies with commercial activities than with financial services. Investment in

banks will become more attractive only if profitability increases. But in that case, commercial ownership of BHCs will be unnecessary because plenty of funds will be available from other investors.²⁸

Compared to new financial powers, commercial ownership would also pose a greater risk of extending the federal safety net outside banking by exposing banks to losses by their affiliates (Corrigan 1991b; Volcker). In theory, the strong firewalls proposed by Treasury would make it hard for a bank to assist a troubled commercial parent. However, firewalls could be much more difficult to enforce for commercial firms than for securities and insurance firms, most of which are already subject to some form of regulation and engaged in activities familiar to banking regulators. For example, one way a bank could aid a troubled affiliate is by lending to the affiliate's customers at preferential terms. Such transactions could be very difficult to spot if the affiliate were an unregulated commercial firm involved in a wide variety of businesses.²⁹ Thus, if banks are to be allowed to affiliate with other firms, a good case can be made for starting with financial firms and allowing commercial ownership only later, if at all.

Conclusions

Citing recent banking difficulties and the precarious state of the insurance fund, Treasury has issued a comprehensive plan for reforming deposit insurance and restructuring the financial system. This plan has three goals—to protect the taxpayer, improve the allocation of investment, and restore the long-run health of the banking industry. Treasury deserves credit for identifying these important goals and coming up with a concrete plan to achieve them. However, while useful as a

starting point for debate, the plan has some shortcomings.

The main limitation of Treasury's deposit insurance reforms is that they are too cautious. Using risk-based premiums to complement minimum capital requirements would improve on the current system by rewarding banks for safe behavior. But Treasury's other deposit insurance proposals fail to resolve underlying problems. Treasury argues that deposit insurance coverage should be reduced to limit the FDIC's liability and increase depositor discipline. But because the plan might not eliminate de facto coverage of deposits at large banks, it could merely shift deposits from small banks to large banks without reducing coverage. Similarly, Treasury emphasizes the benefits of capital as a cushion against failure and an incentive against risk-taking. But rather than push for higher capital requirements, Treasury only advocates stricter enforcement of existing standards.

On the whole, Treasury's financial restructuring proposals err in the opposite direction, going further than necessary. As Treasury suggests, full interstate banking would reduce bank failures due to regional downturns. However, there is little reason to believe affiliation with financial firms would make banks safer or more profitable. The securities and insurance industries have been having their own problems. And even if BHCs diversified their operations, they would not necessarily come to the aid of their troubled banks. Finally, opening ownership of banks to commercial firms would achieve few synergies and attract little capital to the banking industry. Given the lack of benefits, commercial ownership does not seem worth the risk, however small, that losses by commercial firms could spill over to their banks.

Endnotes

¹ The Treasury study is divided into two parts (Department of Treasury 1991a). The first 74 pages give Treasury's justification for reform and explain the details of the plan. The rest of the study consists of 21 discussion chapters written with the help of staff from other government agencies. Soon after publishing the study, Treasury issued a detailed legislative proposal that departed in only minor ways from the recommendations of the study (Department of Treasury 1991b).

² If the FDIC becomes insolvent, it may not be possible to cover the deficit by raising insurance premiums for banks. Beyond a point, increasing the premium rate may reduce total revenue by reducing total deposits. And even if it were feasible, raising premiums enough to cover all FDIC losses might be undesirable because it could cripple the banking industry and curtail financial intermediation.

³ It should be noted that increased competition could have encouraged bank risk-taking in other ways. For example, some economists argue that increased competition reduced the value of a bank charter, making banks more willing to take gambles that could result in failure and loss of the charter. This possibility is not mentioned in the first part of the study but is cited in one of the discussion chapters (Department of Treasury 1991a, p. I-16) and in other Administration analyses of the deposit insurance crisis (Council of Economic Advisers).

⁴ The Treasury study and legislative proposal include many other recommendations besides those discussed in this article. The most important of these are proposals for simplifying bank regulatory structure and recapitalizing the bank insurance fund.

⁵ To be useful as a measure of ex ante risk, capital must also be subject to the bank's control. A bank that has low capital due to heavy losses may be unable to raise capital from outside investors and unable to build up capital quickly through retained earnings. In such cases, capital serves more as an ex post measure of risk, which is why Treasury suggests it may be unwise to charge higher premiums to severely undercapitalized banks.

⁶ Several years ago, for example, the FDIC issued a formal proposal to base premiums on ex post measures of risk such as loan delinquencies and loan chargeoffs (Hirschhorn).

⁷ This potential disadvantage of pure "price regulation" is discussed further in Keeton.

⁸ The 12 accounts would consist of three individual accounts, three joint accounts, two IRA accounts, and four revocable trust accounts (Department of Treasury

1991a, p. 19).

⁹ Pass-through coverage would still be available for self-directed and defined-contribution pension plans. In contrast to defined-benefit plans, members of these plans control their own investments.

¹⁰ The Treasury study also recommends that the Fed lend the FDIC enough money to cover the extra cost of protecting uninsured deposits. In theory, this provision could also limit coverage of uninsured deposits, because the Fed might be reluctant to lend to the FDIC on a regular basis. However, the provision was dropped from the Administration's legislative proposal.

¹¹ Some experts believe that allowing uninsured depositors to suffer losses would cause little harm to the financial system even when the failing bank owes large amounts to other banks. According to this argument, the main risk is that the creditor banks would temporarily lose access to their funds—a problem that would be alleviated by Treasury's final settlement plan and by recent reforms in the large-dollar payments network (American Bankers Association).

¹² The recent literature on bank runs assigns key roles to the illiquidity of bank loans and the fact that some depositors are less informed than others (Jacklin). Even without these factors, however, a flight to quality could occur if enough uninsured depositors came to doubt the ability of borrowers to repay their bank loans.

¹³ The argument that reduced coverage could disrupt the economy by causing flights to quality can be found in Government Operations Committee, pp. 66-73. The original proponents of federal deposit insurance were also concerned about flights to quality. They believed deposit insurance would help end the Depression by reversing the flight from bank deposits to safer assets and stimulating bank lending (Committee on Banking and Currency). Critics of the flight-to-quality argument agree total bank lending might decline as banks shifted out of loans into safer assets but argue that the decline would not be large enough to hurt the economy (Benston and others).

¹⁴ Treasury's proposal for full interstate banking would also encourage the shift in uninsured deposits to large banks by making it easier for large banks to compete with small banks for funds.

¹⁵ Members of the Board of Governors have expressed differing views on the issue of de facto coverage. Chairman Greenspan and Governor LaWare have supported the Treasury view that uninsured depositors should be protected in some circumstances but not others

(Greenspan; LaWare). On the other hand, Governor Angell has argued for fully insuring all deposits (Angell).

¹⁶ Some observers, including Treasury, argue that large banks do not enjoy an unfair advantage over small banks (Department of Treasury 1991a, pp. 30-31 and VI-7). According to this view, large banks have been overcharged for deposit insurance relative to small banks because they fail less often and have assets that can be liquidated more easily when they do fail. This view is highly controversial (Barth and others). But even if it were correct, it would make more sense to provide small and large banks the same coverage and charge them different premiums per dollar of coverage to reflect the difference in their risk.

¹⁷ Treasury's legislative proposal added a provision prohibiting banks that fail to meet minimum capital requirements from offering significantly higher deposit rates than other banks in the same market (Department of Treasury 1991b, p. 8).

¹⁸ With a higher minimum, it would still make sense to require banks falling even slightly below the minimum to submit a recapitalization plan and cut dividends. However, regulators could afford to let banks drop further below the minimum before severely restricting their activities.

¹⁹ This advantage of deposits over equity is emphasized in Orgler and Taggart. Other experts dispute this view, arguing that transactions services can be "unbundled" from deposits. Deposits could also be cheaper to a bank than equity because of the tax deductibility of interest or underpriced deposit insurance. But in this case, there would be no net cost to society from forcing banks to hold higher capital because the increase in banks' cost of funds would be offset by an increase in tax revenues or decrease in FDIC losses.

²⁰ The possibility cannot be ruled out that some banking organizations would take advantage of interstate banking to increase their risk. In particular, a nationwide banking organization eager to gamble on high-risk loans could divert deposits from stable regions to regions experiencing speculative booms. An example of such behavior is the case of midwestern S&Ls that made speculative real estate loans in Texas and Arizona during the 1980s.

²¹ To see why controls on interaffiliate transactions might be needed to insulate banks, suppose a BHC has an implicit understanding with investors that it will use all its resources to back the debt of its nonbank subsidiaries. Allowing a troubled nonbank subsidiary to fail could cause investors to question that guarantee, raising the cost of debt to the BHC's remaining subsidiaries. Thus, without controls, a BHC might use its banks to bail out

its nonbank subsidiaries, even though the bailout would reduce the profits the BHC earned from its banks (Flannery 1986, pp. 220-23). Another situation in which controls may be needed is when a BHC suffers such heavy losses on its nonbank operations that it cannot service its debt. In this case, the only way for the BHC itself to avoid bankruptcy may be to siphon resources out of the banks to make payments on the debt.

²² Under the Treasury plan, all BHCs would be called Financial Service Holding Companies (FSHCs), whether or not they offered the new financial services.

²³ The legislative proposal also requires the BHC to post a bond with the FDIC for the amount of the capital shortfall (Department of Treasury 1991b, pp. 61-62). This bond would be used to reimburse the FDIC for any loss it suffered if the banks failed. If the BHC refused to post the bond or failed to submit a recapitalization plan, regulators could take over those banks not in Zone 1.

²⁴ Some experts argue that allowing affiliation with financial companies could relieve overcapacity in a different way—by enabling BHCs to employ their excess managerial and human capital in other lines of business besides traditional banking (Government Operations Committee, pp. 23-30). This argument assumes that BHCs' managerial and human capital is relatively immobile and would not quickly exit the banking industry in the absence of new powers.

²⁵ The Federal Reserve has long argued that BHCs should act as a "source of strength" to their banks by using the profits from their nonbank operations to prop up their failing banks. But the Fed has had little luck enforcing this doctrine, and its legality has recently been thrown into doubt. Some policymakers have proposed that the source-of-strength doctrine be legalized by making BHCs liable for any losses incurred by the FDIC on their failing banks (GAO, pp. 115-18, Government Operations Committee, p. 48). By discouraging BHCs from walking away from their troubled banks, this proposal would ensure that taxpayers shared in any benefits of expanded powers to BHCs. The question remains, however, whether many companies would be interested in exercising the new powers.

²⁶ A further modification of the Treasury proposal would be to extend controls on interaffiliate transactions to daylight overdrafts, a reform many experts consider long overdue (Flannery 1988). When a bank allows an affiliate to incur overdrafts on its account during the course of the day, the bank extends intraday credit to the affiliate. This form of credit is now exempt from controls on interaffiliate loans, even though default by the affiliate could have serious consequences for the bank.

Some critics worry that even with consolidated capital requirements and controls on daylight overdrafts, losses on nonbank operations could spill over to a BHC's banks through "guilt by association." According to this argument, a bank's uninsured depositors could interpret the losses as evidence that the BHC's entire management was incompetent or risk-loving, causing the depositors to lose confidence in the safety of their funds (Flannery 1986, pp. 217-18).

²⁷ Commercial firms that acquired BHCs would be known as Diversified Holding Companies (DHCs).

²⁸ Some critics have also attacked the Treasury proposal on the grounds that the banking industry suffers from overcapacity and therefore needs no additional capital

(Corrigan 1991a, CBO). This criticism seems overstated. It may be true that the industry as a whole needs to shrink to return to profitability. It may also be true that after such an adjustment, the \$200 billion in capital the industry now holds would be adequate. In the meantime, however, an infusion of outside capital would still help protect the taxpayer and discourage wasteful risk-taking. ²⁹ As in the case of new financial powers, it would be inadvisable to let commercial firms own BHCs without imposing consolidated capital requirements on the owner. But determining the appropriate consolidated capital requirement for a large industrial firm with many different businesses would be no easy matter.

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The Quiet Revolution in the U.S. Food Market

By Alan Barkema, Mark Drabenstott, and Kelly Welch

A quiet revolution in the U.S. food market is underway that may change the way farmers and food processors deliver food to consumers. While consumers will still see grocery shelves stocked with the foods they want, the revolution will significantly alter the way producers and processors do business.

Driving this revolution are changes in both consumer tastes and technology. Today's consumer wants nutrition, convenience, and an ever-widening variety of food products. Meanwhile, advances in production and processing technology are enabling farmers and food processors to target specific consumer niches more precisely than ever before. Combined, these changes in consumer demand and food technology are changing the way the food market links producers, processors, and consumers.

The food market is the elaborate system that moves food from producers and processors to consumers. Historically, raw and partially processed farm products en route to the grocery have been sold in a series of generic commodity markets. These markets are becoming obsolete, however, as food processors aim their products at a growing number of smaller consumer niches. Instead, contractual agreements and vertical integration, or mergers, among producers and processors are becoming increasingly common in the food market.

This article considers how changes in the U.S. food market will affect consumers, farms, rural communities, and farm policy. The first section reviews changes in consumer food demand and in food production and processing technology. The second section shows how those changes are leading to more contracting and vertical integration in the U.S. food market. The third section shows how

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the changing food market may encourage lower food prices, bigger farms, fewer viable rural communities, and an overhaul of farm policy.

Changes in Food Consumption and Technology

The U.S. food market is changing from a mass market to many niche, or specialty, markets. The change appears driven by the consumer's preferences for a wider variety of foods that are both nutritious and convenient. The multiplying niches put new production and marketing demands on farmers and food companies accustomed to a general market. The demands may be met by promising technologies just now emerging from the pipeline of agricultural research.

How is U.S. food consumption changing?

U.S. food consumption has evolved steadily over time, causing food companies to respond with new food products. The shift in food consumption is so great today that it is changing not only the *types of food* brought to the market, but also the *market* itself. The mass food market has splintered into many niche markets. Quaker Oats, for example, used to sell one type of oatmeal. Today, it markets three types and 12 flavors of oatmeal, and the types and flavors vary by region of the country.

The emergence of niche markets for food consumed at home can best be seen at the local supermarket. More than 10,000 new food products were introduced in 1990, five times the number of new products a decade ago (The Food Marketing Institute). To make way for all the new products, supermarkets keep expanding; the floor space in the average supermarket grew by 50 percent during the 1980s. While the

increase was partly due to industry consolidation and economies of scale, a doubling in the number of products was also an important factor.

Niche markets are also developing for food consumed away from home. Consumers want more restaurant choices, including more ethnic food. The number of ethnic category restaurants (including Mexican, Italian, Asian, and others) increased 9.3 percent a year from 1985 to 1990, more than four times as fast as the total number of restaurants (*RE-COUNT*). Moreover, the average menu at individual restaurants now features more choices than a decade ago (*Nation's Restaurant News*).

Changes in U.S. food demand represent a consumer revolution that is transforming the way food is marketed, whether at home or away from home. Niche marketing is the only way to reach consumers effectively (Clausi). Products aimed at the mass market are now being overtaken by products aimed at specific consumer segments. From Campbell soup to McDonald's hamburgers, food companies are aiming at smaller market niches, a strategy that requires more careful product development and marketing.

Why is food consumption changing?

Three forces are behind the recent shift to smaller food market niches: a new emphasis on nutrition, changes in the American lifestyle, and changes in demographics. Together, these forces translate into strong consumer demands for a greater variety of healthier, more convenient foods.

A new emphasis on nutrition is leading to demand for substantially different food products. U.S. consumers increasingly believe that their diet influences the risk of several major chronic diseases, including

Table 1
Foods with Biggest Increases and Decreases in Consumption

<u>Food consumption gains</u>	<u>Percent change 1976-78 to 1986-88</u>
Fresh broccoli	231.8
Low-calorie sweeteners	193.2
Fresh cauliflower	174.1
Fresh grapes	134.8
Rice	95.1
Yogurt	89.4
Fresh carrots	77.0
Frozen broccoli	67.6
Turkey	62.7
Cheese (excl. cottage)	46.0
<u>Food consumption losses</u>	
Veal	-46.1
Whole milk	-33.8
Canned green peas	-32.8
Canned peaches	-27.8
Distilled spirits	-25.2
Nonfat dry milk	-23.2
Canned corn	-19.6
Beef	-17.8
Coffee	-7.5
Lamb	-8.8

Source: *Food Consumption, Prices, and Expenditures*, SB-804, U.S. Department of Agriculture, ERS, May 1990.

heart disease and cancer. A shift away from a traditional high-fat, high-protein diet appears underway. Illustrating that shift, one consumer group recently called for the four basic food groups, the historical benchmark of good eating, to be overhauled.¹ As some consumers adhere to a more traditional diet and others adopt newer diets, the number of products consumed in the food market will increase.

Recent food consumption data confirm that consumers are shifting their spending to different foods. Half of the ten foods for which per capita consumption increased the most over the past two decades were fruits or vegetables (Table 1). Notwithstanding President Bush's disdain, broccoli was the food with the biggest gain in consumption. On the other hand, half of the ten foods with the biggest decline in consumption were red meat or dairy products. In short, consumers appear to want nutrition and freshness while reducing cholesterol and fat.

The shift in consumption places new demands on food suppliers. Producers of traditional foods in decline, such as red meat and dairy products, are forced to explore ways of eliminating unwanted food qualities, like saturated fat. The increased demand for fresh fruits and vegetables calls for improving existing delivery systems.

Lifestyle changes point to greater demand for convenience foods. Nearly three-fourths of the women aged 25-54 are now in the work force, compared with about half 20 years ago. Thus, most households have cut back sharply on the time spent preparing food, choosing instead to eat out or buy foods that are at least partially prepared. The shift to convenience will mean that food companies will process foods more fully and package them differently before they reach the consumer.²

Demographic shifts are resulting in consumer demands for a wider variety of foods. Two shifts stand out: the aging of the baby-boom generation and the increasing ethnic diversity of the population.

The aging baby-boom generation, composed of persons born between 1946 and 1964, may be one of the most powerful forces in the food market of the 1990s. The Food Institute, for example, estimates that the baby-boom segment is essentially the only population

group that will increase spending on food at home in the 1990s.³ As they age, baby boomers are becoming more health-conscious and eating a more diverse diet with less protein and more fruits and vegetables.

Meanwhile, the U.S. population is becoming more ethnically diverse, supporting a move toward a more diverse array of food products. The Asian and Hispanic segments of the U.S. population recently have grown two to three times as fast as the general population, a trend that is expected to continue in the 1990s (*New York Times*). The ascendance of these groups comes at a time when the American palate is already becoming more internationalized. The increasing cultural diversity of the nation's population will only amplify the trend to more food market niches.

The promise of technology

The splintering food market leaves farm producers and food companies with many smaller targets instead of the mass market of the past. Fortunately, emerging technologies make it possible to hit these smaller targets. The technologies will be important for both the farmer and the food company.

Farm technology. In the past, advances in agricultural technology have mainly cut costs while increasing farm output. Two classic examples are hybrid seed corn and herbicides. Technologies now becoming available promise to lower costs *as well as* give the producer more control over the final food product. That element of control—the ability to fine-tune farm products for final markets—would mark a breakthrough in putting farmers in touch with consumers.

Biotechnology offers the greatest benefits in controlling farm product characteristics.⁴ With biotechnology, scientists can assess the genetic blueprint of plants and animals, insert

a gene that produces a desirable trait, and then reproduce plants or animals that carry the gene. With consumers demanding food products with specific nutritional and quality traits, the advantages of biotechnology are enormous. As one observer put it, “the beauty of modern biotechnology lies in its specificity” (*Food Technology*).

A number of prospective biotechnologies offer promise for delivering the food products consumers want. Animal scientists may be able to change genes so that beef cattle and hogs convert feed into lean tissues instead of fat (National Research Council). That breakthrough in leaner meat could spread quickly if scientists perfect current attempts to clone animals, that is, to replicate the genetic profiles of animals. Scientists may also be able to isolate the gene that controls the production of cholesterol in beef, pork, and eggs, offering the possibility of inhibiting its production.

Similar advances are possible in plants. To satisfy the expanding demand for fresh fruit, scientists may be able to insert genes that would keep fruits from bruising and losing flavor once picked. Genetic alteration in the protein composition of major grains would make it possible for farmers to produce corn or wheat for a specific livestock feed or food product requirement.

While none of these technologies is commercially available today, all are being actively pursued in the laboratory. Many industry observers believe that a number of the products could be introduced during the next five years, certainly within the decade of the 1990s.⁵

Food technology. Additional technologies will give food companies new ability to control food characteristics more precisely (*Food Technology*). Several technologies are aimed at reducing fat and cholesterol. A new means of removing substances, supercritical fluid extraction, is being

tested to reduce fat in red meats and cholesterol in eggs. Another method would replace saturated fats with unsaturated fats from non-animal sources in a "restructured" product. An example of this technology already in the market is McDonald's McLean hamburger, which substitutes water and carrageenan, a seaweed derivative, for saturated fat. In a different technology, food processors may be able to add genetically engineered microorganisms to the fermentation of cheese, yogurt, and sausage. The microorganisms would cut fermentation time while reducing the cholesterol level of the final product.

In short, the food chain is being fundamentally changed as new technologies make it possible to design food products from the farm through the processor to the retail shelf. While each technology alone has promise, the integration of the technologies along the entire food chain offers enormous potential for controlling precisely the final cost and characteristics of retail food products.

Consider, for example, the ability to design fresh beef products. At the beginning of the food chain, the producer may select a genetically engineered steer that will convert feed mostly to lean meat. The feed lot operator may then be able to gauge the fat content "on the hoof," through new monitoring technology. Based on the reading, he or she can shift the mix of nutrients and genetically engineered grains to discourage fat levels. New computer software will make these daily decisions routine.

Once the steer is passed to the beef packer, additional steps can be taken to cut fat. After trimming, the processor might select some beef cuts for further processing and fat reduction. Through selective extraction and fat substitution, a variety of low-fat beef products could be sent to the retail market.

All of these steps work together toward

achieving with precision what the consumer wants: a low-fat, nutritious food product. Yet technological innovation alone will not guarantee a well-functioning food market. Innovation in the structure of the food market itself is also vital.

The Changing Structure of the Food Market

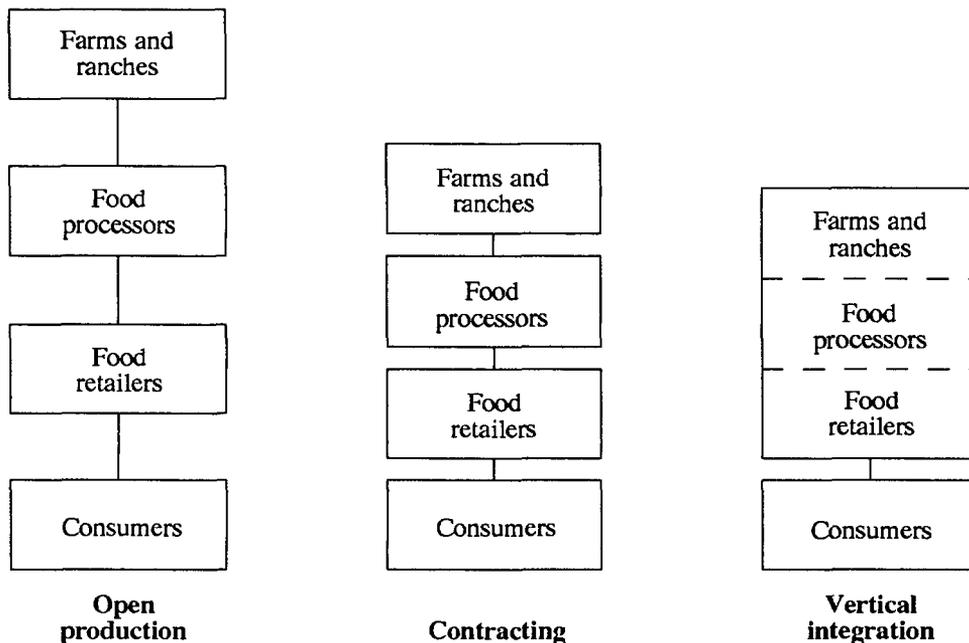
The food market is the elaborate communication and trading system linking farmers and ranchers, food processors, and consumers.⁶ Its primary task is to turn raw farm products into the myriad of food products appearing in the grocery store. If the market is working smoothly, the huge produce from the nation's farms and ranches will reach grocery store shelves in exactly the form and quantity that consumers want. The sweeping changes in consumer food demands and in farm and food technologies, however, have triggered a revolution in the food market's structure.

Why is the traditional market structure changing?

The food market's traditional way of matching food demand and food supply is rapidly becoming outmoded, as consumer demand splinters into smaller niches and as farm and food technologies evolve. Aiming the growing number of new food products at new consumer niches takes more precision than the food market's traditional structure can offer. As a result, other ways of coordinating the food market are becoming more common. The new market structure shortens and clarifies the communication channels among farmers and ranchers, food processors, and consumers, reducing the odds that a targeted consumer niche will be missed.

Market analysts view the food market

Figure 1
The Vertical Structure of the U.S. Food Market



vertically. At the top of the market are farms and ranches, and at the bottom are consumers (Figure 1). Food processing and marketing firms fill the middle stages of the market.⁷ More value is added to raw farm products at each successive processing and marketing stage. Eventually, finished food products are distributed to retail outlets for sale to the nation's consumers. The food market's task of synchronizing the flow of raw, intermediate, and finished food products is called "vertical coordination."

The traditional form of vertical coordination for many of the nation's major farm products—especially livestock, grains, and oilseeds—is called "open production." Under this coordinating method, the entire

production process is completed before any marketing commitments are made. As a result, both farmers and buyers of farm products are exposed to price, quantity, and quality risks during the time after production begins but before marketing commitments are struck. Farmers, for example, are vulnerable to unexpectedly large supplies of farm commodities, which can push prices down. Food processors, on the other hand, are vulnerable to unexpected shortages, which can push prices up, slow processing plants, or force plants to use inferior substitutes.

Open production relies on market prices to tell farmers exactly what food processors—and ultimately consumers—want. The grading and pricing system for farm products

must be detailed enough to differentiate among different types or quality grades that are important to food processors.⁸ Price signals can be inaccurate or easily misinterpreted, however, as product specifications become more detailed and as consumers begin to shop for more specialized products. Open production works well in the marketing of generic commodities that are sorted into a few, broadly defined quality grades. But the system is becoming outmoded in the increasingly specialized U.S. food market.

The marketing of beef cattle reveals the shortcomings of open production. Most beef cattle destined to become steaks and roasts are grouped into one of three quality grades—prime, choice, and select.⁹ Cattle feeders get a higher price for prime and choice cattle, which tend to produce juicier, more tender steaks than select cattle. To achieve the prime and choice grades, feeders often overfatten cattle, which boosts feeding costs sharply. Thus, by encouraging feeders to produce excess fat, the grading and pricing system has not only driven up production costs but also caused feeders to fall out-of-step with the shift in consumer demand toward leaner beef.¹⁰

Open production of beef cattle also exposes cattle feeders and beef processors to large price and quantity risks. Until the cattle are sold, cattle feeders are vulnerable to unexpected drops in beef prices.¹¹ Meanwhile, processors are vulnerable to unexpected shortages of fed cattle, which push cattle prices higher and hold processing volume in processing plants below the optimum level. Processing costs rise much faster in modern, high-speed processing plants than in older processing plants when processing volumes fall short of the optimum.

What are the alternative market structures?

Two other ways of coordinating the food market overcome many of the shortcomings of open production. Under *contracting*, firms bypass the open market and instead strike formal agreements that control the price, quantity, and quality of goods traded in a future transaction. Under *vertical integration*, previously separate stages of the food market are combined in a single firm. As a result, transactions that would otherwise take place in the food market are replaced with the internal administrative actions of a single firm.¹²

Contracting. The distinguishing feature of contracting is that it locks in marketing commitments before or during the production process. These commitments reduce the risks caused by variable price, quantity, or quality. Reducing these risks is a key to targeting new consumer niches.

The simplest type of contract, called a *market-specification* contract, sets the price, quantity, and quality of products to be traded in a future transaction.¹³ A contract of this type between a cattle feeder and a beef processor, for example, controls price risks for the cattle feeder and the beef processor. In addition, the processor is ensured a steady supply of cattle to keep high-capacity processing plants running.

The *production-management* contract can give the food processor direct control of farm production methods. This type of contract is useful when farm production methods influence the quality of the food processor's product. The steady advance of farm and food technologies promises to make this type of contract more popular in the future. For example, say a beef processor wishes to market a new line of fresh, low-fat, low-cholesterol beef products. The processor may contract with a feedlot operator to feed cattle specifically for

the new product market. The contract may specify certain production practices, such as the mix of feed ingredients or the length of time on feed. The contract may even ensure compliance by dictating periodic inspection of the cattle and feedlot by the food processor. Ultimately, the contract helps ensure that the contracted cattle will yield the right beef products to reach the targeted consumer niche.

Processors can assume even tighter control over the quality of farm products with a *resource-providing* contract. With this contract, processors provide all or part of the inputs used to produce farm products. For example, a beef processor may provide cattle of a specific genetic makeup to be fed by a feedlot operator. The contract ensures that the cattle are fed to the processor's specifications. In exchange, the feedlot operator is guaranteed a reasonable return for feeding the contractor's cattle. The control of both the cattle placed on feed and the feeding process ensures the contractor that the cattle will meet strict quality standards when slaughtered.

Each of the contracts described above reduces risk by shifting control of production to the food processor. The farmer's relationship with the food processor gradually approaches that of an employee of the food processor, as the contractual agreement becomes more extensive. Vertical integration takes the sequence of control a step further.

Vertical integration. Vertical integration shifts complete control of farm production to the food processor.¹⁴ Much of the uncertainty present in open production is eliminated, by ensuring greater control over product price, quantity, and quality.

Vertical integration is especially well-suited for controlling risks associated with investment in highly specialized assets.¹⁵ Many new production and processing technologies require expensive investment in research or capital

equipment. Because few other uses are available for an investment in such specialized property, the investment exposes the investor to substantial loss if the investment cannot be used as planned. For example, assume that a processor invests in a new technology for producing low-fat, low-cholesterol beef from cattle with genetically reduced fat levels. The processor may wish to own the cattle feeding operation in addition to the processing facility. Then a steady supply of cattle of the proper genetic makeup would be available to ensure the new processing technology could be used as planned.¹⁶

The food market structure of the future

Contracting and vertical integration are supplanting open production in the food market. Yet the three structures actually form a continuum rather than three distinct ways of coordinating the food market.¹⁷ Contracting provides tighter linkages between separate stages of the market than open production, and vertical integration provides tighter linkages than contracting. Still, some forms of contracting differ only slightly from open production, and others differ only slightly from vertical integration. How far and how fast the food market will move along the continuum from open production toward vertical integration remain open questions.

Two opposing forces will influence the outcome. On one hand, advances in farm and food processing technology will encourage more contracting and vertical integration. On the other hand, new information technology will help extend the usefulness of open production.

The same technologies that make it possible to target consumer niches will also require improved communication among the various stages of the food market. The technologies

Table 2

Percentage of Farm Production under Contract and Vertical Integration

	Production and marketing contracts				Vertical integration				Combined			
	1960	1970	1980	1990	1960	1970	1980	1990	1960	1970	1980	1990
Broilers	93.0	90.0	89.0	92.0	5.4	7.0	10.0	8.0	98.4	97.0	99.0	100.0
Fed cattle	10.0	18.0	10.0	17.5	6.7	6.7	4.5	5.0	16.7	24.7	14.5	22.5
Hogs	.7	1.0	1.5	8.5	.1	.1	.1	6.0	.8	1.1	1.6	14.5
Feed grains	.1	.1	7.0	NA	.4	.5	.5	NA	.5	.6	7.5	NA
Food grains	1.0	2.0	8.0	NA	.3	.5	.5	NA	1.3	2.5	8.5	NA
Oil seeds	1.0	1.0	10.0	NA	.4	.5	.5	NA	1.4	1.5	10.5	NA

Source: Marion (1960 - 80) and industry specialists at the U. S. Department of Agriculture, the National Cattlemen's Association, and the University of Missouri (1990).

will also expose farmers and food processors to the risk of loss on huge fixed investments. Both contracting and vertical integration are better suited than open production for addressing the specific communication needs and special risks of the high-technology food market.

Developments in information technology, however, will slow the trend from open production toward integration. Advances in testing and grading techniques will allow processors to sort farm commodities quickly and reliably into a wide range of precisely defined categories. For example, new ways to test cattle may allow processors to identify exceptionally lean fed cattle when they are sold. As a result, the processor's need to control the feeding process through contracting or integration would diminish.

The outcome of these two opposing forces will differ markedly for different food products. Data on the current structure of the U.S. food market are limited. Thus, projecting future changes is difficult (Table 2).¹⁸ Still, some general observations are possible. An

almost complete shift toward contracting and vertical integration has already taken place in the broiler industry. Contracting is increasing rapidly in cattle and hog production. But open production still predominates in the grain and oilseed markets.

The drive toward contracting and integration in the broiler industry was spurred in the 1950s and 1960s by the need to keep pace with the high-tech developments of the day—feed formulation, poultry genetics, and mechanization (see the box in the next section). Later, the industry's high level of integration enabled the quick development of new poultry products to meet rapidly changing consumer preferences.

In the pork and beef industries, contracting between feeders and processors has grown rapidly in recent years. Processors have sought to keep high-capacity processing plants operating at peak efficiency. Advances in genetic engineering, processing, and transportation will result in a wider range of conveniently prepared red meat products tar-

geted at health-conscious consumers. The communication and control needs of the new technologies will encourage a further shift toward contracting and integration in the pork and beef industries.

Changes in market structure for grains and oilseeds will be slower. Continued government intervention in grain markets promises to keep grain supplies available at low cost. Grain processors have little incentive to contract for grain production when government policies ensure a steady supply of low-cost grain.

In addition, recent advances in testing techniques promise quick identification of grain and oilseed attributes for specialized uses. For example, near-infrared spectroscopy can now be used to analyze the composition of a grain or oilseed sample in less than two minutes (Hurburgh). The new testing technique will give grain buyers—both livestock feeders and grain processors—quick assurance that grain bought in the open market meets requirements for protein, moisture, and oil content. Thus, the new testing techniques could encourage the use of market prices, rather than contractual agreements, to ensure grain quality specifications.

Peering further into the future, advances in production and processing technology may eventually lead to more contracting and vertical integration in the grain industry. When it occurs, the drive to more contracting will likely be driven by two things. First, genetic advances will allow the precise targeting of grain or oilseed attributes for a specific food or commercial application. Second, the company that researches and develops the genetic improvement will use contracts or vertical integration to protect its investment in intellectual property. For example, a soybean processor may enter a joint venture with a plant science research company to develop a soybean variety with a high yield of a par-

ticularly valuable oil. Once developed, the processor would protect the investment by retaining sole control over the enhanced soybean variety, probably using exclusive production contracts to do so.

The United States, therefore, is likely to have two types of grain production in the future. The first will yield generic commodities, perhaps with somewhat more detailed market grades than in the past. The second will yield high-value grains and oilseeds for specific commercial uses. Bulk corn and soybean production, for example, are likely to dominate in the Corn Belt stretching from Columbus, Ohio, to Lincoln, Nebraska. But within that expanse will emerge several pockets where highly specific grains are grown under contract for processing. As scientists are able to engineer grains for more food and commercial uses, the pockets will expand and multiply, displacing more of the generic production.

The Consequences of a Changing Food Market

The trend to tighter vertical coordination appears likely to spread, with varying speed and degree, to more parts of U.S. agriculture in the 1990s. What effects will a more integrated food chain have for consumers, producers, rural communities, and farm policy? Since U.S. agriculture has a history of mainly open production, the answers are difficult to predict. One food industry segment that is already dominated by contracting and integration, the broiler industry, does offer some helpful insights into what may happen (see box).

Consumers come out ahead

Consumers appear likely to reap several

benefits from the changing structure of the food market. As discussed earlier, the consumer's more specific food demands are the real impetus for change in the food market. With new farm and food technologies and tightened market coordination, consumers will get the foods they want. For example, they will be able to select from generic beef, branded beef, preprocessed beef entrees, and fat-reduced beef products.

The bigger question is whether consumers will see food prices rise or fall as a result of a more tightly coordinated food market. The evidence from the broiler industry suggests consumers received a variety of convenient chicken products *and* were able to buy them at lower prices, at least in part due to the industry's tighter coordination. Since the 1950s, when the shift to contracting and integration began in the broiler industry, poultry prices have fallen more than half in real terms. Prices for pork and beef, where contracting and vertical integration have proceeded much more slowly, have fallen much less.

Will food prices fall in other food industry segments as vertical coordination tightens? The answer depends on whether the firms that gain greater control in one food segment also control competing products in the same retail food category. For example, eight firms now control 55 percent of broiler production and processing, a relatively high degree of concentration. Such market power might be used to keep retail chicken prices high. But that has not happened for two reasons. First, competition remains keen among the eight dominant broiler producers; and second, chicken products must compete with many other meats and meat substitutes (including beef, pork, lamb, seafood, and dairy). The firms that control the broiler industry do not control the competing meats. The consolidation in the broiler industry, therefore, has simply passed

the lower costs of production along to consumers in the form of lower chicken prices. Whether this pattern holds true for other food industry segments remains to be seen.

Large farms gain, small farms lose

Greater vertical coordination will favor large U.S. farms, accelerating a long-standing trend toward fewer farms in the United States. Again, the broiler industry offers insight. Over the past 30 years, large broiler operations (those that sell more than 100,000 broilers a year) increased their share of total broiler production from 29 to 93 percent, while many small producers went out of business.

A similar trend may occur as contracting becomes more extensive in cattle and hog production. The relatively high fixed costs of administering production contracts encourages processors to contract with large-scale hog and cattle feeders. Moreover, as production and processing technologies become even more sophisticated, only the large-scale feeders are likely to have the technical means and management skills required to satisfy the exacting requirements of the processors. Feeders who can meet the more demanding requirements of the new food market will receive a premium price, while those that cannot will face a smaller market for their lower-priced generic production.

Likewise, increased contracting in grains and oilseeds production will likely benefit larger producers who are better able to meet contract specifications while minimizing the processor's administration costs. The industry's financial landscape may change markedly, as farms in pockets of high contracting activity enjoy the benefits of the special-purpose market, while farms elsewhere are limited to generic production.

For the large producers that remain, farm-

ing will be substantially different than in the past. Managing farm production will be more demanding with increased scale, greater use of complex technologies, and more exacting product quality requirements. Yet even as production oversight becomes more taxing, authority for many business decisions may shift to food companies down the food chain. What seed is used, when it is planted, and how the crop is harvested may all be decided by the firm that processes the crop. Historically, farmers have taken pride in their independence. If the broiler industry is a guide, producers will take on many attributes of contracted employees and give up many attributes of sole proprietors as contracting and integration increase (*Wall Street Journal*).

Small rural communities lose

Just as large farms gain and small farms lose, so the move toward tighter coordination in the food market benefits larger rural communities at the expense of smaller communities. Rural economic activity has been moving to larger market centers for a long time. Tighter vertical coordination will just accelerate the trend.

Contracting generally encourages a shift in production to larger rural communities in one region of the country. Broiler production, for example, has concentrated in South Central and Mid-Atlantic states while declining in the Northeast and Midwest. As production has migrated to states like Arkansas and Virginia, it has tended to locate near large rural towns that are home to the processing plants. Thus, small towns have been hurt, both in regions that gained production and those that lost it.

Increased agricultural production is clearly an economic plus to a large rural community, but the benefit may be less than expected. The firms controlling the production will be large

and probably will obtain inputs and credit from large urban centers. Thus, farm communities may increasingly resemble “branch plant” towns, or places dependent on economic decisions made elsewhere.

New questions for farm policy

By reducing the number of farms and by changing the nature of the farm business, tighter vertical coordination in the food market may force a new debate on the goals and programs of agricultural policy. Current programs distribute benefits largely on basis of how much a farmer produces. Commercial-sized farms (those with annual sales greater than \$100,000 a year) receive about 60 percent of commodity program payments despite Congressional attempts to limit payments to large farmers. A trend toward larger contract farming operations will only push this figure higher. Thus, taxpayers and Congress may ask why the public should support farm businesses that have higher income and more wealth than average citizens.

The trend to tighter vertical coordination in the food industry seems likely to result in a substantial exodus of small farmers. In the past, this problem has gone largely untreated by policymakers, partly because the farmers leaving agriculture were able to find new jobs elsewhere in the economy. In the 1950s and 1960s, for example, millions who left agriculture found high-paying industrial jobs. Most of the jobs created in today’s economy, however, are in the service sector. These jobs may be more difficult for many rural emigrants to enter. Thus, vertical coordination may lead policymakers at federal and state levels to give more attention to retraining programs for displaced farm families.

The spread of contracting between food companies and agricultural producers may also reduce the need to stabilize farm prices through farm programs. Commodity programs have

been justified in the past because they stabilized otherwise volatile agricultural commodity prices. The advent of more contracting, however, will stabilize prices. In short, the food company increasingly shares the farmer's price risk, reducing the need for government intervention.

For policymakers concerned with rural development, greater vertical coordination in the food market may encourage new approaches to spurring economic growth in rural places. Farm communities will increasingly pin their economic growth on the performance of the food industry that may be located there, while depending much less on the production of bulk commodities. Thus, traditional farm programs—which are still aimed at commodities—will be increasingly out-of-step with the new economy of farm communities. In the place of farm programs, policymakers may look at ways to invest in rural infrastructure, train rural workers, and encourage rural business starts.

Conclusions

The steady evolution in consumer demand and in farm and food technology is driving the U.S. food market toward more contracting and vertical integration. While new consumer niches are evolving, new farm and food tech-

nologies are enabling food producers and processors to engineer foods for these niches. The new technologies require much tighter coordination, however, as raw farm products are transformed into retail foods. Both contracting and vertical integration tighten the coordination between food producers and processors, ensuring that new food products reach targeted niches.

While tighter coordination of the food market will help meet consumer needs, the changes will create winners and losers among farmers and rural communities. An increase in contracting will benefit larger farmers with the scale and technical means to meet rigorous product requirements.

Smaller farmers and those in areas without ready access to the specialty-product market, however, will find fewer opportunities for marketing their generic production. Economic activity will rise in some rural communities and fall in others, as contracting and integration create a new patchwork of specialty-product and generic production. The widening gap between the winners and losers may call into question farm programs aimed at bulk commodities. In their place, policymakers may turn to a broader mix of farm and rural programs designed to improve the skills of rural workers and encourage entrepreneurship.

The Case of the Broiler Industry

The broiler industry shows how consumer demands and innovations in technology can turn agricultural production and processing into a highly integrated and concentrated structure. This case study will briefly show how the broiler industry has changed and how each major player—consumers, farmers, and rural communities—has gained or lost.

The structure of the broiler industry in the 1950s severely limited its ability to grow. The surplus roosters of egg production, or spring chickens, made up most of the nation's chicken supply. This limited out-of-season chicken purchases to Sunday dinners and special occasions. To meet year-round demand, many small farmers began producing broilers. But retail chicken prices fluctuated widely, and markets were limited to urban areas.

Integration began as a reaction to these limits on production, but new technologies made the process possible. Mechanical innovations in equipment and housing design increased production efficiency and economies of scale. Biotechnological advances in breeding, feeding, and disease control cut feed consumption per pound by 50 percent from 1945 to 1972. In addition, new types of production contracts and ownership agreements helped coordinate each of the growing and processing stages. As large-scale production became attractive, technology was adopted faster. By the mid-1960s, vertical integration in the broiler industry was nearly complete.

In the early 1970s, the industry faced rapidly changing consumer demands. Consumers wanted a variety of convenient, nutritious, and high-quality products. In response, the large broiler integrators created new products from the basic whole broiler.

They cut up broilers into parts and further processed them to add value. Processors began to use brand names and target market niches with diversified products. By 1987, cutup parts production accounted for well over half of total broilers processed, compared with 19 percent in 1965. The volume of further processed products (extending beyond the cutup stage) expanded even faster, accounting for 22 percent of the broilers processed in 1987, compared with 9 percent in 1979. This gain reflects an array of new products such as patties, fillets, and nuggets.

The most obvious beneficiaries of these changes in the broiler industry have been consumers. Their demands are met with a variety of more convenient, nutritious products at less than half the 1950s prices in real terms. Technological advances and lower cost integrated enterprises have lowered retail prices despite greater concentration among the largest broiler firms.

Whether growers have benefited from a more tightly integrated broiler industry is unclear. As the industry began to consolidate, processors chose to contract with larger, more efficient growers, forcing many small growers out of business. But even for the large growers that stayed in business, their incomes have not necessarily increased. Growers did reduce unit costs by expanding. Over time, however, unit costs have increased due to rising input prices. Meanwhile, revenues to contract growers have not increased as fast, leaving growers with declining profits.

Moreover, the large growers have seen the nature of their business change. With contracts setting the payments received per broiler, growers are not subject to the previous risks of

market prices. On the other hand, they now have more capital investment at risk while controlling fewer production decisions.

The effects on rural communities have been mixed. As larger broiler integrators have gained efficiency, production locations have shifted across regions. Broiler operations have concentrated in just a few states in the South and Mid-Atlantic regions. The operations have also

converged on agribusiness centers within those states, resulting in benefits to only a few rural communities. The advantages of the southern states included a favorable climate, depressed agricultural conditions, and ample surplus labor from underemployed farmers willing to adapt to new technologies and methods.

Endnotes

¹ The Physicians Committee for Responsible Medicine advocates the four basic food groups be: whole grains, vegetables, legumes, and fruit (Physicians Committee for Responsible Medicine). The U.S. Department of Agriculture's standing recommended group of basic foods are: meat, fish, and poultry; dairy products; breads and cereals; and fruits and vegetables.

² Consumer concerns about the environment represent another major factor influencing food packaging. McDonald's for example, recently gave up its foam packaging in favor of paper products because foam cannot be recycled. This trend to "environmentally friendly" packaging seems certain to continue, but it will affect food processors much more than producers.

³ A slight increase in spending is forecast for 75+ year-olds.

⁴ Information technology will also be a major contributor in controlling agricultural production. Many biotechnologies will place new management demands on farm operators that will be met only with more sophisticated information technology.

⁵ For a fuller discussion of biotechnology, its prospective adoption, and possible positive and negative effects, see Julie Stanley, "Agricultural Biotechnology: Dividends and Drawbacks" in this issue of the *Economic Review*.

⁶ The food market is in fact an international market linking farmers, food processors, and consumers around the globe. Many food companies are multinational corporations. This article, however, focuses solely on the linkages among farmers, food processors, and consumers in the United States. Changes in foreign food supply and demand will affect the domestic food market, but the domestic changes described in this article will dominate. U.S. trade in farm and food products is relatively small compared to the overall size of the U.S. food market. In 1990, for example, U.S. imports of foods, feeds, and beverages (\$26.6 billion) were less than 5 percent of consumer spending on food (\$624.7 billion) (Survey of Current Business).

⁷ In their much earlier, comprehensive study, Mighell and Jones define stages as "...any operating process capable of producing a salable product or service under appropriate circumstances." They also warn that "the image of chronological vertical succession is only a general symbol to aid our thinking; it should not be taken too literally."

⁸ Marion summarizes the function and importance of the grading system in the food market. "Grades may reduce quality uncertainty and transaction costs, but their benefit may be limited if not based on the product characteristics that determine the product's value to the customer."

⁹ The National Research Council, Chapter 5, provides a

more detailed review of the beef grading system.

¹⁰ The cattle industry has recently launched an initiative to lower the cost of producing beef and to make beef more attractive to modern consumers. An important part of the initiative is an effort to reduce the production of excess fat. See Barkema and Drabenstott for a more detailed analysis of trends in the beef industry.

¹¹ Price risks can also be hedged in commodity futures markets before marketing commitments are made.

¹² This is the generally accepted definition of vertical integration. According to Blair and Kaserman, for example, "...the distinguishing feature of vertical integration is the replacement of a market exchange by an internal (within the firm) transfer."

¹³ The classification scheme outlined in this section groups contracts "...in accordance with the number of stages transferred from their traditional place with the farmer to the control of another firm" (Mighell and Jones).

¹⁴ Integration can also occur between any other stages of the food market.

¹⁵ Williamson (1979) argues that idiosyncratic investment is the primary motivation for vertical integration, stating, "More generally, the economizing problem includes choice between a special-purpose and a general-purpose good or service. A general-purpose item affords all of the advantages of market procurement, but possibly at the sacrifice of valued design or performance characteristics. A special-purpose item has the opposite features: valued differences are realized but market procurement here may pose hazards."

¹⁶ Contracting can also protect the value of an idiosyncratic investment, but to a lesser extent than vertical integration. A long-term contractual agreement can tie two firms together almost as tightly as if they had merged into a single firm. The drawback of a long-term contract, however, is that it provides less flexibility than full ownership to meet unanticipated changes in market conditions. Thus, a high risk of loss on idiosyncratic investments tends to encourage vertical integration rather than contracting. See Williamson (1979 and 1986) for a fuller explanation of the relative merits of contracting and vertical integration.

¹⁷ Other authors have recognized the continuum extending from open production through vertical integration. For example, Blair and Kaserman suggest, "the metric that varies as we move from the one end of this continuum to the other is the degree of control that one of the parties to the exchange exercises over the other."

¹⁸ A comprehensive, up-to-date estimate of the current extent of contracting and vertical integration in the U.S. food market is a critical research need.

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Agricultural Biotechnology: Dividends and Drawbacks

By Julie A. Stanley

Biotechnology is changing the face of agricultural production. Several biotech products are already used in the United States and many others are in late stages of development. With more widespread adoption these products offer substantial dividends, but they also have potential drawbacks.

All groups associated with production agriculture, therefore, will need to prepare themselves for both the positive and negative effects of biotechnology. Toward that end, this article first reviews the biotech products currently or prospectively in use. The article then examines the possible dividends and drawbacks of the use of biotech on such groups as farmers and ranchers, policymakers, agribusiness, agricultural bankers, and consumers.

Animal and Plant Biotechnologies

Biotechnology offers tremendous potential for improving animal agriculture and crop production. This section defines biotechnology and discusses animal and plant technologies that may help production agriculture in the near future.

What is biotechnology?

Biotechnology is the use of scientific techniques to improve animals or plants. Biotechnology focuses on genetic engineering—that is, on recombinant DNA and cell fusion procedures.¹ Under these procedures, scientists can transfer genetic material into animals and plants to control their characteristics. Biotechnology also includes the modern extensions of age-old tools of animal and

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plant breeding.² In the past, animal and plant breeding efforts were aimed at entire organisms. Today, biotechnology concentrates on individual genes—and their associated traits—within an organism.

Biotechnology is superior to traditional methods of animal and plant breeding in speed, precision, and scope. Scientists can produce generations of animals and plants in the time of one traditional breeding season. They can also manipulate just one characteristic of an organism by locating and transplanting a gene that controls an economically important trait. Scientists also are able to transfer desirable characteristics between organisms that cannot be crossed sexually—for example, from an animal to a plant. In 1989, scientists exchanged genes between bacteria (an animal) and yeast (a plant), opening up wide possibilities for transferring traits between the animal and plant kingdoms (Booth and others).

How can biotech improve animal production?

Some biotechnologies have been used in animal production for more than a decade, while others are in the first stages of discovery and testing. This section examines how various technologies may affect livestock production and how quickly they may be available for use on U.S. farms and ranches.

Embryo transfer. Embryo transfer was one of the first tools of biotechnology used in livestock production, and its use is now widespread. Embryo transfer involves transferring multiple fertilized eggs, or embryos, from one mother to host mothers. As a result, a genetically superior animal can produce tens of offspring in a single breeding season. In use for more than a decade, the technology is still being refined and improved.

Livestock vaccines. Genetically engineered vaccines are a useful tool for livestock producers because normal antibiotics are generally ineffective in treating viral diseases in livestock. Normal antibiotics are unable to attach to an animal virus to kill or sterilize it. The protein in a genetically engineered vaccine, however, can attach to a virus and kill or deactivate it so it cannot reproduce.³

Vaccines are both therapeutic and preventive; that is, they help heal existing illnesses and ward off other illnesses. Genetically engineered vaccines were first introduced in 1985 when the government approved a vaccine against pseudorabies, a disease that costs U.S. swine producers up to \$60 million annually (National Research Council). A vaccine for foot-and-mouth disease is also on the market. In the future scientists hope to develop a vaccine to control inflammation of the udder (mastitis), which affected 100,000 beef cows and 1.3 million dairy cows in 1990 (Doane Marketing Research Inc.).

Diagnostic tools. Monoclonal antibodies have proved to be multipurpose tools for livestock producers. Monoclonal antibodies are disease-fighting proteins produced by fusing a rapidly growing cell with one that produces an antibody to a particular substance, such as a hormone, virus, or bacteria.

These antibodies can be used to diagnose disease, monitor the efficacy of drugs, and develop therapeutic treatments and vaccines to immunize against certain diseases. Monoclonal antibodies have been used for treatments against both calf and pig scours, illnesses that affected nearly three million cattle and more than eight million swine in 1990 (Doane Marketing Research Inc.). Antibodies that detect time of ovulation in cows help to ensure the highest efficiency in breeding. A more recently marketed product is a detector for

blue-tongue virus, which reduces growth and reproduction efficiency in cattle, sheep, and goats.

Growth promotants. Genetically engineered growth hormones could be the next widely used biotech product for improving livestock production. Such hormones, including bovine somatotropin (BST) and porcine somatotropin (PST), are naturally occurring proteins in cattle and hogs. The proteins can now be replicated in the laboratory and then administered to livestock to enhance productivity traits.⁴ BST-treated cows may produce 10 to 40 percent more milk (Jacobs; National Research Council). PST-treated hogs have shown up to 30 percent greater feed efficiency and have also produced leaner pork (Boyd and others).

Growth hormones may be used widely in cattle and hog operations in a few years. BST was approved by the Food and Drug Administration in 1985 for use in trial dairy herds to evaluate its effects on milk production and on the animal itself. BST developers expect the hormone to be available to all dairy farmers within a year, although consumer resistance could slow or even derail full commercialization.⁵ PST has been successfully administered to hogs in research trials and could be used commercially within a few years.

Transgenic animals. Designing transgenic, or genetically altered, animals is the major goal of animal biotechnology, but scientists are a long way from achieving it. This process involves injecting genes from another organism directly into the nucleus of a newly fertilized egg and thereby changing the growth and quality of the mature animal and its offspring.

Gene transfer is very complex in animals. Scientists have transferred genes into pigs, but the procedure is not consistently successful. In the future scientists hope to transfer the

booroola gene, a gene from Australian merino sheep that controls the incidence of twins and triplets, into sheep and cattle to help improve production efficiency. Overall, scientists are studying many techniques that might produce transgenic animals, but the technologies may not be available until the next century.

How can biotech improve plant production?

Most genetic engineering discoveries in plant production have surfaced only in the past few years. Some products have been improving crop characteristics, altering microorganisms associated with plants, and controlling crop pests for many years. More advanced products with greater potential to affect U.S. crop production are still on the horizon.

Crop characteristics. Perhaps the most direct way biotechnology can improve crop agriculture is by genetically engineering plants—that is, by altering their genetic structure. The process of genetically engineering plants requires a scientist to locate and extract the desired gene and then insert it into a cell from the targeted plant. The scientist then induces the transformed cell to grow into an entire plant having the desired trait. For example, assume a scientist identifies a gene that would increase the protein content of corn. The gene must be inserted into the right place in the genetic code so that protein is added in the seed, not in the stalk or another part of the plant.

In one important breakthrough, scientists have recently produced plants resistant to herbicides. For example, glyphosate-resistant soybeans are now being field-tested in the United States. Glyphosate is a common herbicide that is both effective and environ-

mentally safe. But because it indiscriminately kills crops as well as weeds, it can only be used before a crop germinates. Scientists have transferred a glyphosate-resistant gene from petunias into soybeans, a discovery that in a few years may allow growers to use glyphosate herbicide instead of herbicides that are more costly, less effective, and more damaging to the environment.

Scientists also hope to alter plants genetically to improve the nutritional qualities of grain. For example, scientists are developing high-oil corn hybrids to supply a more valuable feed grain. Livestock and poultry may gain weight more efficiently on corn that contains significantly more oil and protein than present commercial hybrids, resulting in feed cost savings for the producer. A company recently applied to the U.S. Department of Agriculture to begin field testing transformed corn plants.

Microorganisms. Microorganisms in the environment affect the growth of plants in both beneficial and harmful ways. Some microorganisms protect plants from bacterial or fungal infections, while others help protect plants from the stress of acidity, salinity, or high concentrations of toxic metals. Some microorganisms also attack weeds that compete with crops. Other microorganisms, such as certain bacteria and fungi, attack crops and cause disease. The Dutch Elm disease is a dramatic example of the damage a fungus can cause. This disease has killed millions of North American trees in the 20th century.

Through genetic engineering, scientists have improved crop productivity by enhancing the abilities of beneficial microorganisms and inhibiting the effects of harmful microorganisms. Microbial soil inoculants to increase nitrogen uptake by plants have been available for years. Genetically engineered bacteria, dubbed "ice-minus" bacteria, have the potential

to protect plants from frost damage. The bacteria interfere with a natural population of organisms that promotes frost formation on fruit trees, thereby insulating fruit from damage. Ice-minus bacteria have been field-tested since early 1987. In the next several years, scientists hope to insert a bacterium into crop plants to alleviate the stress of subfreezing temperatures, allowing them to grow in cooler climates.

Crop pests. Several biotechnologies are aimed at overcoming such crop pests as insects and viruses. In the past two years, for example, scientists have found a way to protect tobacco from the tobacco hornworm by inserting into the plant a protein found in potatoes and tomatoes that naturally repels hornworms. Scientists hope to use the technology in food and fiber crops and begin field testing within a few years.

Scientists have also developed biologically engineered insecticides to control insects that eat vegetable plants. Researchers have been able to produce endotoxin, a potent, naturally occurring insecticide, by inserting a gene into bacteria. The altered bacteria could be applied to cabbage, broccoli, lettuce, and other crops to control caterpillar attacks. Large-scale field trials were recently approved for the insecticide.⁶

A few plant biotechnologies have benefited crop production for some years, but the major impacts of the biotechnologies may not be felt until the next century. The immediate impacts have been greater for animal agriculture because some of the technologies have been in place for more than a decade. The future impact of biotechnology, however, may be substantially greater for plant agriculture as the number of developments begins to multiply more rapidly in coming years.

The Implications of Biotechnology for Agriculture

Biotechnology has far-reaching implications for farmers and ranchers, policymakers, agribusiness, agricultural bankers, and consumers. These groups will be especially affected as the number of biotech developments multiply in the next decade.

Implications for farmers and ranchers

Adoption of biotechnologies will have two major effects on production agriculture. The supply of farm production will increase which will tend to drive down farm prices. And, the nature of the new technologies will combine with lower prices to encourage larger farms.

The supply effect. Biotechnologies will lead to greater agricultural production. Using the technologies, farmers will be able to produce more output with the same complement of fixed resources, driving down unit costs. As profit margins in the commodity increase briefly, producers will expand production (Kalter and Tauer). Ultimately, the increased supply will drive down the commodity's price and discourage any further expansion (box).

The structure effect. Like other technologies before it, biotechnology seems likely to favor large farms. Lower farm prices appear likely to squeeze out smaller producers because they will not be able to cut costs as much as large producers.

Small farms will have relatively high costs of production because they will likely be reluctant to adopt the new technologies. The Office of Technology Assessment, for example, estimates that 70 percent or more of large farms may adopt biotech products by the year 2000, compared with only 10 percent of small farms (Office of Technology Assessment

1986).⁷ Small farms may shy away from many biotech products because they are complex and require careful supervision. Many small farms may lack the management skills necessary to implement or fully utilize biotechnologies. By contrast, large farms usually have skilled management that allows specialized attention to complicated production tasks.⁸

Even if small farms do adopt biotech products they may pay more for them than large farms, blunting the cost savings of the technology. Quantity discounts appear likely to prevail for biotech products, such as BST, just as they do for most other farm inputs.⁹

In short, the adoption of biotechnology means that the most efficient scale of farming increases. With biotechnology, well-managed farms can effectively produce more output with the same complement of fixed resources, lowering the overall cost structure of the industry. The real test is whether a farm has the necessary management skills to incorporate biotech products fully and effectively and thereby cut costs. Large farms appear much more likely to meet that management test than small farms. Thus, large farms will produce more at lower cost and remain in business even though farm prices fall. Small farms, on the other hand, will be unable to lower their costs and thus their profits will diminish.

Implications for policymakers

The adoption of biotechnologies may require policymakers to adjust farm policy and regulation. Policymakers will need to determine whether current farm programs should continue in the face of changes in the industry. And they will have to sort out which government agencies will oversee the commercialization of biotechnology.

Federal farm policy. Policymakers may

need to adjust federal farm policy in light of increased supplies and lower prices caused by the adoption of biotechnologies. Policymakers are left with a dilemma. They can cut support prices, causing farm income to fall. Or they can keep prices high, increasing the costs to taxpayers.

The situation in the dairy industry illustrates the dilemma. Over many years dairymen have produced milk more and more efficiently, while government price supports have encouraged them to produce more milk than the market demands. As a result, milk surpluses have mounted, causing taxpayers to pay for the excess milk. If policymakers maintain price support programs while farmers adopt newer technology to produce milk more efficiently, taxpayers will end up paying for an even greater burden of milk surpluses.

How policymakers react to this policy dilemma will have major implications for the structure of agriculture. As already shown, biotechnology favors larger farms. Maintaining current price support programs, which peg payments to the quantity produced, may further encourage large farms. As an alternative, price supports could be cut while payments were targeted more specifically at smaller farms.

Regulation. A network of policymaking groups governs the development and use of biotech products. The uniqueness of biotechnologies and the large number of recent developments have added to the confusion over policymakers' roles in the regulatory process. The U.S. Department of Agriculture and the U.S. Environmental Protection Agency (EPA) regulate field testing of biotech products. The EPA also has the power to approve the commercial sale and use of pesticides. Authority to approve animal health products is held by the Food and Drug Admin-

istration. The number of agencies involved may complicate the overall approval process.

The law requires regulators to evaluate each product on two important criteria before approving its use: effectiveness and safety. The product must perform as stated by those who developed it. Safety must be proven in three areas: safety of food for human consumption, safety to the target animal, and safety to the environment. Regulators do not consider economic effects of a product before approval.

Regulators thoroughly review human health aspects of each biotechnology. In 1985, the FDA reviewed the scientific evidence and affirmed that milk and meat from cows treated with BST is safe for human consumption (Ingersoll 1990a; Sugarman). The National Institutes of Health (NIH) completed a study that supported FDA's findings (Ingersoll 1990b). Notwithstanding FDA and NIH's rulings, consumers' perceptions of the safety of food produced with the new inputs will control whether BST and other biotechnologies move into the mainstream of U.S. agriculture.

The safety of biotech products to the animal is also important because the animal is expected to maintain a high level of production over time, reproduce efficiently, and be as healthy as possible. If increased costs from reproduction and health problems outweigh benefits of a technology, it is not useful in agricultural production.

Regulators also review the product's effects on the environment. Environmental risks have gained importance as public concern over the safety of the water supply and other environmental issues has grown. Chemicals now used in crop production have leaked into groundwater supplies, sending scientists in search of alternative production inputs for agriculture (Office of Technology Assessment 1990). Biotechnologies that take the place of

chemical inputs may help alleviate the problem of contaminated water. But regulators may still want to determine the long-term effects on the environment of biotech products.

Product reviews must be thorough, but the length of the regulatory process will have a major influence on further developments of biotechnology. Many companies have shied away from biotech research because the review process is costly and protracted. Genetic engineering projects may be at a significant disadvantage in competing for research and development funds. Generating data for field testing approval can cost \$250,000 or more, not counting the scientists' time (Hayenga). This may constrain product development and the survival of small biotech companies.

Implications for agribusiness

Biotechnology has significant implications for the competitiveness of individual firms and the structure of the agribusiness industry. Biotech products offer both new opportunities and new challenges for agribusiness.

Competitiveness. Innovations in biotechnology will provide new sales opportunities for agribusiness. Firms that engage in the development and distribution of products of biotechnology can benefit from more diversified product lines. In addition, firms tied to older technologies that will be replaced by biotech products will need to participate in production and sales of the biotech products to remain competitive in the industry. For example, the Monsanto Corporation has long manufactured chemical inputs for agricultural production. Now it is researching and developing genetically engineered alternatives to traditional chemicals. The company recognizes that chemicals will continue to be

important inputs but is maintaining its competitive position by also developing more current technologies.

Structure. Small firms appear to be at a disadvantage in developing and marketing biotech products because the research and development process is long and costly. Because the biotechnology industry is young, few products have reached the market and generated returns on investments. Products have faced adverse public reactions and tough regulatory hurdles, causing developers to wonder when, and sometimes if, the products will ever reach the market. During this infant stage of the industry, larger companies with wider product lines are better equipped to support research and development and absorb unforeseen costs of developing biotech products. In the future, when more products are on the market, small companies may become more important to the overall industry.

The relatively large firms that now constitute the food processing industry may exert more control over agriculture as biotechnologies are adopted. The practice of contracting—arranging sales of commodities between producers and processors—will gain popularity as farmers use more biotech inputs. Contracting will ensure that complex biotechnologies are closely controlled to yield farm products of uniform quality. Food processors will probably prefer to contract with fewer large farms to keep fixed costs low, a practice that will further encourage development of larger farms (Barkema, Drabentstott, and Welch).

Implications for agricultural bankers

Agricultural bankers are in a unique position to encourage or discourage the use of biotechnologies on farms. Bankers may welcome loans to farmers that use cleaner biotech-

nologies instead of chemical products; lender liability may be less with biotechnology. But the use of biotechnology may require farm lenders to acquire additional skills.

Lender liability. The high cost of cleaning up environmentally damaged property has made lenders cautious about loaning funds to farmers and ranchers that use chemicals. Under the federal Comprehensive Environmental Response, Compensation and Liability Act, a lender that forecloses on a property may be held liable for cleanup costs as an owner or operator (Turner and others). As a result, a property's value as collateral may be significantly reduced by the use of chemicals.

The use of biotechnologies may decrease the risks for the agricultural banker financing the farm. The use of a bioherbicide that displaces use of chemical herbicides may help avoid or reduce contamination by chemicals, for example.

But all of the future effects of the use of biotechnologies are not known. The lender may wish to reduce risk of supplying funds to farmers who use either chemicals or biotechnologies by taking additional precautions. To help protect their interests, lenders might conduct a thorough review of the history of the property and require the borrower to obtain environmental-impairment liability insurance. The lender could also consider alternatives to using real estate as collateral for a loan.

Educational needs. As biotechnologies are adopted, agricultural bankers will need to provide additional education for bank employees. Employees that determine credit needs for use of the technologies and perform reviews on farms that use biotechnologies will need additional training. Special training will help the employees learn production techniques that are more complex than traditional methods.

Lenders may also be in a position to encourage farmers and ranchers to improve their

understanding of biotechnology. With the assistance of good consultants, extension agents, and university researchers, agricultural bankers may help extend the knowledge of growers and keep farmers up-to-date on new alternative products and practices. Farm and ranch operators will need to be encouraged to use the technologies to remain competitive and taught to use products correctly to improve profitability of operations.

Implications for consumers

Consumers will make perhaps the greatest adjustment to the use of biotechnology. They must sort out the related issues of food prices and food and environmental safety.

The greatest potential benefit of biotechnology to consumers may be lower food prices. As already shown, the use of biotechnologies allows producers to grow the same or greater quantity of food at a lower cost, resulting in lower retail food prices.

While lower food prices appeal to consumers, they are still troubled by food and environmental safety issues related to the use of both chemicals and biotech products. A 1990 study showed that about nine out of ten Americans are concerned about the use of pesticides on crops (Research & Forecasts, Inc.). While about 62 percent think biotechnologies should be explored as alternatives to chemical use, 52 percent feel biotechnologies might represent a serious threat to people or the environment.

Consumer fears or adverse perceptions of biotech products could stifle the adoption of some biotech products in agriculture. Although the FDA certified that milk produced by BST-treated cows is safe, five of the nation's largest supermarkets refused to buy dairy products from farmers who used the hormone (Sugarman). The supermarkets apparently feared that some consumers

might boycott the products.

Consumers must weigh the scientific evidence supporting use of biotechnologies against any perceived risks. Consumers are concerned about levels of certain substances in food, such as hormones in milk. But milk from BST-treated cows, for example, has the same composition as milk from untreated cows. BST occurs naturally in cattle, so it is found in milk produced without supplemental BST. Furthermore, scientific evidence produced by the FDA, the American Medical Association, and health and safety regulators in many foreign countries has shown that milk from BST-treated cows is safe (Ingersoll 1990b). Also, some crop biotechnologies offer alternatives that may be safer for human consumption than chemical inputs. Such products may help alleviate problems with contaminated water and chemical residues on food, too. Further benefits of biotechnology, including lower prices and higher quality foods, may convince consumers that the benefits of biotechnology outweigh any perceived risks.

Summary

Biotechnology is opening an exciting frontier in agriculture. Although the technologies

have been used in animal and plant production for more than a decade, scientists are now rapidly developing new products that will extend biotechnology's potential well beyond current uses.

Biotechnology offers both dividends and drawbacks for all groups associated with production agriculture. Farmers and ranchers will be able to produce more output at lower cost, but small farms may be reluctant to use the new technologies and could see their profits cut as a consequence. Policymakers must reevaluate the goals and costs of farm policy and also provide a system for thorough but speedy reviews of new products. Large agribusiness firms can remain competitive by developing biotech inputs, while small agribusiness firms may find it difficult to navigate a long and costly development process. Agricultural bankers could benefit from less lender liability with the use of biotechnology, but will need to provide additional education for bank employees to properly review use of the new technologies. Consumers will benefit from lower prices, but must weigh their perceptions of biotech products against an accumulating base of scientific evidence on food and environmental safety.

The BST Example

The use of BST in dairy herds provides a good example of how biotechnology can increase supply and lower prices. The increase in milk supply and the subsequent structural changes in the dairy industry are illustrated in the three panels of Figure 1. Panel A shows the effect of an increase in the milk supply on the price of milk and the consumption of milk. The milk demand curve (D_m) shows the quantities of milk consumers are willing to purchase at various prices, and the milk supply curve (S_m) shows the quantity of milk producers are willing to produce at various prices and with old technologies. At the initial equilibrium price (P_m), determined at the intersection of the demand and supply curves, consumers are willing to buy the same quantity (Q_m) that producers are willing to produce.

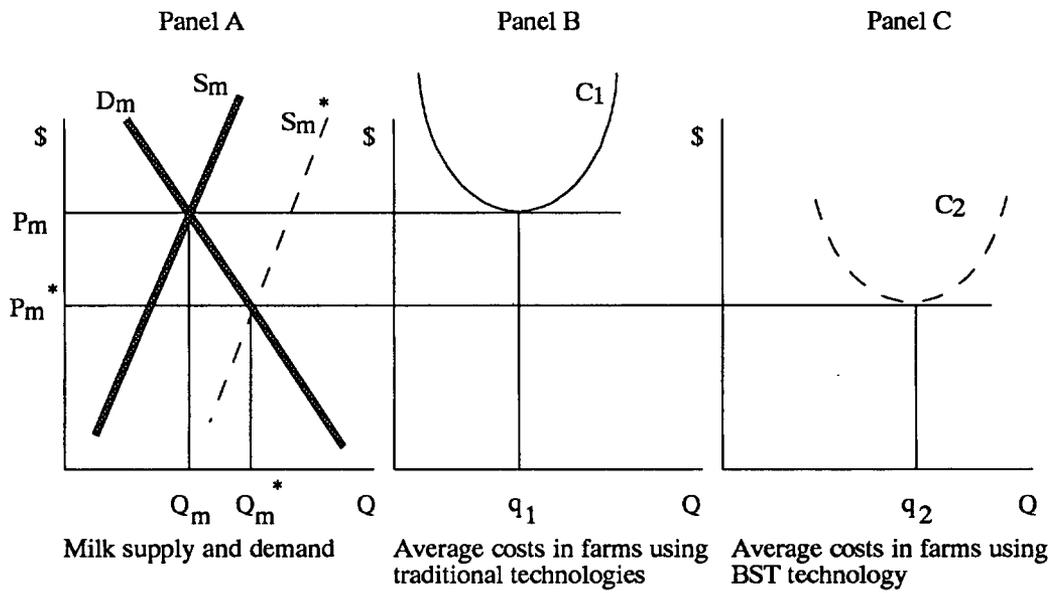
Adopting BST has the effect of shifting the supply curve to the right, resulting in bigger output and lower prices. The rightward shift of the milk supply curve to S_m^* shows that producers are now able to supply more milk at

any given price. As the supply curve shifts to the right, the milk market reaches a new equilibrium at a greater quantity of milk (Q_m^*) and a lower price (P_m^*).

The increase in milk production affects the structure of the dairy industry, as shown in Panels B and C. Curve C_1 in Panel B shows short-run, per-unit costs for various milk production levels for producers using old technologies. At the old equilibrium price of P_m , farms of this type produce milk at a rate of q_1 and cover all costs. At the new equilibrium price of milk (P_m^*), however, the farms using older technologies can no longer cover their costs and are forced out of business.

At the new equilibrium, adoption of BST allows farms to produce more at lower cost (Panel C). Even at the lower price P_m^* , the farms using BST can cover all costs. The net effect, therefore, is that the most efficient farms operate at a much larger production (q_2) than previously, and thus the industry becomes concentrated in fewer, larger farms.

Figure 1
The BST Example



Endnotes

¹ The recombinant DNA procedure is the technique of isolating DNA molecules and inserting them into the DNA of a cell, "recombining DNA." It is also called genetic engineering.

² The most promising extensions of traditional tools of animal and plant breeding are cell culture, plant regeneration, monoclonal antibodies, embryo transfer, and bioprocess engineering. Cell culture is the technique of producing identical copies (clones) of genetically engineered cells. Plant regeneration is the technique of growing a whole plant from a single engineered cell or piece of plant tissue. Monoclonal antibodies are disease-fighting proteins produced by fusing a rapidly growing cell with one that produces an antibody to a particular substance, such as a hormone, chemical residue, virus, or bacteria. Embryo transfer is transferring multiple fertilized eggs, or embryos, from one mother to host mothers. Bioprocess engineering is genetically manipulating life processes.

³ The production of genetically engineered livestock vaccines involves reproducing certain proteins that are taken from genes of a disease agent. The protein is then injected into an animal to stimulate its immune system to protect it from infection. Such vaccines offer an effective, safe, and easy-to-manufacture tool to fight disease.

⁴ Growth hormones can now be produced in laboratories in large quantities. Scientists extract the gene that produces the hormone in animals and mix it with bacteria to produce the hormone in abundant quantities. Producers can then administer the hormone to animals by injection at any

recommended level.

⁵ Some farm groups fear that increased milk production among large producers will lower prices, put family farmers out of business, and only create a larger surplus of milk in the country. For these reasons, several states, including Wisconsin and Minnesota, have introduced legislation to ban BST-produced milk.

⁶ The gene to produce the pest toxin was transferred from another bacterium, *Bacillus thuringiensis*, which itself has been marketed as a biological insecticide for more than 20 years.

⁷ The rate of adoption may differ markedly by product. Genetically engineered seeds, for example, may become widely adopted by both small and large farms. Animal biotechnologies, on the other hand, are more complex and may be adopted less by small farms. In general, biotechnology requires more careful record-keeping and more precise production practices, demands that appear to favor greater adoption by large farms.

⁸ Larger farm units will be able to extract more benefits from biotechnologies, because they have better resources to implement the technologies and manage expanded production (Molnar and others).

⁹ Most biotech products are not yet commercially available and thus price discounts cannot be thoroughly documented. Discounts for other farm inputs are widespread and it would be unlikely that they would not be found in biotech products.

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Forecasting Consumer Spending: Should Economists Pay Attention to Consumer Confidence Surveys?

By C. Alan Garner

The invasion of Kuwait in August 1990 took virtually all Americans by surprise. Rising oil prices in the second half of the year and uncertainty about a possible Mideast war dramatically weakened consumer confidence in domestic business conditions. Many analysts believe the decline in consumer confidence worsened the U.S. recession. But after the Allied victory in the Persian Gulf War, consumer confidence rebounded strongly, leading some analysts to predict an early end to the recession.

The question at issue is whether consumer confidence surveys warrant such predictions. Some economists believe consumer confidence can reliably predict future consumer spending and thus the course of the economy (Langer). Others are more skeptical, arguing "consumers cannot spend confidence" (Lieberman).

This article argues that consumer confidence indexes are seldom very useful in forecasting economic performance, although they may be useful in exceptional instances like the Persian Gulf conflict. The first section explains the channels through which confidence may affect consumer spending and shows how previous studies have reached differing conclusions about the usefulness of confidence surveys. The second section develops some guidelines for making judgments about the economy on the basis of confidence indexes.

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Consumer Confidence and Spending Decisions

Many economists believe consumer spending depends not only on current income and household wealth but also on consumers' uncertainty about their future personal finances. Consumer confidence

surveys are intended to reflect consumers' changing attitudes about the business conditions and job prospects that determine their future finances. But economists have found it difficult

to show conclusively that confidence measures can predict consumer spending and thus help forecast the economy.

Channels of influence

Traditional economic theory suggests that consumer spending depends on such economic variables as income and prices. But recent discussions have identified psychological channels of influence as well. According to the psychological consumption theory, consumers spend in relation to their confidence about future personal finances (Katona 1975).

Developers of consumer confidence surveys propose that a diverse set of factors may influence consumer confidence (Katona 1976). Some of these factors cannot be quantified—for example, the Persian Gulf War or President Kennedy's assassination. Thus, fluctuations in consumer confidence cannot be explained solely by consumers' reactions to publicly announced economic statistics. Consumer attitudes are formed instead by a social learning process depending as much on conversations between neighbors over the backyard fence as on government statistical releases.

A primary channel by which consumer confidence affects the economic outlook is believed to be consumer purchases of durable goods, such as automobiles and refrigerators.¹ Durable goods purchases are often discretionary in that they can be postponed if economic conditions are unfavorable. For example, a family can repair its present car rather than buy a new one if family finances are strained or job prospects are uncertain. Durable goods

purchases thus depend on both willingness and ability to buy.

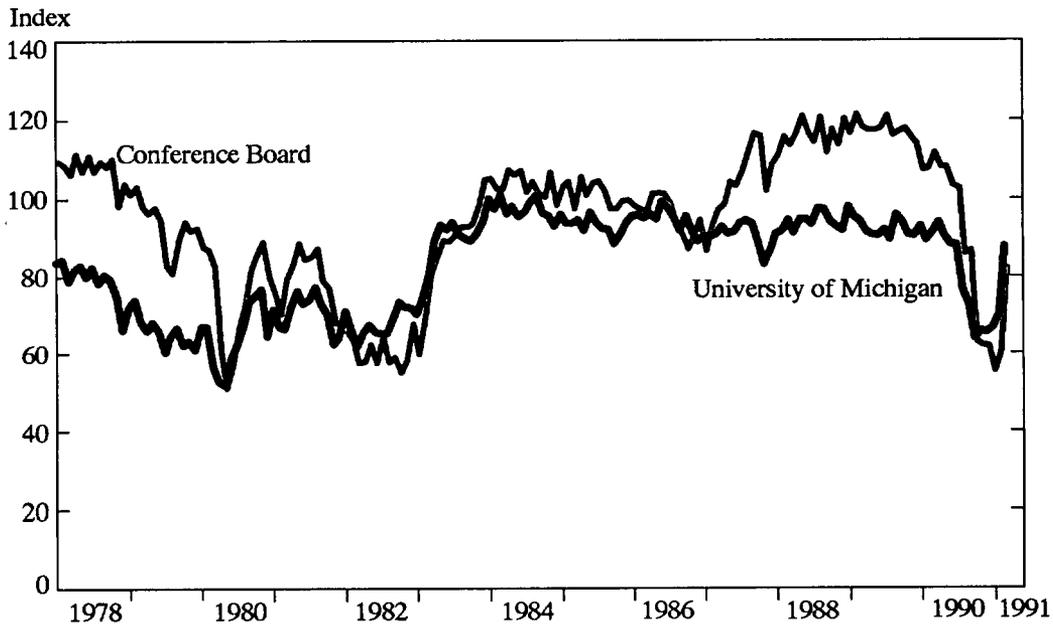
Recent research has attempted to reconcile the traditional and psychological views of consumption by reinterpreting consumer confidence within the life-cycle theory of consumption. Life-cycle theory asserts that consumption depends on expected lifetime resources, including current and future labor income and household wealth (Modigliani and Brumberg). If current household income is high relative to expected future income, the household may decide to save a large part of current income and use the savings to consume more in the future. Like psychological theorists, life-cycle theorists thus believe that current consumption depends on expectations about the future.

When consumer confidence worsens, purchases of consumer durable goods are likely to bear the brunt of any reduction in consumer outlays. Greater concern about future personal finances will cause consumers to save more in preparation for possible bad times. When consumer confidence is low, consumers believe financial distress is more likely in the future. As a result, they want to hold more liquid assets that can easily be converted into money to buy necessities or pay off debts. In such circumstances, consumers are less likely to purchase durable goods because such goods cannot be converted quickly into cash without a large loss in value.²

Measures of consumer confidence

Economic theory thus suggests that decreases in confidence may reduce consumer spending, particularly purchases of durable goods. Empirical evidence is needed, however, to test whether such effects really exist and are economically important. Two major measures of consumer confidence are

Chart 1
Measures of Consumer Confidence



available for such testing. Both measures are derived from large-scale surveys of U.S. households.

The first measure is the University of Michigan's Index of Consumer Sentiment. This index was developed by Katona and his coworkers at the university's Institute for Social Research. The index combines responses to five questions about the survey participants' personal financial situations and their views on general business conditions. Two of the questions refer solely to the present. The three others are forward-looking questions that ask about expected conditions over the next one to five years.

The second measure of consumer attitudes is the Conference Board's Consumer Confidence Index. This index is similar in construction to the Michigan index, being a summary of

responses to five questions about current and expected future conditions (Linden). The Conference Board, however, asks explicitly about the respondents' job and income prospects rather than the Michigan survey's vaguer notion of "financial situation." And the Conference Board asks survey participants about expectations over the next six months, a shorter period than in the Michigan survey.

Because the surveys differ, the two measures of consumer confidence do not always move together (Chart 1). While both indexes frequently rose or fell at the same time from January 1978 to March 1991, the Conference Board index fluctuated over a wider range than the Michigan index.³ Moreover, the two indexes often reached their peaks or troughs at different times. For example, the Michigan index reached a low point in October 1990,

but the Conference Board index did not bottom out until January 1991. Because the indexes sometimes give differing information about consumer confidence, both are examined in the empirical work later in the article.

Previous empirical studies

Empirical evidence is needed to determine whether consumer confidence actually influences spending. Confidence measures might not help to explain consumer spending if the surveys do not accurately reflect consumer attitudes. Or the measures might have little value to forecasters and policymakers if changes in confidence merely reflect macroeconomic variables, such as income and unemployment, which can be used directly to predict consumer spending.

Most studies of the relationship between consumer confidence and spending have tested whether a confidence index adds explanatory power to statistical consumption equations. The Michigan index has been used more often than the Conference Board index in such studies because it is available over a longer period. Early studies used a wide range of consumer spending models. More recent studies have often used life-cycle consumption equations relating consumer outlays to income and household wealth.⁴

Several studies have concluded that confidence indexes have little or no value in explaining consumer purchases of durable goods. Hymans found the Michigan index normally had little value in explaining consumer purchases of automobiles or nonauto durable goods, although large changes in confidence did help explain automobile purchases. Burch and Gordon (1984, 1985) also found the Michigan index had little explanatory power and argued that stock prices and the unemploy-

ment rate are equally useful to forecasters and policymakers.

In contrast, other studies have concluded that consumer confidence indexes have some value in predicting consumer purchases. Juster and Wachtel found the Michigan index did a surprisingly good job of explaining automobile sales over certain periods. Economists at Data Resources Incorporated (DRI) also concluded that consumer confidence indexes have forecasting value (Kelly). As a result, the Michigan index is an important explanatory variable in the consumption equations of DRI's U.S. macroeconomic model. And Throop found that consumer confidence helped explain changes in consumer spending that were left unexplained by life-cycle equations without a confidence measure.

Reasons for differing conclusions

Empirical studies have reached differing conclusions because testing the predictive value of consumer confidence indexes raises difficult statistical issues. Isolating the effect of consumer confidence on durable goods purchases is difficult because confidence is closely related to other economic variables that also may affect consumer spending. For example, an increase in household income might raise both consumer confidence and consumer purchases. Even if confidence had no direct effect on spending, consumer confidence indexes might still help predict consumer purchases by indirectly reflecting the change in income. But if forecasters and policymakers take household income directly into account, consumer confidence might have no additional predictive value.

Previous studies have shown consumer confidence is closely related to many macroeconomic variables that could be important determinants of consumption. Lovell found

that over 90 percent of the variation in the Michigan index could be explained by the inflation rate, the unemployment rate, stock prices, and the previous value of consumer confidence. He concluded that low levels of confidence in the early 1970s were due to economic conditions rather than to non-economic events, such as the Vietnam War or the Watergate political scandal.

Mishkin (1978) argued that consumer confidence seems useful in predicting consumption primarily because confidence is a stand-in for more important household balance-sheet variables. A higher level of household debt increases the chance of future financial distress, causing consumers to cut back on purchases of illiquid durable goods. But a higher level of household assets reduces the chance of future distress, allowing consumers to buy more durable goods. Mishkin showed the University of Michigan's index is closely related to these balance-sheet variables.

When household assets and liabilities were included in the consumption equation, Mishkin found the Michigan index had much less predictive value. The explanatory power of the confidence index fell sharply when balance-sheet variables were added to an equation for total spending on consumer durable goods. And the confidence index had no predictive value in separate equations for automobile purchases and nonauto durable goods purchases when balance-sheet variables were present.⁵

Previous empirical studies of consumer confidence have disagreed partly because these studies had different information sets—sets of macroeconomic variables used to explain and predict. Some studies related consumer spending to consumer confidence and only one or two other information variables. Others, like Mishkin's, had larger information sets containing such variables as household debt and assets.

Previous studies also have differed in the time lags of the statistical models, the number of periods between the consumption variable being explained and the variables in the information set. Some studies explained consumption in the current period with information only from the current and immediately preceding periods. Other studies included information from several previous periods—for example, measures of household income for several preceding quarters.

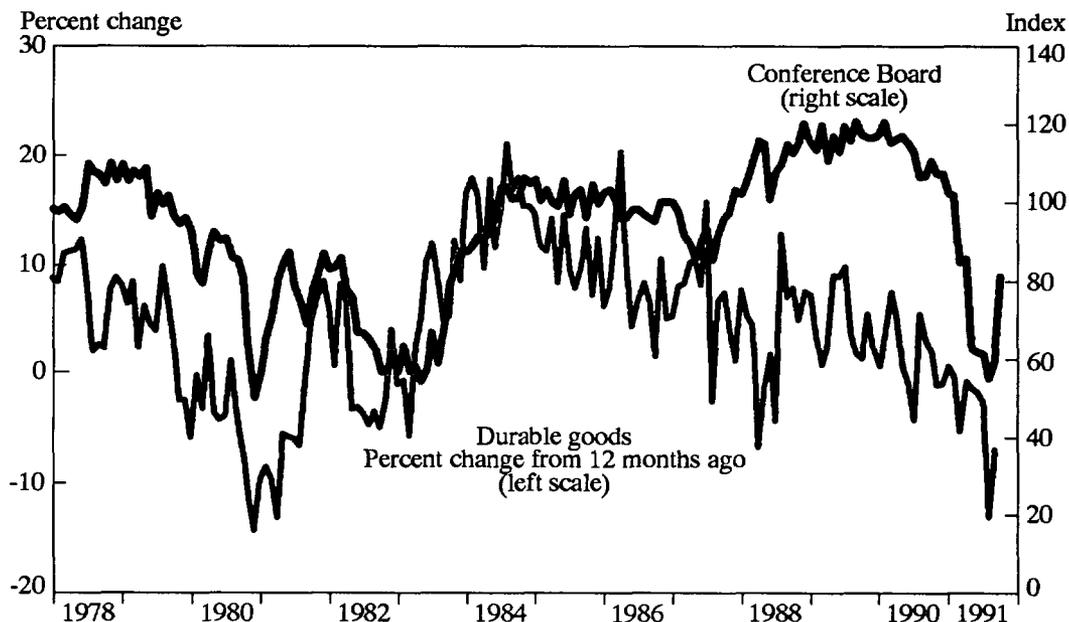
Finally, a possible reason why previous studies have disagreed is that some changes in confidence may be more useful than others in predicting future consumer spending. For example, the large drop in confidence at the beginning of the Persian Gulf conflict may have discouraged consumer spending, yet small declines in confidence may have little or no effect. As noted previously, Hymans found large changes in confidence were more useful in predicting automobile purchases. But most studies did not consider whether abrupt changes in confidence have greater predictive value. As a result, studies covering periods with several abrupt changes in confidence might be more likely to find confidence measures useful than studies covering periods with few large changes.

Drawing Inferences from Consumer Confidence

Because previous empirical studies have disagreed about the usefulness of consumer confidence indexes, this section presents some new evidence on the predictive value of such indexes. The goal is to suggest some guidelines to forecasters and policymakers for drawing inferences about the economic outlook from consumer confidence measures. The empirical analysis focuses on consumer purchases of durable goods because economic theory implies consumer confidence is likely to have its

Chart 2

The Conference Board Index and Durable Goods Purchases



greatest effect on durable goods purchases. The analysis is based on revised data for consumer spending and other macroeconomic variables rather than the initial estimates released by government statistical agencies.⁶

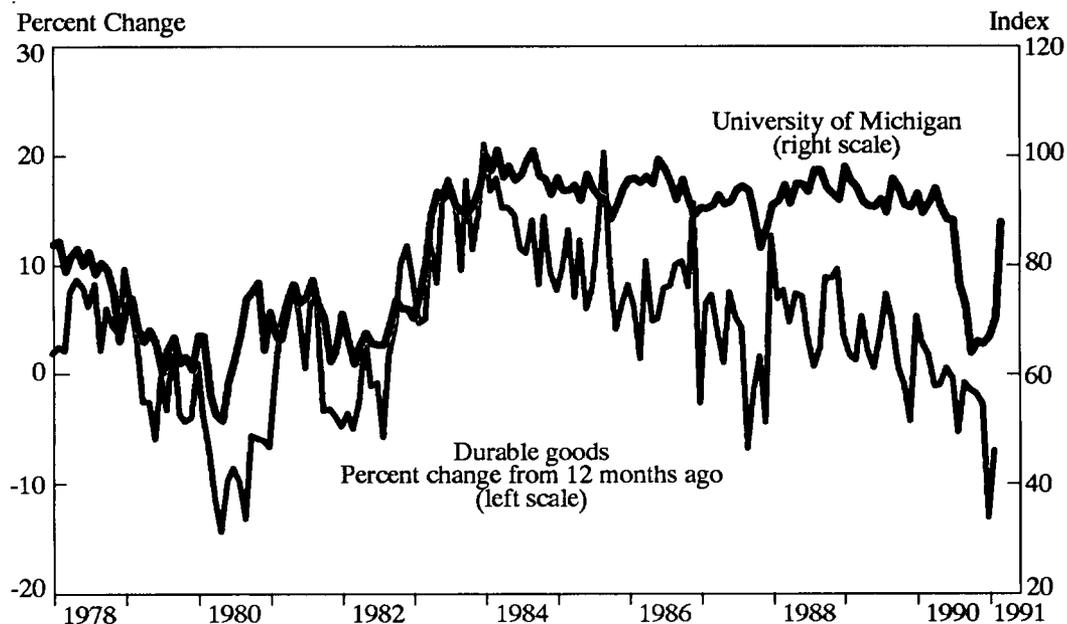
Guideline 1: Stand-alone value

Can consumer confidence indexes, by themselves, give dependable forecasts of consumer spending? If so, the indexes can be said to have stand-alone value. Such a question may be particularly important to small businesses that need to forecast consumer spending but cannot afford to develop elaborate data bases or statistical models. If confidence indexes have stand-alone value, such measures would provide a simple, inexpensive way for businesses to forecast durable goods purchases.

Graphical analysis. Graphical analysis suggests that consumer confidence indexes are not good stand-alone indicators of future consumer spending. Chart 2 shows the Conference Board index and the percentage change in durable goods purchases since June 1977.⁷ Consumer confidence was not a reliable indicator when the economy recovered from recession in the early 1980s. After declining in late 1981 and early 1982, real consumer spending on durable goods rose nearly 2 percent over the year ending in September 1982. But the Conference Board index did not give a clear signal of the recovery in durable goods purchases. The confidence index rose temporarily to 63 in July but then fell to 54 in October, after a sustained recovery in durable goods purchases was already under way.

The Conference Board index was also not

Chart 3
The Michigan Index and Durable Goods Purchases



a good stand-alone indicator of durable goods purchases during the long expansion in the 1980s. As Chart 2 shows, confidence rose to 106 in 1984 and then began drifting downward. The growth rate of durable goods purchases also slowed gradually after the initial rebound from recessionary levels. But the Conference Board index began rising sharply in 1987 and reached record highs in 1989, even though growth in durable goods purchases continued to slow. In fact, consumer spending on durable goods declined 4 percent over the year ending in December 1989, even though confidence remained extremely high by historical standards.

Graphical analysis also shows the University of Michigan's confidence index is not a reliable stand-alone indicator of consumer spending. The Michigan index has often moved

in the same direction as the growth rate of durable goods purchases (Chart 3). But the confidence index has not provided a consistent advance warning of changes in consumer spending. And like the Conference Board index, the Michigan index did not reflect the sustained slowing of durable goods purchases during the 1980s.

Correlation coefficients. Correlation statistics confirm that consumer confidence indexes are not good stand-alone indicators of durable goods purchases. A correlation coefficient measures the degree to which two variables move together, taking the value 1.0 if there is a perfect positive relationship and zero if the variables are unrelated.

The correlations between the Conference Board index and consumer spending on durable goods indicate a weak and unreliable relation-

Table 1

Tests of Stand-Alone Value: Correlation Coefficients Between Durable Goods Spending and Confidence Indexes

Lead Time* (months)	Conference Board Index		Michigan Index	
	Correlation Coefficient	t†	Correlation Coefficient	t†
(1)	(2)	(3)	(4)	(5)
0	.07	.83	.12	1.47
1	.00	-.01	.10	1.21
2	.01	.08	.07	.88
3	.00	-.01	.06	.76
4	-.02	-.26	.06	.75
5	-.07	-.83	.03	.39
6	-.08	-1.04	.03	.36

* The lead time is the number of months by which the confidence index precedes the change in durable goods purchases. A lead time of zero means the confidence index and durable goods purchases are from the same month.

† The statistic tests whether the corresponding correlation coefficient is different from zero. None of the correlations differs significantly from zero at the 5 percent level.

ship. Table 1 gives correlation coefficients in column 2 with the Conference Board index leading consumer spending by zero to six months. The correlation coefficients are small, ranging from 0.07 when the lead time is zero, to -0.08 when the lead time is six months. In addition, the table presents t statistics in column 3 testing whether the correlations between consumer confidence and durable goods purchases are statistically significant—that is, whether the coefficients are statistically different from zero. These tests show the correlations are not statistically significant.

The results are similar for the Michigan index. Although the correlations in column 4 are consistently positive, the coefficients are always small. For example, the largest correlation coefficient between the confidence index and growth in durable goods purchases is only 0.12. And based on the t statistics in

column 5, none of the correlations involving the Michigan index is statistically significant.⁸

The small correlations and lack of statistical significance support the view that confidence indexes have no stand-alone value for predicting durable goods purchases. Thus, a first guideline for forecasters and policymakers emerges: Consumer confidence indexes are not reliable as stand-alone indicators of consumer spending and thus should not be used as a decision maker's sole—or even primary—forecasting tool.

Guideline 2: Complementary value

Given that consumer confidence measures cannot stand alone as a forecasting tool, do such indexes have value as part of a larger forecasting process? Confidence measures can be said to have complementary value if they

Table 2

Tests of Complementary Value: F Statistics on Confidence Indexes in Equations Relating Durable Goods Spending to Confidence Index and Other Variables

Confidence index	Equations include past durable goods purchases	Equations include additional economic variables
(1)	(2)	(3)
Conference Board	2.55*	1.38
University of Michigan	2.86*	1.09

* Statistically significant at 5 percent level.

Note: Statistical significance indicates the confidence index is useful in predicting durable goods purchases. For further details on these tests, see endnotes 9 and 10.

can be combined with other macroeconomic information to produce more reliable forecasts of consumer spending.

Consumer confidence measures might not have stand-alone value because confidence indexes reflect both economic and psychological factors. Changes in these different factors could from time to time cancel out, causing confidence indexes to have no predictive value. But statistical tests can control for the economic factors by including macroeconomic variables in the consumption relationship. As a result, the confidence indexes might have complementary forecasting value because of the psychological factors.

Preliminary results hint that confidence indexes may have some complementary value in predicting consumer spending. The simplest way to control for economic effects on consumer confidence and spending is to include past values of durable goods purchases in the information set. Such past values can be interpreted as a stand-in for slowly evolving macroeconomic fac-

tors affecting consumers. Changes in durable goods purchases were thus regressed on past changes in durable goods purchases as well as past values of consumer confidence.⁹ The preliminary results are summarized in column 2 of Table 2. The tests find both confidence indexes to be statistically significant and, thus, useful in predicting durable goods purchases.

But a better statistical test finds that consumer confidence indexes have little complementary value to forecasters and policymakers. Past changes in durable goods purchases are an imperfect stand-in for changes in macroeconomic variables. A better procedure is to include additional economic variables directly in the forecaster's information set. Past values of real disposable income, the consumer price index, and the unemployment rate were added to the regression equations.¹⁰ As column 3 of Table 2 shows, tests with these additional variables never found the confidence measures to be

useful in predicting durable goods purchases.

Such results suggest a second guideline for forecasters and policymakers: Confidence indexes have little complementary value when used in a forecasting process with other macroeconomic variables.

Guideline 3: Value in exceptional situations

The first two guidelines state that confidence indexes are not useful as stand-alone indicators of consumer spending and that such indexes have little complementary value when combined with other economic variables. But the results on which these guidelines are based are average results for the overall period from the late 1970s to the present. Could consumer confidence indexes have greater forecasting value in exceptional situations?

The Persian Gulf crisis provides an excellent opportunity for testing the predictive value of confidence indexes in exceptional circumstances. Had the Gulf crisis been widely anticipated, uncertainty might have risen before the actual invasion. As a result, consumer spending might have weakened, and past macroeconomic data might have foreshadowed further declines in consumer spending. But in actuality, past economic data probably did not reflect the greater uncertainty because the invasion surprised nearly all U.S. households. The abrupt decline in confidence after the invasion thus provided potentially useful information to forecasters about the reactions of consumers.

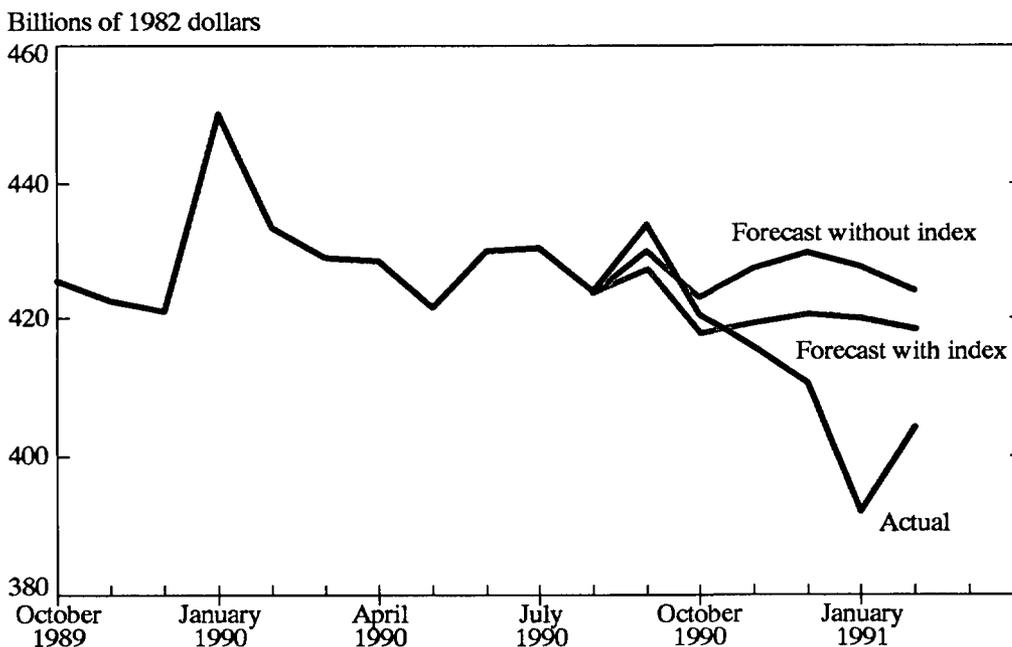
To examine the predictive value of confidence measures during the Persian Gulf crisis, forecasts of durable goods purchases were produced with three Bayesian vector autoregressive models (BVARs). Such models express each variable in the model in terms of its own past values and the past values of the

other variables in the model.¹¹ The first BVAR did not contain any consumer confidence measure, the second contained the Conference Board index, and the third contained the Michigan index. All three BVARs included two consumption variables—real purchases of durable goods and real purchases of non-durable goods and services. Each BVAR also contained the Standard and Poor's 500 common stock price index, the unemployment rate, real disposable income, the price of imported crude oil, the consumer price index, and the six-month commercial paper rate.¹²

Consistent with the previous tests, a forecasting exercise with the BVARs found that including consumer confidence did not improve forecast accuracy under average, or ordinary, circumstances. The three models were estimated through December 1987 and used to forecast six months ahead. Actual and predicted values were compared to calculate the forecast errors. Another six months of data were then added to the sample period, and the process was repeated to produce another six-months-ahead forecast. Five forecasts were generated in this way, with the final set of forecasts covering the first half of 1990.

The BVARs including consumer confidence were actually less accurate under ordinary circumstances. The forecast accuracy of the models can be measured by the mean absolute forecast error, which is the average prediction error without regard to sign. The BVAR with no consumer confidence measure had a mean absolute forecast error of \$10.6 billion for six-months-ahead predictions of real durable goods purchases. In contrast, the BVAR with the Conference Board index had a mean absolute forecast error of \$12.4 billion, and the BVAR with the Michigan index had a mean absolute forecast error of \$16.7 billion. Including consumer confidence in the model thus did not improve forecast accuracy under

Chart 4
Durable Goods Purchases during the Persian Gulf Conflict



ordinary circumstances—as would be expected based on the earlier tests.¹³

The empirical results were quite different in the exceptional circumstances surrounding the Persian Gulf crisis. The three models were re-estimated over the period ending in August 1990. Forecasts of durable goods purchases were then produced for the period from September 1990 to February 1991. Chart 4 compares the forecasting accuracy of the BVAR with the Conference Board index and the BVAR with no confidence index. Although neither model predicted the sharp decline of consumer spending in late 1990, the model with consumer confidence was closer to the mark. The BVAR containing the Michigan index similarly outperformed the model with no consumer confidence measure.¹⁴

One should not conclude from the Persian Gulf results that consumer confidence measures will be useful in all exceptional circumstances. The stock market collapse in October 1987 is a case in point. Although consumer confidence indexes fell sharply, the predictive value of these indexes was mixed. The three BVARs were estimated through October 1987 and used to predict durable goods purchases over the next six months. Although the BVAR with the Conference Board index was slightly more accurate than the BVAR with no confidence measure, the BVAR with the Michigan index was slightly less accurate.¹⁵

Consumer confidence indexes were presumably more useful after the Kuwait invasion because the invasion was an unanticipated noneconomic event. In contrast, the

stock market collapse was an economic event that may have been partially anticipated.¹⁶ Other macroeconomic variables may have already reflected the uncertainties associated with the large decline in stock prices. Thus, the abrupt decline in confidence may have provided forecasters and policymakers with little new information.

These results produce a third guideline for forecasters and policymakers: Consumer confidence indexes may be useful in exceptional instances where confidence changes abruptly because of unanticipated noneconomic events.

Conclusion

Consumer confidence is receiving greater attention lately because of the U.S. economic recession and sharp fluctuations in confidence caused by the Persian Gulf crisis. Economists disagree, however, about the usefulness of confidence measures in assessing the economic outlook. This article presents new empirical evidence to suggest some guidelines for using consumer confidence indexes in

economic forecasting and policymaking.

Three general guidelines are proposed. First, confidence indexes are not reliable stand-alone indicators of durable goods purchases under ordinary circumstances. As a result, confidence indexes should not be used as primary forecasting variables. Second, confidence measures ordinarily have little complementary value when used in a forecasting process with other macroeconomic variables. And third, confidence measures may be useful in exceptional instances where confidence changes abruptly because of unanticipated noneconomic events.

To the extent that the recent rebound in confidence is due to a faster than expected end to the Persian Gulf War, the third guideline suggests that consumer spending might be stronger in the months ahead than it otherwise would be. But forecasters and policymakers must be cautious in interpreting this rebound because consumer spending also will continue to reflect such negative macroeconomic factors as higher unemployment and weak disposable income growth.

Endnotes

¹ Another channel by which consumer confidence may affect the economy is home purchases. For example, the University of Michigan's confidence index is a determinant of housing activity in the Data Resources Incorporated model of the U.S. economy. This article, however, looks only at consumer purchases of durable goods.

² Purchases of consumer durable goods can be viewed as a form of saving, even though government statisticians classify such purchases as consumption. When a household owns a durable good, its true consumption in any year is the services from that good, not the entire initial value of the purchase. Part of the initial purchase price is really an investment in a household asset that will yield consumer services in the future. But when consumers become more uncertain about the future, they channel their savings toward more liquid assets instead of highly illiquid durable goods (Mishkin 1976).

³ The monthly levels of the two confidence indexes have a correlation coefficient of 0.75. The correlation coefficient measures the degree to which the two indexes move together. The correlation coefficient would be 1.0 if the two series had a perfect positive relationship and zero if the series were unrelated.

⁴ This section does not present a comprehensive review of previous empirical studies. Other studies of the predictive value of consumer confidence indexes include Adams, Burch and Stekler, Friend and Adams, Fuhrer, Mueller, and Thomas.

⁵ Mishkin's findings have limited practical implications for forecasters and policymakers, however, because statistics on household assets and liabilities are not available on as timely a basis as the confidence indexes. Moreover, household balance sheet data may be revised substantially after their initial release.

⁶ Statistics on such macroeconomic variables as consumption and disposable income are revised for years after their initial release. As a result, the initial estimates available to forecasters and policymakers are presumably less accurate than the revised statistics used for empirical testing in this and other studies. Consumer confidence measures, in contrast, are never revised, leaving open the possibility that they might have more predictive value in practical forecasting situations than in empirical tests using revised macroeconomic data.

⁷ The empirical work in this article is based on monthly data. As a result, the Conference Board index was available from June 1977 to March 1991. Before June 1977, the Conference Board survey was conducted on a

bimonthly basis. The Michigan index was available from January 1978 to March 1991. Before January 1978, the Michigan survey was conducted on a quarterly basis. Results with quarterly data over a longer period will be reported in a future Federal Reserve Bank of Kansas City working paper.

⁸ Rao and Miller explain the t test in Table 1. For all of the statistical analysis except the charts, growth in durable goods purchases is the change from the previous month at an annual percentage rate. Growth in durable goods purchases was also regressed on a constant and either 6 or 12 past values of a confidence index. An F statistic was then computed to test whether past values of the confidence index help jointly to predict consumer spending. The F tests did not reject the hypothesis that past values of consumer confidence have no predictive value.

⁹ These tests are called Granger causality tests because the tests were proposed by Granger. However, there are problems with interpreting these tests as indicating causation in any deeper sense (Jacobs, Leamer, and Ward). As a result, this article views such tests only as indicating predictive usefulness relative to a particular information set.

The Granger regressions included six lagged values of each explanatory variable. As a result, the sample period for regressions with the Conference Board index was from December 1977 to February 1991, and the sample period for regressions with the Michigan index was from July 1978 to February 1991.

¹⁰ The confidence measures and the unemployment rate were expressed as levels. All other explanatory variables were annual percentage changes. Similar results were obtained when the regressions included 12 lagged values of each explanatory variable. The results of Granger tests with other consumer spending variables will be reported in a future working paper.

¹¹ Hakkio and Morris provided a general introduction to vector autoregressions. Todd discussed forecasting with Bayesian VARs.

¹² The BVARs contained 12 lagged values of each explanatory variable. Each equation also included a constant term. The unemployment rate, the six-month commercial paper rate, and the confidence measures were entered as levels. The other variables were entered in logarithmic form. Real variables were measured in constant 1982 dollars.

¹³ The differences in mean absolute error for the three BVARs are small relative to consumer spending. Real

purchases of durable goods were between \$400 billion and \$450 billion annually from 1988 to 1990. The BVAR with no confidence index also had a slightly better record over forecast horizons of one to five months.

¹⁴ All three BVARs predicted stronger consumer spending than actually occurred during the Persian Gulf crisis. The model with no confidence index had a forecast error of \$20.4 billion for a six-months-ahead prediction. The model with the Conference Board index had a \$14.7 billion error, while the model with the Michigan index had a \$19.3 billion error.

¹⁵ All three BVARs predicted weaker durable goods purchases than actually occurred over the six months after the stock market collapse. The model with no confidence measure had a forecast error of \$27.5 billion

for a six-months-ahead prediction. The models with the Conference Board index and the Michigan index had errors of \$21.6 billion and \$30.8 billion, respectively.

¹⁶ Economists still disagree about the causes of the stock market crash. But stock prices were actually declining before October 1987. And prior to the crash, some market analysts were predicting further declines in stock prices because prices were high by historical standards relative to corporate earnings. Such predictability of stock prices is inconsistent with a leading theory of stock market behavior, the efficient markets hypothesis. But recent financial research severely challenges this theory, implying that stock prices are somewhat predictable (Fortune).

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