FEDERAL RESERVE BANK OF KANSAS CITY

Economic Review

July/August 1991

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Can Losses of Federal Financial Programs Be Reduced?

By Sean Becketti

Federal financial programs have cost taxpayers billions of dollars in recent years. The collapse of the thrift insurance fund is the most familiar and expensive example. But many other programs, such as pension insurance and credit programs for students, farmers, and homeowners, have also suffered large losses. The Administration estimates these and other financial programs will cost taxpayers billions of dollars more in coming years.

Congress and regulators are searching for ways to reduce future losses. Some programs have already been restructured, and legislation for further changes is being debated. A key question in these debates is whether losses can be reduced significantly without also reducing program benefits. If not, Congress will have to make the hard choice between higher taxes and lower program benefits.

This article argues that the scope is limited for reducing future program losses without reducing program benefits. The first section of the article describes the major federal financial programs. The second section explains why various programs suffered losses in the past and are expected to suffer losses in the future. The final section argues that the risks responsible for a sizable share of prospective losses cannot be reduced without reducing benefits.

Federal Financial Programs

The dozens of federal financial programs fall into two types: insurance programs and credit programs. Both types of programs are designed to offer financial services the private market does not offer and to promote such social goals as home ownership and education. Insurance programs provide coverage that is difficult or

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impossible to obtain from private insurers. Credit programs use a variety of methods to increase the flow of finance to such activities as agriculture, education, and housing. These programs make the federal government the nation's largest source of credit and underwriter of risk, with a total risk exposure of more than $6 trillion.

Insurance programs

Government insurance programs are perhaps the most familiar of the federal financial programs because of the catastrophic losses of the deposit insurance system. Insurance programs account for almost three-quarters of federal financial programs, and deposit insurance accounts for almost two-thirds of the federal insurance outstanding (Table 1). Pension benefit insurance accounts for another 21 percent of total federal insurance. The remainder is composed of a grab bag of smaller insurance programs.

Deposit insurance. The three deposit insurance programs together cover close to $3 trillion in deposits. FDIC's Bank Insurance Fund (BIF) insures deposits at commercial and savings banks. FDIC's Savings Association Insurance Fund (SAIF) protects deposits at thrifts.[1] The Share Insurance Fund (SIF) of the National Credit Union Administration insures deposits at credit unions.

All three deposit insurance programs operate similarly. Insured institutions pay premiums tied to the size of their deposit holdings. When an insured institution fails, the insurance fund resolves the situation. The insurance fund may find a buyer for the failed institution. Or, the fund may close the institution, pay off the insured depositors, and sell the institution's assets to recover what it can.[2] Whatever approach is taken to resolve the situation, the insurance program protects the insured depositors from loss.

Table 1

Federal financial programs

(Amounts in billions)

Program	Face value*
Insurance programs	$4,496
Deposit Insurance	
Banks	1,911
Thrifts	726
Credit unions	178
Pension insurance	943
Other insurance	738
Credit programs	1,648
Agriculture	
Farmers Home Administration	59
Farm Credit System	50
Education	
Guaranteed student loans	53
Sallie Mae	—
Housing	
Fannie Mae	372
Federal Housing Administration	356
Freddie Mac	317
Veterans Affairs	161
Federal Home Loan Banks	117
Other credit	163
Total	$6,144

* The face value of each program is its total potential liability. For example, the Bank Insurance Fund insures $1,911 billion of bank deposits.

Source: *Budget of the United States Government, Fiscal Year 1992*, Part Two, p. 204.

Deposit insurance was created to safeguard the savings of small depositors and to prevent bank runs. Bank runs arise when depositors who are concerned about the condition of one or a handful of weak institutions

flee healthy and failing institutions alike. Such a bank run can reduce credit and impair the payments system.

Federal deposit insurance prevents bank runs because depositors know the government's resources are adequate to back deposits even if many insured institutions fail simultaneously. Federal deposit insurance is backed by the full faith and credit of the United States. Thus, depositors are protected even when losses exhaust the reserves of the insurance fund, as happened with FSLIC (Federal Savings and Loan Insurance Corporation) in the 1980s.

Pension insurance. The government insures $950 billion of pension benefits in the private sector through the Pension Benefit Guaranty Corporation (PBGC). PBGC insures defined benefits pensions, which promise retirees fixed monthly payments.[3] Annual premiums paid by the insured pension plans fund PBGC insurance. These premiums are based on the number of persons enrolled in the plans and the adequacy of plan funding.

PBGC insures pensions by making up the shortfall in promised benefits when defined benefits plans are terminated.[4] Plans typically are terminated when the firm sponsoring the plan fails. A terminated plan might suffer a shortfall because it did not invest enough to cover promised benefits; that is, the plan was underfunded. Alternatively, the return on the plan's investments might be inadequate.

Private insurance companies do not insure pensions for two reasons. First, the possibility of catastrophic claims makes the government the only credible insurer. Second, it is difficult to predict the pension plan terminations accurately. As a result, private firms cannot determine the appropriate premium to cover the expected losses of a pension benefit insurance policy.

Credit programs

Federal credit programs subsidize and increase the supply of credit to a number of sectors. In 1990, the face value of the outstanding obligations of these programs exceeded $1.6 trillion. Programs serving agriculture, education, and housing accounted for over 90 percent of these obligations (*Budget of the United States Government, Fiscal Year 1992*; *Budget* hereafter).[5] Credit programs direct credit to favored sectors in four ways: They loan money directly to borrowers in favored sectors. They guarantee loans made by others. They securitize loans made by others (that is, they issue securities backed by a pool of loans). Finally, they provide assistance to lenders who serve a targeted sector. These programs are financed by federal appropriations, by fees and interest charges levied by the programs, and by borrowings from the private sector.

Agriculture. The Farm Credit System (FCS) and Farmers Home Administration (FmHA) are the largest credit programs serving agriculture. FCS is an example of a government-sponsored enterprise, that is, a privately owned but federally chartered specialized lender. FCS institutions make real estate loans, operating loans, and loans to cooperatives—all of which they finance with bonds. The bonds are sold on national capital markets at low, government agency rates.[6] FmHA is a part of the Agriculture Department. FmHA provides loans and loan guarantees to young farmers, undercapitalized farmers, and other farmers who cannot obtain credit elsewhere. These loans are financed by federal appropriations.

The missions of FCS and FmHA are different. FCS was established in the early 1900s to reduce the transactions costs of bringing credit from national capital markets to rural

communities and to restructure credit terms to better match the income cycle of farmers. Today, these institutional problems have largely disappeared. FCS now helps farm borrowers primarily by borrowing money at low, government agency rates and passing on these savings to borrowers.

FmHA's mission has always been to assist poorer farmers. Originally called the Resettlement Administration, FmHA offered loans and outright grants to destitute farmers during and after the Great Depression. FmHA has remained a lender of last resort, lending to and guaranteeing loans for farm borrowers turned down by private lenders. Interest rates on FmHA loans are typically lower than market rates and sometimes lower than Treasury rates.

Education. Two programs serve education: the Guaranteed Student Loan (GSL) program and Sallie Mae (Student Loan Marketing Association). The GSL program guarantees and subsidizes loans from banks and other qualified lenders to students and their parents. The GSL program is administered by the Department of Education and financed by appropriations.[7] Sallie Mae encourages lender participation in the GSL program by buying student loans from lenders and by providing technical assistance in loan servicing. Sallie Mae is a self-supporting government-sponsored enterprise.

The GSL program helps solve the problem of financing an education, especially for students unable to tap family savings. Private lenders probably would not make student loans in the absence of government guarantees because student borrowers have little collateral and limited job histories. Moreover, students are mobile, making it difficult to find them should they default. Finally, students are typically unable to begin repayment until they finish school. The GSL program replaces the weak credit standing of the student borrowers with the strong credit standing of the federal government to overcome these obstacles to obtaining finance.

Sallie Mae increases the willingness of lenders to make student loans by promoting a secondary market and by reducing loan servicing costs. By standing ready to purchase student loans from the original lenders, Sallie Mae makes student loans liquid. By developing and distributing sophisticated software for servicing student loans, Sallie Mae reduces servicing costs. Sallie Mae has a competitive advantage in undertaking these activities because it borrows funds at agency rates.

Housing. The housing sector is served by several competing programs. The FHLBanks (Federal Home Loan Banks), another government-sponsored enterprise, provide advances to the thrift industry, which specializes in mortgage lending. Advances are loans of varying maturities collateralized by high-quality, liquid assets used to provide thrifts with a stable source of funds. The FHLBanks finance their lending by borrowing in national capital markets at agency rates and by accepting deposits from member thrifts.

Fannie Mae (Federal National Housing Administration) and Freddie Mac (Federal Home Loan Mortgage Corporation) are government-sponsored enterprises that serve the housing sector by promoting an active secondary market for mortgages and mortgage-backed securities. Both programs purchase mortgages from thrifts and other mortgage lenders, releasing funds to make additional mortgages. The mortgages are pooled and used to back securities that entitle investors to pro rata shares in the principal and interest payments from the mortgages. Fannie Mae and Freddie Mac guarantee these mortgage-backed securities against defaults on

the original mortgages.[8]

The activities of Fannie Mae and Freddie Mac increase the flow of housing finance and decrease mortgage rates. The programs' guarantees of mortgage-backed securities attract additional funds to the mortgage market. As government-sponsored enterprises, Fannie Mae and Freddie Mac borrow at agency rates, passing on this cost advantage to borrowers. In this way these programs lower the cost of housing finance (Hendershott and Shilling).[9]

Several other programs use housing assistance to help target groups. For instance, FCS and FmHA help rural families by providing and guaranteeing rural real estate loans. The FHA (Federal Housing Administration) and VA (Department of Veterans Affairs) guarantee mortgage loans for low-income and veteran borrowers. Qualified borrowers obtain FHA/VA-guaranteed loans from private mortgage lenders. To further aid these borrowers, FHA and VA restrict the fees, down payments, and other terms lenders can impose. Fees and federal appropriations finance FHA and VA.

Losses of Federal Financial Programs

Most federal financial programs have suffered significant losses and are likely to suffer more in the future. Like any financial concern, these programs lose money because they are exposed to credit risk, interest rate risk, business risk, and management risk. Business and credit risk account for much of the past and most of the prospective losses.

Program costs are divided into two parts: subsidies and losses. Subsidies are a measure of the services a financial program provides. For example, the GSL program subsidizes some of the interest charges of guaranteed student loans. That is, the program pays some of these charges to lower the cost to student borrowers. Losses are expenditures for insurance claims, loan defaults, portfolio losses, and the like. For instance, when a student defaults on a guaranteed loan, the GSL program suffers a loss.

While both are costs, subsidies and losses have very different implications. Subsidies may be expensive, but they provide the services Congress intended to deliver when it enacted a program. Thus, subsidies are not a cause for concern provided they do not exceed the levels intended by Congress. Losses, on the other hand, drain the resources available to a program. Thus, losses are costs that Congress, program managers, and taxpayers wish to minimize.

Why do federal financial programs lose money?

Financial program losses result from exposure to the same risks facing any financial concern: credit risk, interest rate risk, business risk, and management risk. *Credit risk* is the risk that debt obligations will not be repaid. Programs are exposed to credit risk directly by making, guaranteeing, or purchasing loans. Programs are exposed to credit risk indirectly when they insure institutions that make loans. For example, deposit insurance indirectly exposes the government to credit risk because depository institutions make loans. Pension insurance indirectly exposes the government to credit risk because plans can default on obligations to pay future benefits.

Interest rate risk is the risk of loss due to a change in interest rates. Programs are exposed to interest rate risk when the values of their assets and liabilities respond differently to changes in interest rates. For example, Fannie Mae's net worth plummeted when interest rates increased in the early 1980s because the return on its fixed-rate mortgages remained

constant while its cost of funds increased sharply.

Business risk is the risk of loss due to factors beyond an organization's control. Examples of business risk are unexpected changes in legislation or changes in demand for a program's services. Over the past 20 years, for instance, changes in the law have permitted Freddie Mac and Fannie Mae to stimulate and to participate in the growth of the secondary mortgage market. The growth of this secondary market weakened the competitive position of the thrift industry by reducing the profitability of funding mortgages. Thus, the legislative changes that led to the growth of the secondary mortgage market constituted a business risk for the thrift industry and, hence, for the thrift deposit insurance fund.

Management risk is the risk of costly management mistakes. Fraud and other program abuses also are included in management risk. For example, inexperienced and unprofessional management in some FCS institutions reportedly caused some FCS losses.

Losses of selected programs

Almost all major federal financial market programs have suffered substantial losses—in recent years, more than $100 billion (Table 2).[10] Losses of the same order of magnitude are expected in the coming decade.[11]

Thrift deposit insurance. The deposit insurance system has suffered the largest losses so far and is expected to suffer the largest losses in the near future. The thrift insurance program accounts for most of these losses. The Administration estimates that the total cost of the S&L cleanup will be $130 billion to $176 billion—that is, up to $700 for every American (*Economic Report of the President*).

Interest rate risk was largely responsible for the initial losses. Sharp increases in interest rates in the late 1970s, combined with legal limits on deposit rates, led to disintermediation. That is, depositors withdrew funds from thrifts and placed them in higher yielding investments. Thrifts raised rates and retained deposits when deposit rate ceilings were eliminated in the early 1980s. But the higher cost of deposits drove many institutions into insolvency because the return on existing portfolios of fixed-rate mortgages remained low.

Table 2

Past losses and prospective costs of selected programs

(Amounts in billions)

Program	Past losses	Prospective costs *
Insurance programs		
Deposit Insurance		
Banks	$22	$42-78
Thrifts	130-176	70-83
Pension insurance	2	6-20
Credit programs		
Agriculture		
Farmers Home Administration	10	20-36
Farm Credit System	4	1-2
Education		
Guaranteed student loans	12	30-37
Housing		
Federal Housing Administration	6	8-16
Veterans Affairs	5	3-6

* Past losses and prospective costs of credit programs are not directly comparable because the prospective costs include both losses and subsidies. Subtotals for insurance and credit programs are not included because many programs are omitted. See the appendix for additional explanation.

Source: See appendix.

Management risk compounded the original losses. In response to the losses from higher interest rates, Congress granted thrifts new powers in the hope that thrifts could earn their way out of insolvency. Thrift managements inexperienced in these new business areas made many misguided investments. Additional losses from management risk were incurred because of delays in closing insolvent thrifts. These delays allowed losses to mount. Moreover, during these delays, owners of insolvent thrifts had a greater incentive to undertake risky projects because they no longer had their own wealth at risk. Some observers estimate that a quarter to a third of the total costs can be attributed to such delays.[12] More vigorous efforts by Congress and the regulators to close insolvent thrifts would have avoided much of these costs.

Business risk also contributed to losses. Economic downturns in oil and agriculture damaged a number of thrifts. These downturns reduced incomes and produced job losses in regions dependent on these industries. As a consequence, defaults on home mortgages also increased in these regions, hurting thrift profits in the process. In addition, increasing competition from Fannie Mae and Freddie Mac squeezed profit margins in housing finance, the core business of the thrifts.

Interest rate risk and management risk are expected to produce smaller future losses than those produced in the past. The explosive rise of interest rates that reduced the net worth of many thrifts was unprecedented and is unlikely to be repeated. And the costly delays in closing insolvent institutions are not expected to recur.

Business risk and credit risk are therefore expected to account for most of the prospective losses of the thrift insurance fund. Profits will be squeezed by continuing competition from commercial banks, mortgage banks, Fannie Mae, and Freddie Mac. In addition, the recent weakness in real estate values in some regions is likely to increase loan defaults.

Bank deposit insurance. Bank Insurance Fund losses have also been high in recent years. Losses exceeded $1 billion in seven of the ten years in the 1980s (Federal Deposit Insurance Corporation, Table 125). These losses cut the reserves of the bank insurance fund by almost half from 1985 through 1990 and by over a quarter in 1989 alone (*Budget*, Table A-4).[13]

Losses are expected to remain high. The recent decline in real estate values has weakened many banks, particularly in the Northeast. In the longer run, stiffer competition in banking's traditional lines of business is likely to squeeze bank profits. The Administration estimates that, in the absence of recapitalization or other legislative initiatives, the bank failures produced by these forces will push the Bank Insurance Fund into insolvency by the end of 1992. The Administration also forecasts that the Bank Insurance Fund's net worth will continue to fall in succeeding years, reaching a negative $22 billion by 1996 (*Budget*, Table A-5).

Business risk and credit risk appear to account for most of the past and prospective losses in bank deposit insurance. Business risk, in the form of downturns in the agriculture and energy sectors in the 1980s, hurt a number of banks. Increased competition from securities markets, foreign banks, and other competitors is expected to continue to cap the profitability of banking (U.S. Department of the Treasury 1991). Credit risk appears to be a serious problem as well. Many banks are not adequately diversified. The most recent example is the concentration of real estate loans in many bank portfolios. Some observers also believe that banks simply made too many bad loans.

Pension insurance. The pension insurance fund has deteriorated steadily since its incep-

tion. Claims against the PBGC have exceeded projections and have grown faster than premiums. As a result, the PBGC deficit grew from $12 million in 1975 to over $1.9 billion in 1990.[14] A large part of PBGC's losses reflect the economic distress of the U.S. steel and automobile industries, which account for over 60 percent of PBGC claims.[15] Because the conditions that produced past losses are expected to persist, future costs may reach $20 billion (*Budget*).

The PBGC's vulnerability to economic downturns in a handful of industries constitutes an important business risk. Nonetheless, most of the PBGC losses reflect credit risk from pension fund defaults. A number of insured corporations have attempted to terminate pension plans despite their ability to pay benefits.[16] In addition, many corporations deliberately reduce funding just before terminating their pension plans (Ippolito). The aspects of PBGC insurance that encourage such behavior have not changed. Thus, losses from this behavior are expected to continue in the future.

Farmers Home Administration. FmHA losses have risen in recent years for several reasons. First, the farm income crisis of the 1980s increased FmHA loan defaults. FmHA chargeoffs have exceeded 12 percent of loans outstanding in recent years, and delinquency rates have topped 50 percent in some FmHA programs. Second, legal challenges for years delayed FmHA attempts to foreclose on delinquent borrowers. Finally, Congress has legislated a number of "borrower's rights" designed to keep delinquent borrowers on their farms (*Budget*). As a result, FmHA's portfolio has many weak loans, suggesting that loan losses will remain high.

Business risk and credit risk account for both the past and the prospective losses of FmHA. The collapse in farm incomes in the 1980s and the legal challenges to FmHA's foreclosure powers were business risks that contributed to past losses. The increase in borrowers' rights is a business risk that is likely to keep losses high in the future. And, as for credit risk, FmHA's statutory obligation to serve as a lender of last resort to low-income, high-risk farm borrowers guarantees FmHA a higher-than-average rate of loan losses.

Farm Credit System. Many factors impaired the performance of FCS in recent years. The farm income crisis of the 1980s imposed losses on FCS. Net loan chargeoffs soared from only $8 million in 1983 to $1.3 billion in 1986 (U.S. Department of Agriculture). From 1982 through 1989, cumulative net loan chargeoffs were $3.8 billion. Management weaknesses also surfaced in recent years. Examples include inadequate oversight of managers by some boards of directors, ineffective internal audits, and inadequate systems for reporting problem loans. The interest rate increases of the early 1980s also hurt FCS as the system borrowed long-term funds at high interest rates without raising lending rates proportionately.

FCS's financial performance has improved recently, but its troubles are not over yet. FCS held loan loss reserves of $1.6 billion at the end of 1989. Fourteen percent of outstanding loans are classified as high-risk loans. And, according to the Farm Credit Administration, management weaknesses continue to hamper many FCS institutions.

Past and prospective FCS losses reflect exposure to all four types of risk. The farm recession of the 1980s was a business risk, an event beyond the control of farm lenders and borrowers. Restricting FCS to agricultural lending ensures its continuing vulnerability to the fortunes of agriculture (U.S. General Accounting Office). Turning to credit risk, the boom in farming in the 1970s apparently generated

overly optimistic and overly expansive lending in the early 1980s, resulting in higher defaults as the decade progressed. FCS loan portfolios remain weak, so losses from credit risk will continue (U.S. Department of the Treasury 1990). Weak management practices and controls—management risk—added to the losses of FCS. Several management deficiencies are being corrected, although some deficiencies remain. Finally, the failure to synchronize interest rates on FCS assets and liabilities produced past losses. Large swings in interest rates, however, are unlikely to be repeated.

Guaranteed student loans. Default rates on guaranteed student loans climbed throughout the 1980s, although loss rates remained about the same due to improvements in collections (*Budget*). Default losses from 1980 through 1990 totaled $12 billion, slightly more than a third of program costs. Interest rate and other subsidies accounted for most of the remainder. The share of defaults in program costs has been rising, however. The $2.7 billion in defaults in 1990 represented 70 percent of costs. The prospective losses on student loans in Table 2 are split about evenly between subsidies and defaults. Thus, the present value of prospective defaults should total $15 billion to $19 billion (*Budget*).

Credit risk, management risk, and business risk are responsible for most of the past and prospective losses in the GSL program. The rate of net default claims is over 10 percent, and it has taken steadily increasing collection efforts to keep the rate from climbing even higher. A recent Congressional investigation blamed the management of the GSL program for a share of program losses (U.S. Congress, Senate). The growth in proprietary schools, such as cooking and cosmetology schools, whose students have much higher-than-average default rates, raises business risk for the GSL program. Without a change in the structure of the GSL program, these factors will continue to add to the costs of the program.

Federal Housing Administration and Veterans Administration. FHA and VA suffered substantial losses in recent years, and more losses are expected. Defaults have been high in the 1980s. Over 250,000 VA-guaranteed loans were foreclosed from 1986 to 1990, and the fees charged by FHA and VA have proved too low to cover the costs of the defaults. The reserves of the FHA single-family fund, for example, fell from 5 percent of outstanding mortgages in 1980 to less than 1 percent in 1990. To reduce losses in the FHA loan guarantee programs, Congress enacted reforms in 1990 to be phased in through 1995. Congress debated, but did not enact, reforms in the VA program (*Budget*). Thus, losses are expected to decline in the FHA program but stay about the same in the VA program.

Credit and business risk account for most of the past and prospective losses of FHA and VA. Both programs are exposed to extraordinary credit risk. Because FHA/VA borrowers are required to make little or no down payment, they have strong incentives to default if they suffer financial reverses or if the value of their homes decline.

Unanticipated changes in the mortgage market in the 1980s—a business risk—also increased FHA and VA losses (Hendershott and Waddell). The number of homes whose prices fell increased sharply, increasing mortgage defaults. In response to this change, private mortgage insurers raised premiums and tightened underwriting standards in the mid-1980s. As a result, some relatively risky borrowers shifted from private mortgage insurance to FHA or VA insurance, producing even higher defaults.

Which risks account for most of the losses?

Business and credit risk appear to account for much of the past and most of the prospective losses. Business risk accounts for substantial losses in all the programs considered in this section. Structural changes in financial markets affect deposit insurance. The decline in international competitiveness of some U.S. industries, such as steel and autos, hurts the pension insurance fund. The farm income crisis affected banks, thrifts, and the farm credit programs; and these programs remain exposed to the shifting fortunes of the farm sector. The rise of proprietary schools inflicts losses on the GSL program. Changes in the mortgage market threaten the FHA/VA programs.

Credit risk also is a central risk for every program suffering significant losses. Bad loans push banks and thrifts into insolvency. Terminations of underfunded pensions are a form of loan default. Most credit programs specialize in loans to risky borrowers.

Interest rate risk and management risk are not expected to contribute as heavily to losses in the future. For instance, skyrocketing interest rates in the late 1970s and early 1980s drove a number of thrifts into insolvency. Rising interest rates also imposed losses on FCS. Such a large swing in interest rates is unusual, however, and is unlikely to recur.

Management risk will also be less important in the future. The costly delays in resolving failed thrifts are not expected to be repeated. FCS is in the process of correcting past management deficiencies. Congress has investigated the management problems of the GSL program and may enact changes. If changes are not made, the GSL program will remain exposed to substantial management risk.

Can Program Losses Be Reduced?

Losses of financial programs can be reduced only by reducing risk exposure. Management risk and interest rate risk can be reduced or eliminated without reducing program benefits. Business risk and credit risk, however, are more difficult to control. Because prospective losses are due mostly to business and credit risk, the scope for reducing program losses without reducing program benefits is limited.

Management and interest rate risk can be controlled

Management risk can be controlled using techniques described in any management textbook. Such techniques include hiring qualified program managers, implementing strict financial controls, avoiding potential conflicts of interest, and performing regular, independent audits. In addition, regulators can strengthen their oversight. None of these measures needs to interfere with a program's mission.

Interest rate risk also can be controlled without reducing program benefits. In recent years, new techniques for measuring and hedging interest rate risk have protected investors from changes in interest rates (U.S. General Accounting Office; Morris). At their simplest level, these techniques involve purchasing assets whose values change with interest rates in the opposite direction from the changes in the investors' original portfolios. Thus, when interest rates shift, the changes in the values of the hedging assets offset the changes in the values of the original portfolios.

The difference in the performances of Fannie Mae and Freddie Mac provides a good example of how interest rate risk can be controlled without sacrificing program benefits. Both programs have helped create a more

liquid secondary market for mortgage loans. In the late 1970s and early 1980s, soaring interest rates drove Fannie Mae into insolvency from 1978 through 1984 (U.S. Department of Housing and Urban Development, Table V-3). In contrast, Freddie Mac has long maintained a policy of avoiding interest rate risk. As a result, Freddie Mac remained profitable throughout the 1980s despite high interest rate volatility.

Business risk cannot be controlled

Business risk, by definition, refers to events beyond the control of an organization. Macroeconomic downturns, natural disasters, political upheavals, and technological changes impose losses on a program that management can do little about. For example, FCS and FmHA suffered heavy losses in the 1980s as a result of the collapse of the farm sector. This collapse was outside the control of any government agency. In addition, the missions of the FCS and FmHA required them to continue supplying credit to the farm sector even though prospects for repayment declined.

Programs can at least anticipate, though not control, one type of business risk—changes in legislation. It generally takes a long time to fundamentally change legislation governing programs or the markets in which they participate. Program managers thus can anticipate and adapt to such changes in an orderly fashion. In addition, programs can make sure Congress is fully informed of the potential effects of new legislation on a program's mission and losses.

Controlling credit risk conflicts with program objectives

Credit risk can be reduced using several techniques. When used together, these techniques limit—but do not eliminate—exposure to credit risk. A problem with using these techniques to reduce the credit risk of federal financial programs is that each technique conflicts with one or more program objectives. As a result, credit-related losses cannot be reduced without reducing program benefits.

Forecastable losses. The first way to control credit risk is to participate only in projects with forecastable losses. This principle applies most forcefully to insurance programs. Private insurers refuse to write policies when they cannot develop reliable estimates of the likelihood and probable size of claims. Without this information, it is impossible to calculate a premium that will cover expected claims and yield a profit.

Unfortunately, this method for controlling credit risk conflicts with the rationale for some federal programs, especially insurance programs. One of the principal reasons for government insurance is the unwillingness or inability of private firms to offer coverage. For example, the difficulty of predicting claims is one of the reasons private insurers do not offer pension benefit insurance (Ippolito). The government has made three studies of pension termination rates in the last 20 years.[17] Yet, even with this information, Congress and the PBGC have frequently underestimated the rate of net claims. If Congress and the PBGC rigidly adhered to sound underwriting principles, pension benefit insurance would not be offered. Such a decision, however, would eliminate not only the PBGC's credit risk, but also the benefits of the PBGC.[18]

Creditworthy borrowers. The second way to control credit risk is to fund only creditworthy borrowers. Banks try to lend only to borrowers with good credit histories, collateral, and realistic prospects of repayment. This principle of sound lending may seem obvious, but the missions of many programs

compel them to target borrowers shunned by private lenders. The student loan program guarantees loans to borrowers without collateral and often without jobs. Borrowers must be refused credit by a private lender to qualify for FmHA loans. Given these practices, the high default rates of these programs are no surprise. But tightening credit standards would reduce the assistance given by these programs.[19]

Coinsurance and down payments. A third way to control credit risk is to require coinsurance or down payments from borrowers. When potential losses are shared by the lender and borrower, both parties have a strong incentive to undertake only economically sound projects and to bring them to successful conclusions. When borrowers share in the profits but not the losses, however, they have an incentive to take greater risks and to abandon troubled projects.

Again, this sensible credit practice conflicts with the purposes of many federal programs. FHA and VA loans guarantee mortgages with little or no down payment to help low-income households buy homes. Students in the GSL program are typically too young to have acquired significant down payments. One of the goals of FmHA is to help younger, undercapitalized farmers "graduate" to borrowing from private lenders. These and similar federal programs could reduce credit-related losses by requiring coinsurance or down payments, but program benefits would be significantly reduced.[20]

Diversification. Finally, credit risk can be limited by diversifying the types of projects and borrowers that are funded. Economic performance in any one sector of the economy is more variable than the average economic performance of many sectors. Thus, lending primarily to one sector, such as agriculture, is riskier than lending to many sectors.

Diversification is not feasible for many programs, however. The point of such programs as FmHA is to boost loans to a particular sector, not to augment the flow of credit to the economy as a whole. As a result, FmHA and FCS are exposed by design to fluctuations in the fortunes of farmers. Deposit insurance also suffers from a lack of diversification. Even though deposit insurance covers banks and thrifts across the nation, the failure of many of these insured institutions to diversify their portfolios exposes the insurance fund to greater risk than necessary.[21]

Conclusion

Federal financial programs have suffered billions of dollars in losses and are expected to suffer losses of the same magnitude in the future. Some of these losses are the result of exposure to management risk and interest rate risk—risks that can be controlled without interfering with program goals. A substantial portion of the losses, however, are due to business risk and credit risk. Business risk is beyond the control of management. And while methods are available for limiting credit risk, applying these techniques would directly reduce benefits for many programs. Consequently, the scope for reducing program losses without reducing program benefits is limited.

This tradeoff between program costs and benefits leaves Congress with difficult choices. Congress and the managements of the various programs have worked in recent years to reduce losses, and Congress is debating further legislative changes to control program costs. Nonetheless, Congress ultimately must decide how much of each kind of program taxpayers are willing to purchase in light of the high prices these programs unavoidably carry.

Appendix

Notes for Table 2

The past losses and prospective costs reported in Table 2 come from a variety of sources. This appendix lists these sources and provides an explanation of the table entries. The past losses and prospective costs of credit programs are not directly comparable because the prospective costs include expected subsidies in addition to expected losses.

Past losses. The $22 billion in past losses of bank deposit insurance are the total net losses for the 1980s (Federal Deposit Insurance Corporation, Table 125). These losses are disbursements in excess of actual and anticipated recoveries in the 1,086 bank failures from 1980 through 1989, accounting for over 99 percent of FDIC losses since its establishment in 1934.

The past losses and prospective costs for thrift deposit insurance involve some double counting because the Administration's estimate of the total cost of the S&L cleanup ($130 billion to $176 billion, *Economic Report of the President*) includes both the cost of resolving currently insolvent thrifts and the cost of resolving thrifts that are likely to fail soon.

The accumulated deficit of the PBGC as of September 30, 1990, was $2 billion (Pension Benefit Guaranty Corporation 1990). Because most of the PBGC's liabilities are the discounted value of future benefits it is obligated to pay, the PBGC has been able to cover expenses with premium income. At some later date, however, taxpayers will be required to cover this deficit.

FmHA accumulated $10 billion in principal chargeoffs and judgments from 1980 through 1990 (Farmers Home Administration). FCS accumulated $4 billion in net chargeoffs from 1982 through 1989 (U.S. Department of Agriculture).

From 1980 through 1990, the GSL program paid $12 billion to lenders for defaults on guaranteed loans (U.S. Department of Education). Total appropriations for this period were $33 billion, thus defaults accounted for 36 percent of appropriations. The gross default rate was 15.3 percent. The rate net of recoveries was 10.4 percent. In 1990, defaults were $3 billion, or 70 percent of appropriations.

As of 1990, FHA's losses on guaranteed loan terminations were $6 billion (*Budget*). A recent letter from the GAO to the members of the House and Senate Banking Committees estimated this loss at a somewhat higher $7 billion (Noah). Reserves fell from over 5 percent of outstanding mortgages in 1980 to less than 1 percent in 1989.

The net costs of the VA-guaranteed loan program from 1980 through 1990 were $5 billion (U.S. Department of Veterans Affairs 1991b). Between 1986 and 1990, over 250,000 VA loans were foreclosed (*Budget*). At the end of the 1990 fiscal year, the VA had a $2.4 billion liability for losses on guaranteed loans (U.S. Department of Veterans Affairs 1991a).

Prospective costs. The prospective costs are from *Budget*, Table A-2. Prospective costs for deposit insurance are the estimated cost of cumulative outlays in excess of premium income from 1991 to 1996. Prospective costs for other programs are the present value of estimated future costs in excess of program income and include both subsidies and losses. The subsidies in the FCS,

FmHA, and GSL programs are substantial. As a result, the prospective costs listed in the table for these programs should overestimate future losses.

Endnotes

[1] The Resolution Trust Corporation is responsible for thrifts that become insolvent before September 1992. Then SAIF will assume responsibility for failed thrifts. SAIF is the replacement for FSLIC (Federal Savings and Loan Insurance Corporation), which insured thrift deposits until it became insolvent in the late 1980s.

[2] These are only two of the many approaches used to resolve failed depository institutions. U.S. Department of the Treasury (1991) discusses the complete range of alternatives.

[3] *Defined contribution* plans are an alternative type of pension that neither needs nor has federal insurance. These plans invest pension contributions on behalf of employees and return the accumulated value of each individual's contribution in monthly payments upon retirement. Since retirees are entitled only to the accumulated value of their contributions, defined contribution plans can always pay the promised benefits.

[4] Despite PBGC insurance, workers suffer capital losses when pension plans terminate early. The PBGC insures benefits tied to the worker's wage at the time of plan termination. Thus, the worker loses the increases in pension value associated with future wage increases. Ippolito explains these capital losses in greater detail.

[5] Among the better-known credit programs not listed in Table 1 are the Rural Electrification Administration, the Small Business Administration, and the Export-Import Bank. These programs are not discussed because they are much smaller than the programs listed in Table 1.

[6] U.S. Treasury rates are the lowest interest rates on national capital markets because investors are certain Treasury securities will be repaid. Investors require significantly higher yields on bonds issued by private corporations since even highly rated corporate bonds occasionally default. Government and quasi-government agencies, such as FCS, borrow at so-called agency rates, which lie between the Treasury and private rates. Agency rates are lower than private rates because investors believe the government would protect investors if the agency did not meet its bond obligations. Agency rates are higher than Treasury rates because the government guarantee is implicit and at the discretion of the government rather than an explicit legal obligation.

[7] State programs provide the largest subsidies to higher education, but the bulk of their support is provided to educational institutions. The federal GSL program was established in 1965 to complement state programs by providing funds directly to individuals, particularly individuals from low-income families. The GSL program helps students finance their education by guaranteeing loans from banks and other qualified lenders. The terms of the loans vary across programs and have changed frequently over time; however, they typically allow students to defer payments and the accumulation of interest while they attend school. The loans also provide subsidies to reduce and to cap the interest rate paid by student borrowers.

The four components of the GSL program are the Stafford, PLUS, SLS, and Consolidation loan programs. Students must pass a needs test for Stafford loans. Parents of students can borrow through the PLUS (Parent Loans to Undergraduate Students) program. Students can obtain additional financing through the SLS (Supplemental Loans for Students) program. Consolidation loans consolidate loans from one or more programs to reduce the burden of debt service. In addition to these GSL programs, students in the health professions are eligible for special guaranteed loans.

[8] Fannie Mae guarantees the full and timely payment of principal and interest, including mortgage prepayments. Freddie Mac guarantees the full and timely payment of interest and the ultimate payment of principal. Becketti and Morris discuss the history of the housing government-sponsored enterprises and the mechanics of the mortgage-backed securities market.

[9] The thrift industry and the housing government-sponsored enterprises are competing methods for achieving the same end—promoting housing finance and protecting it from cyclical and other disruptions. The thrift industry funds mortgage loans with the short-term savings of households. Fannie Mae and Freddie Mac fund mortgage loans by selling mortgage-backed securities to institutional investors, intensifying the competitive pressures faced by thrifts. It is unclear whether securitization will eventually supplant the thrifts or whether these two approaches to housing finance will coexist.

[10] Four programs—Sallie Mae, Fannie Mae, Freddie Mac, and the FHLBanks—appear in Table 1 but not in Table 2. These four government-sponsored enterprises avoided the losses suffered by the other programs. Fannie Mae was insolvent in the late 1970s and early 1980s but regained solvency without taxpayer assistance. The General Accounting Office and the Treasury studied these programs recently and concluded that they present no prospective risk of financial loss to taxpayers (U.S. Department of the Treasury, 1990; U.S. General Accounting Office).

[11] There is an important difference between the estimates of past losses in the first column of Table 2 and the estimates of prospective costs in the second column of the table. The first column reports losses in excess of program income. For example, the $22 billion loss of the bank deposit insurance program is the total net loss of the fund for the 1980s. The second column reports the present value of prospective losses plus the subsidies provided by the program.

The share of subsidies in prospective costs varies across programs. The prospective costs of the insurance programs are primarily losses. Most of the costs of direct loan programs represent interest rate subsidies, not default losses. Only FCS and FmHA have significant direct loan components, however. Most of the costs of loan guarantee programs represent default losses. The GSL program is a notable exception—about half its prospective costs are subsidies.

[12] Thomas and Ricks attempt to decompose the costs of the S&L cleanup. The interest costs of delaying resolution account for a quarter of the total costs. If administrative costs, the deterioration of seized S&Ls, and the excess costs of the 1988 thrift deals are added, the delays account for over a third of the costs. Some of these costs would have been incurred even if failed thrifts had been resolved more rapidly, but some portion is due to the delays.

[13] Because the Bank Insurance Fund still has positive net worth, taxpayers have not lost any money on bank deposit insurance yet. If current trends persist, however, the Bank Insurance Fund soon will become insolvent and taxpayers may have to cover losses.

[14] These figures are for the single-employer fund of the PBGC. The much smaller multiemployer fund had a surplus of $133 million in 1990 (Pension Benefit Guaranty Corporation 1976, 1990).

[15] This figure reflects claims through June 1986 (Ippolito, Tables 3-2 and 3-3). It excludes claims of over $2 billion from the pension plans terminated in early 1987 when LTV, a large steel company, entered bankruptcy proceedings. LTV's claims greatly increased the fraction of claims accounted for by the steel and automobile industries. Three of the LTV plans, however, were restored to LTV in December 1990.

[16] In the early years of the PBGC, a solvent corporation could surrender its pension plans to the PBGC for 30 percent of the corporation's net worth (Ippolito; Utgoff).

[17] Termination rates were studied by the Treasury and Labor departments in 1972 and by the PBGC in 1977 and 1982 (Ippolito).

[18] While predicted termination rates may never be as accurate as a private insurer would require, the PBGC's estimates have improved. It has used these improved estimates to refine its premium structure to reduce its credit risk. Thus, the PBGC has some limited control over this aspect of credit risk.

[19] To the extent borrowers' high default rates are predictable, program losses could be reduced by raising fees and loan rates to cover expected losses. In a sense, then, some of the losses that derive from lending to high-risk borrowers can be regarded as an intentional subsidy. Raising fees and loan rates, however, would discourage some borrowers from using the program, thereby reducing program benefits.

[20] A related method for controlling credit risk is to restrict or withdraw credit or insurance when losses consume the borrower's contribution. This principle is directly applicable to such programs as deposit insurance, where the incentives of the insured institution to take greater risk increase drastically once stockholders' equity has vanished. Procedures for closing institutions rapidly before their net worth has disappeared have been proposed to reduce the losses of the deposit insurance fund.

[21] Other programs suffer in subtle and unexpected ways from lack of diversification. For example, the steel, airline, and automobile industries account for a disproportionate share of PBGC's risk exposure (Ippolito). Another example is Fannie Mae: half its mortgages and mortgage-backed securities are located in just five states (U.S. Department of the Treasury, 1990, Table 8, p. A-30).

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Does More Money Mean More Bank Loans?

By George A. Kahn

Even before the economy slipped into recession last summer, some analysts viewed slow monetary growth as indicating a reduced willingness of banks to increase lending. To these analysts, slow growth of money signaled a "credit crunch" that contributed to the onset and depth of the recession. Those who view monetary growth as a signal of credit availability might also argue that faster monetary growth would signal an easing of credit conditions. Easier credit, in turn, would help strengthen the economic recovery.

Other analysts have pointed out, however, that there is no necessary link between monetary growth and bank lending. Banks can increase their portfolio of loans by selling securities, even as deposit growth slows. As a result, monetary growth can slow without generating a slowdown in bank lending. Conversely, banks create deposits not only when they make loans but also when they buy securities. Thus, a pickup in monetary growth does not necessarily imply an increase in bank lending.

This article examines the relationship between monetary growth and the growth of bank loans. The article first analyzes how monetary growth is related to bank lending, then examines how closely the two variables have been linked historically. The article concludes that a pickup in monetary growth does not necessarily imply a near-term pickup in bank lending. Slow monetary growth did not necessarily cause reduced bank lending last year, and faster monetary growth this year would not necessarily generate an immediate pickup in bank lending.

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How Are Money and Bank Loans Related?

Money and bank loans are related to each other through the banking system's balance sheet. Money—in the form of deposits—is a liability of the banking system, while bank loans are an asset. Money has traditionally served as an indicator of the Federal Reserve's monetary policy, but bank lending has only recently received attention as a monetary policy indicator. This section examines the role of money and bank lending in traditional monetary analysis, explains the special role of bank lending in more recent monetary analysis, and, finally, uses balance-sheet identities to show that an expansionary monetary policy does not necessarily lead to more bank loans.

The traditional role of money and bank lending

Monetary growth has long been a key indicator of the Federal Reserve's monetary policy. The Federal Reserve eases monetary policy by supplying reserves to the banking system. These reserves form the basis for expanding the money supply. According to traditional monetary analysis, an expansion of the money supply results in a decline in interest rates and an expansion of total credit.

Total credit is one of several concepts of credit. Total credit is the sum of credit raised outside the banking system and credit extended by banks. Nonbank sources of credit include the commercial paper market, other domestic securities markets, nonbank financial institutions in the United States, international financial markets, and foreign financial institutions. Bank credit consists of total loans and investments of all domestically chartered commercial banks in the United States, as well as of U.S. branches and agencies of foreign banks.[1] Bank credit includes all credit extended by these institutions to both domestic and foreign borrowers. While a small part of bank credit takes the form of investments in government and other securities, the bulk of bank credit takes the form of loans.

Traditional monetary analysis largely ignores the question of how a given supply of total credit is divided among bank lending, bank investments, and nonbank sources of credit.[2] According to the traditional analysis, bank loans are a perfect substitute for other sources of credit. In other words, borrowers are able to obtain credit from banks under the same terms as from other credit sources. Under the traditional analysis, for example, borrowers would be indifferent between, and capable of, borrowing from banks or borrowing through the issuance of bonds.

Moreover, in the traditional analysis, total credit availability always increases when the money supply increases. An expansion of the money supply leads to an increase in bank credit. How banks divide this increase in bank credit between loans and investments in securities does not matter.[3] If banks decide to increase securities holdings as a proportion of their total assets, for example, borrowers will simply obtain a greater share of their credit from securities markets. Thus, changes in the money supply lead to similar changes in bank credit and total credit.

Which variable—money, bank credit, or total credit—best serves as *the* indicator of policy depends on which variable the Federal Reserve can best measure and control and on which variable is most reliably related to economic activity. If no one variable proves dependable in all circumstances, the Fed may need to monitor the behavior of all three. But in the traditional analysis, the Fed would not need to monitor narrow credit aggregates such

as bank loans because bank lending plays no special role.

The Fed has at times monitored various broad credit aggregates in addition to monetary aggregates. In the 1970s, for example, the Federal Reserve set growth ranges for bank credit to supplement the target ranges for growth of the monetary aggregates. Moreover, growth of bank credit was sometimes mentioned directly in the operating instructions that governed Federal Reserve purchases and sales of securities, a key policy instrument. More recently, the Federal Reserve has set monitoring ranges for growth of total domestic nonfinancial debt, a broader credit measure that is more closely related to total credit. All of the major components of bank credit are included in total domestic nonfinancial debt, along with government and corporate securities, mortgages, and loans by nonbank financial institutions. At no time, however, has the Federal Reserve monitored bank loans by setting formal monitoring ranges.

The special role of bank lending

With the breakdown of the relationship between various monetary and credit aggregates and economic activity in the 1980s, economists have begun to examine more closely the role of bank lending in monetary policy. In particular, economists have begun to question whether faster monetary growth necessarily results in an increase in the availability of loans to all prospective borrowers, especially those who rely solely on banks for credit. In other words, economists question the traditional assumption that bank loans are perfect substitutes for other sources of credit.

One reason bank loans may not be perfect substitutes for other sources of credit is that not all borrowers have access to national financial markets. Although large businesses can raise funds directly through auction markets, such as the market for commercial paper, other borrowers must rely predominantly on banks for credit.[4] To these borrowers—typically consumers and small to medium-size businesses—auction-market credit is not a substitute for bank credit. As a result, if these borrowers cannot obtain a loan from a bank, they often cannot finance spending with credit. In contrast, if a large corporation cannot borrow from a bank, it can often obtain credit by issuing securities in national capital markets. In fact, many large businesses prefer to borrow directly from capital markets, leaving banks to specialize in lending to other, smaller customers.

Banks, in contrast to auction markets, allocate credit not only with interest rates, but also with various nonprice terms. These nonprice terms of lending potentially make banks a "special" source of credit, qualitatively different from auction markets.[5] Specifically, banks set terms of lending that raise the probability that a borrower will repay a loan. Banks, for example, maintain long-term relationships with their customers, screen loan applicants for creditworthiness, require collateral for loans, and prefer short-term to long-term lending.[6] Banks impose these and other nonprice terms, rather than simply charging the highest interest rate a customer is willing to pay, to reduce the likelihood that a customer will default on a loan.[7] As a result of these nonprice terms, bank customers may not be able to borrow as much as they want from a bank even though they may be willing to pay a market interest rate or higher.[8]

The special nature of bank loans, along with the exclusion of some borrowers from markets that auction credit, makes changes in the growth of bank loans a possible source of economic fluctuations.[9] A decision by banks to reduce their holdings of loans, for example,

could lead to a decline in economic activity. Banks might decide to substitute securities for loans if they become concerned about the riskiness of their loan portfolio—as many banks allegedly were before the start of the current recession—or if they wanted to increase liquidity. As banks reduce loans and increase securities, businesses without access to auction-market credit would have to reduce spending on investment projects. Likewise, consumers' purchases of houses and consumer durables might fall. Thus, a decision by banks to reduce loans could reduce economic activity.

But how important is bank lending to the conduct of monetary policy? Bank loans are important to the extent they are the only source of credit for a significant share of the economy as a whole.[10] A limited amount of evidence suggests that bank loans may be an important source of credit, even though many large businesses have come to rely increasingly on auction markets for credit. On the basis of 1988 Commerce Department data, for example, Radecki estimates that between 56 and 70 percent of bank loans to manufacturing firms represent lending to firms with no alternative source of credit. Moreover, the net sales revenues of these firms is between 32 and 44 percent of the sales revenues of all manufacturing firms.[11] Thus, bank loans to firms lacking alternative sources of credit are possibly a significant share of total credit in the economy.

Balance-sheet relationships

Because of the possibility that bank loans are both special and important in the economy, understanding their relationship to bank reserves and monetary growth could be vital for the conduct of monetary policy. While the Federal Reserve has direct control over the supply of reserves and, through reserves, indirect control over monetary growth, the Fed does not control the availability of bank loans. Unexpected changes in the desired mix of loans and securities in banks' portfolios may partly or completely offset Federal Reserve actions to restrain or stimulate the economy. For example, an economic slowdown accompanied by a reduction in the supply of bank loans could require a more forceful monetary policy response than a slowdown with no change in loan supply.

Examining the banking system's balance sheet shows that changes in the money supply do not necessarily lead to changes in bank loans. In fact, the relationship is rather loose. In a simplified balance sheet, the assets of the banking system consist of reserves, loans, and securities. Balancing the banking system's assets are deposit liabilities and the banking system's net worth or capital. Holding bank capital constant, any change in the money supply in the form of deposits must result in an equal change in some combination of reserves, loans, and securities. Changes in monetary policy, therefore, affect both sides of the banking system's balance sheet.

An easing of policy, for example, leads to an increase in deposits and some combination of higher reserves, loans, and securities. When the Federal Reserve eases policy, the Fed injects reserves into the banking system by buying Treasury securities from securities dealers. As a result of the transaction, the Fed credits the reserve accounts of the dealers' banks, and dealers increase their bank deposits. After setting aside reserves needed to meet legal reserve requirements, banks can use the remainder of the new reserves to increase loans or to buy securities. As funds from these transactions are deposited back into the banking system, banks can again choose either to increase their holdings of securities or make new loans.

As a result of the Fed's initial injection of

reserves, a multiple expansion occurs in the banking system's holdings of deposits, loans, and securities.[12] At each stage of the process, banks choose how to allocate increases in assets between loans and securities.[13] If banks choose to increase only their holdings of securities, for example, an injection of reserves will result in an increase in deposits and the money supply but no increase in bank loans. Banks might make this choice if they want to reduce the overall riskiness of their assets. Thus, an increase in the money supply does not necessarily lead to an increase in bank loans.

Why should we care? If bank loans are perfect substitutes for other sources of credit, a change in the composition of banks' assets from loans to securities does not matter. Any spending that would have been carried out with bank loans will be carried out using other sources of credit. On the other hand, if bank loans are not perfect substitutes for other sources of credit, a change in the composition of banks' assets away from loans would result in an overall decline in spending in the economy. Thus, to the extent bank loans are the only source of credit for a large part of the economy, monetary policy will be more potent when monetary expansion results in an expansion in bank loans than when it does not. Accordingly, the Federal Reserve might need to monitor the relationship between the money supply and bank loans if bank loans are both special and important as a source of credit.

Is There a Predictable Relationship Between Money and Bank Loans?

If bank loans are both special and important, monetary policymakers would need to understand the relationship between the money supply and the supply of bank loans. As previously argued, banks largely determine how they will allocate an increase in deposits between loans and securities. If bank behavior can be predicted, policymakers can estimate how policy actions will affect bank loans, and through bank loans, the economy. Using this information, along with information about the more traditional channels of monetary policy, policymakers can potentially design policies to moderate economic fluctuations.

This section examines the historical relationship between monetary growth and growth in bank loans, starting with simple atheoretical evidence and moving toward more complex evidence. The evidence generally shows that an increase in monetary growth often precedes an increase in bank loan growth. However, the relationship changes over time. As a result, policymakers cannot predict with much precision the effect their actions will have on bank lending. Policymakers might therefore need to examine direct evidence on bank lending—in addition to information on monetary growth—to determine the effectiveness of policy actions.

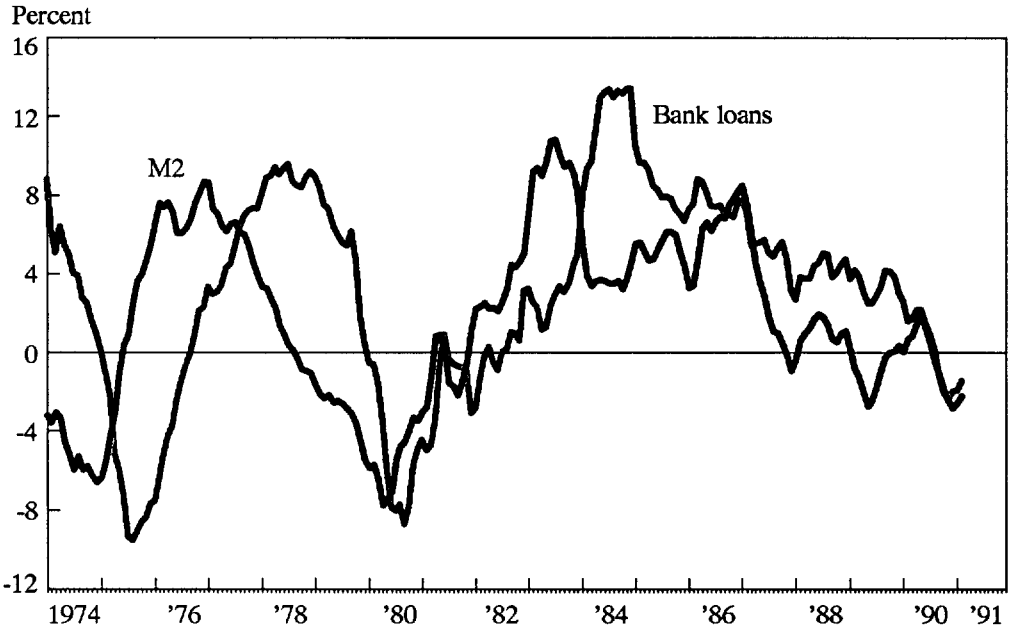
Simple evidence

Monetary growth and growth in bank loans declined simultaneously from mid-1990 to early 1991. This common behavior of the two variables contributed to concern that the economy was experiencing a "credit crunch." Such common behavior, while not without precedent, does not typify the historical relationship between monetary growth and bank loan growth in the last two decades.

Simple plots. The relationship between monetary growth and bank lending has varied over time.[14] Growth in M2, for example, has moved together with, as well as in opposite directions to, growth in bank loans (Chart 1). From 1981 to 1983 and from 1987 to 1991, M2 growth and bank loan growth generally moved in the same direction. In contrast, from

Chart 1

Growth of Money and Bank Loans



Note: Variables are expressed as 12-month rates of change and deflated by the consumer price index.
Bank loans include loans at all domestic and foreign-related commercial banks in the U.S. and exclude interbank loans.

Sources: Federal Reserve and Department of Commerce.

1974 to 1978 and from 1983 to 1985, M2 growth and bank loan growth generally moved in opposite directions. Growth of other monetary aggregates, both broader and narrower, displays similarly complex relationships.

Simple statistics. Correlation coefficients also reveal a relatively loose relationship between monetary and bank loan growth. Correlation coefficients measure the degree to which two variables move together over time, taking the value 1.0 if there is a perfect positive relationship and zero if the variables are unrelated. Correlation coefficients are presented for a sample of monthly data from 1973 to 1991 and for a subsample of data from 1982 to 1991. Coefficients from the subsample—a period of substantial financial market deregulation—provide evidence on the stability of the correlations over time.

Several measures of monetary growth, ranging from broad to narrow, are used in constructing correlation coefficients between monetary growth and bank loan growth. Broad measures include M2 and M3.[15] Those who believe slow monetary growth restricts the availability of bank loans look to the behavior of these aggregates for information about credit availability. But because M2 and M3 contain components that are not liabilities of the banking system, narrower measures of money might also be useful in assessing the availability of bank loans.[16] Narrower measures of money that are composed entirely of bank liabilities, such as total deposits at banks,

Table 1

Correlation of bank loan growth and monetary growth

Monetary variable	1973:2 - 1991:2	1982:11 - 1991:2
M3	.48	.51
M2	.24	.30
Total deposits at banks	.48	.46

Note: Before calculating correlation coefficients, each variable was expressed as a growth rate and deflated by the rate of CPI inflation (see footnote 14). Each variable was then regressed on a constant term and 11 monthly dummy variables. Residuals from these regressions were used as data in calculating correlation coefficients. Based on t-statistics, all correlation coefficients are significant at the 95 percent confidence level.

Source: Author's calculations, based on Federal Reserve and Department of Commerce data.

are potentially more closely related to bank assets such as loans. Finding a relationship between total deposits and bank loans may therefore be easier than between broad measures and bank loans. Moreover, like M2 and M3, data on total deposits are available to policymakers on a timely basis.

Correlation coefficients show a weak, positive correlation between bank loan growth and both broad and narrow measures of monetary growth (Table 1). The correlation is greater for M3 and total deposits than it is for M2. Correlations between loans and the broad measures of monetary growth increase slightly in the latter part of the sample period as indicated by larger correlation coefficients in the 1982-91 sample relative to the full sample. The small increase in these correlation coefficients after 1982 is consistent with the visual evidence on M2 and bank loans presented in Chart 1. The correlation between loans and total deposits, however, falls slightly in the post-1982 period.

Complex evidence

While correlation coefficients show a weak contemporaneous association of monetary growth and bank loan growth, simple correlations cannot provide evidence on leading or lagging relationships. That is, simple correlations may fail to detect a relationship in which increases in monetary growth precede increases in bank loan growth. Although bank loan growth in a given month is not highly correlated with monetary growth in the same month, bank loan growth may be highly correlated with past monetary growth. Banks, for example, might initially purchase securities as a result of an increase in deposit growth, and later sell securities to expand loans. If so, monetary growth would lead bank loan growth.

Another shortcoming of the evidence presented so far is that it fails to account for possible inertia in bank-loan and monetary data. For example, a large part of the variation

Table 2

Does past monetary growth help explain bank loan growth?

Monetary variable	1974:2 - 1991:2	1982:11 - 1991:2
M3	Yes (.021)	No (.857)
M2	Yes (.016)	No (.552)
Total deposits at banks	No (.104)	Maybe (.076)

Note: This table reports the results of bivariate Granger causality tests on whether past values of various monetary variables "help explain" bank loan growth. All tests are based on regressions containing 12 lags of the dependent variable (bank loan growth), 12 lags of a monetary variable, and a constant and 11 monthly dummy variables. All variables are expressed in growth rates and deflated by the rate of CPI inflation (see footnote 14). Numbers in parentheses give the marginal significance level of F tests on the joint significance of the 12 lagged monetary variables. "Yes" indicates rejection, at the 5 percent level, of the null hypothesis that the 12 lagged monetary variables are jointly insignificant. "Maybe" indicates rejection of the null hypothesis at the 10 percent level. "No" indicates a failure to reject the null hypothesis.

Source: Author's calculations, based on Federal Reserve and Department of Commerce data.

in bank loans may be explained by past fluctuations in bank loans. If banks commit to loaning funds to businesses over several months on demand, the current growth rate of loans may reflect past bank loan growth.[17] Moreover, if banks find it costly to adjust their portfolio of loans quickly, bank loan growth would change only gradually over time. Any factor that affects banks' desired portfolio of loans—including, but not limited to, changes in bank liabilities—would lead to a gradual adjustment of bank loans.

Likewise, a large part of the variation in monetary growth may be explained by past monetary growth. If consumers and businesses change their holdings of monetary assets only slowly in response to changes in income or interest rates, current monetary growth would at least partly reflect past monetary growth.

Accounting for the possibility of lagged responses and inertia in bank loans and money gives mixed evidence on the relationship between monetary and bank loan growth (Table 2). Broad monetary variables help explain bank loan growth over the full sample, but not over the post-1982 subsample. With the possible exception of total deposits in the post-1982 sample, narrow monetary variables do not explain bank loan growth. This evidence suggests that the correlation coefficients, which generally supported a weak relationship between monetary and bank loan growth, may be measuring the effect of bank loan growth on monetary growth and not the other way around. In other words, money may respond to an increase in bank loans as much as or more than bank loans respond to an increase in money. As loans increase, the economy strengthens, causing an increase in the demand for money.

The breakdown in the ability of M2 and M3 to explain bank loans after 1982—a break-

down not evident in simple correlation coefficients—may reflect financial market deregulation. Since the removal of interest rate ceilings on deposit accounts in the early 1980s, a greater proportion of the monetary aggregates pay a market-related rate of interest. As a result, monetary growth has become less sensitive to interest rate changes. If the interest-sensitivity of bank loan growth were unaffected by financial market deregulation, a given increase in interest rates would reduce bank loan growth just as much as in the past. But the same interest rate increase would have less effect in reducing monetary growth. Thus, bank loans might fluctuate more than money, causing an apparent breakdown in the estimated effect on bank loan growth of a change in monetary growth.[18]

Conclusions

One way faster monetary growth can stimulate the economy is by increasing the availability of bank loans. Evidence presented in this article, however, suggests that faster monetary growth does not guarantee increased availability of bank loans. Banks decide how to allocate an increase in deposits between loans and securities purchases. At times in the past, banks have increased loans when monetary growth increased. But more recently, the tendency for increased monetary growth to stimulate bank loans may have diminished. Thus, just as slow monetary growth did not necessarily cause reduced bank lending last year, so faster monetary growth this year would not necessarily generate an immediate pickup in bank lending. As a result, to the extent bank loans play a special and important role in the allocation of credit, the Federal Reserve might need to monitor direct evidence on bank loans in addition to growth in the monetary aggregates.

Endnotes

[1] For more information about bank credit, see Wurtz.

[2] See, for example, the IS/LM model in a macroeconomics textbook such as Gordon 1990.

[3] The traditional analysis typically assumes that banks hold little or no excess reserves.

[4] Smaller borrowers can sometimes obtain credit from other financial intermediaries such as finance companies or obtain trade credit.

[5] Some auction-market credit, however, does have nonprice features such as the covenants often found in bonds.

[6] Because of restrictive lending practices, banks turn away some potential customers and loan other customers less than they are willing to borrow at the going interest rate. As a result, bank lending does not necessarily rise when the Federal Reserve's policy actions cause market interest rates to fall. Moreover, at any given interest rate, banks may change the nonprice terms of lending. Market interest rates, therefore, might be an unreliable guide to the availability of credit to some parts of the economy. If bank loans are the only source of credit to many potential borrowers, the overall thrust of monetary policy would depend not only on the level of interest rates and rate of monetary growth, but also the terms of bank lending. Further complicating monetary policy is the possibility that interest rate movements reflect credit needs as well as credit availability. In an economic downturn, for example, declining interest rates may signal declining credit needs. See Radecki for more information on the special nature of bank loans. See Keeton for information on how banks use nonprice terms to allocate credit and how this practice affects monetary policy.

[7] Banks restrict the availability of credit because of the difficulty of assessing the creditworthiness of their main customers—consumers and small to medium-size businesses. Customers with the riskiest borrowing needs may have the greatest incentive to seek bank loans. Banks try to limit this adverse selection problem by carefully screening their customers and imposing restrictive terms of lending. Banks do not simply charge the highest interest rate a customer is willing to pay because higher rates require higher returns on investment projects and increase the risk of default (Stiglitz and Weiss; Jaffee and Stiglitz).

[8] On the other hand, bank credit commitments guarantee some, usually large, businesses continued access to bank

credit even as terms of lending to other borrowers tighten or as total credit availability in the economy declines. See Morgan for more information on the potential for credit commitments to reduce the severity of credit crunches.

[9] For a formal model that establishes a link between bank loans and real GNP based on the imperfect substitutability of bank loans for other sources of credit, see Blinder and Bernanke 1988. For models that rely on credit rationing to establish a link between loans and GNP, see Blinder 1987 and King 1986.

[10] To the extent lending activities increasingly take place outside the banking sector, the Federal Reserve may have less influence on economic activity through its control over monetary growth. For example, borrowers such as large businesses rely less heavily on banks. They increasingly raise funds through auction markets such as the market for commercial paper. Should these borrowers with direct access to national financial markets not be able to obtain credit from banks, they can often obtain credit by issuing securities. Thus, although a reduction in monetary growth might reduce the supply of bank loans, it may not reduce the total supply of credit as much as in the past.

[11] Other evidence is less direct. Fazzari, Hubbard, and Peterson, for example, find that investment spending by small firms is more sensitive to internal financial positions than investment spending by large firms. One possible reason for this difference might be that small firms have less access to national financial markets. Similarly, Gertler and Hubbard find that cash flow helps explain investment spending by individual manufacturing firms. As a result, these firms are likely credit constrained.

[12] For a description of the multiple expansion process, see a money and banking textbook such as Chandler and Goldfeld.

[13] It is assumed that banks hold excess reserves constant.

[14] All evidence presented is for inflation-adjusted monetary and bank-loan growth. The consumer price index was used to deflate all of the nominal data. Real variables were used rather than nominal variables because what matters in a credit crunch is the real supply of loans. Nevertheless, all statistical tests presented in the text were also carried out using nominal variables. Results were qualitatively similar, although even less indicative of a stable relationship between monetary and bank loan growth than results using real variables.

[15] Two additional broad measures, M2 and M3 excluding currency, were also examined. Currency was excluded in these additional measures because its behavior largely reflects changes in the public's demand for currency, not necessarily changes in monetary policy. Moreover, currency in the hands of the public is not a banking system liability. As a result, bank-loan behavior may be unrelated to currency growth. Excluding currency from monetary data might, therefore, increase the likelihood of finding a relationship between monetary growth and bank loan growth. However, results for M2 and M3 excluding currency turned out to be very similar to results for M2 and M3 including currency and are, therefore, not reported separately.

[16] M2 and M3, for example, contain deposits outside the commercial banking system, such as deposits at savings and loans. M2 and M3 also include deposits in money market mutual funds. These deposits, along with many other monetary assets that are included in the broad monetary measures, are not liabilities of the commercial banking system. As a result, bank loan behavior may bear little or no relationship to these components of the money supply.

[17] For a discussion of bank-loan commitments and their importance in the economy, see Morgan.

[18] One potential problem with the analysis is its focus on two endogenous variables—variables that are influenced by many other economic variables and over which policymakers have only limited and indirect influence. In focusing on the interaction of only two variables, the evidence in Table 3 may oversimplify the channels through which bank loans react to changes in monetary growth. Looking at a more complete set of bank balance-sheet assets and liabilities and separating policy-induced changes in monetary growth from other changes in monetary growth may result in a more accurate description of the relationship between money and bank loans.

One such study, Bernanke and Blinder 1989, estimates the reaction of various bank balance-sheet variables to a change in Federal Reserve policy. As expected, an unanticipated tightening of monetary policy causes an almost immediate decline in deposits, as higher market interest rates lead investors to substitute assets paying higher returns for deposits at banks. More interestingly, a tightening of policy has no immediate dampening effect on bank loans. Rather, a tightening of policy leads initially to a reduction in the banking system's portfolio of securities. Only after six months do banks begin to reduce their loan portfolio, substituting securities for loans. Unfortunately, Bernanke and Blinder's model has been estimated only with data up to 1979. Thus it is not clear whether these results remain relevant for today's economy.

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Prospects for the Tenth District Energy Industry

By Tim R. Smith and Tim Sheesley

Volatile world oil markets have led to wide swings in the Tenth District's important oil industry. OPEC price hikes in the 1970s and early 1980s spurred oil production and set off a boom in exploration in the region. Then, after oil prices collapsed in 1986, oil production slowed and exploration nearly halted. As the 1990s unfold, oil activity in the region is expected to remain weak.

Does this dim outlook for oil spell trouble for the district's energy industry? The answer is probably no because, while oil is only part of the district's energy industry, the district also has rich deposits of natural gas and coal. And, new environmental policies will probably boost the demand for natural gas and low-sulfur coal in the decade ahead. Therefore, while the region's oil output could fall in the 1990s, natural gas and coal production is likely to rise.

This article describes the strengths and weaknesses of the district's energy industry in the market of the 1990s. The first section describes the district's main energy resources—oil, natural gas, and coal. The second section considers how prospective energy market conditions and special features of the district's energy resources will influence the outlook for energy production in the district.

District Energy Resources

Reserves of oil, natural gas, and coal and their current levels of production provide a foundation for assessing the outlook for the district's energy industry.[1] Reserves indicate the potential output of energy resources in the region. Production reflects how much output is forthcoming under current market conditions and thus gives a

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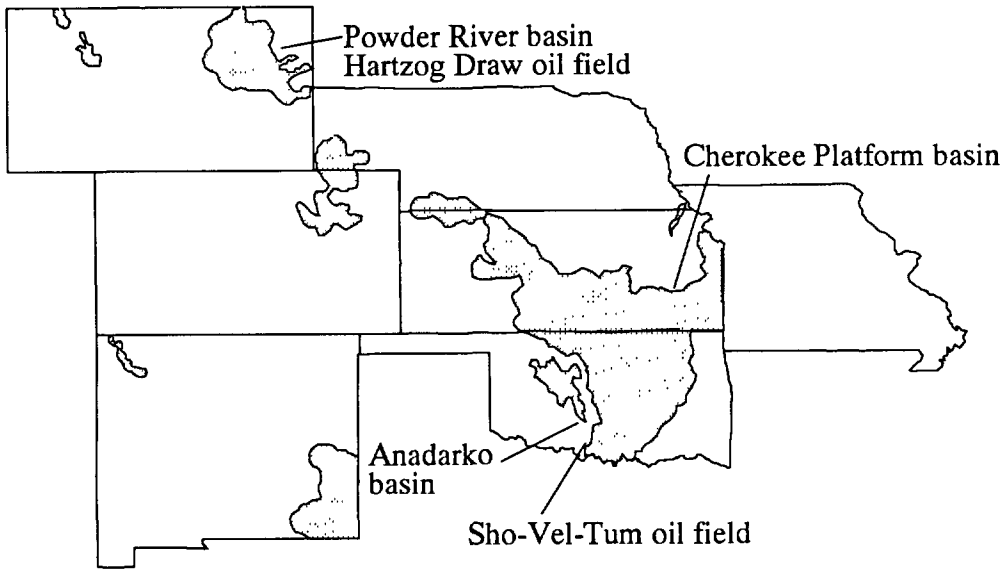
Figure 1
Oil Fields in the Tenth District



Source: Petroleum Information Corporation.

starting point for predicting the future course of production.

Special features of the district's energy resources also play an important role in formulating the outlook. While market conditions will determine the overall direction of production, certain features of the district's energy resources may strengthen or weaken the region's production outlook.

Oil

The energy industry in the Tenth Federal Reserve District has been identified with oil since the discoveries of the 1800s. More recently, the energy boom of the late 1970s and early 1980s boosted reserves and production, focusing even more attention on the district's oil. Most district states have oil reserves, but their size and associated production vary considerably. A notable feature of district oil production is the predominance of low-volume stripper wells.

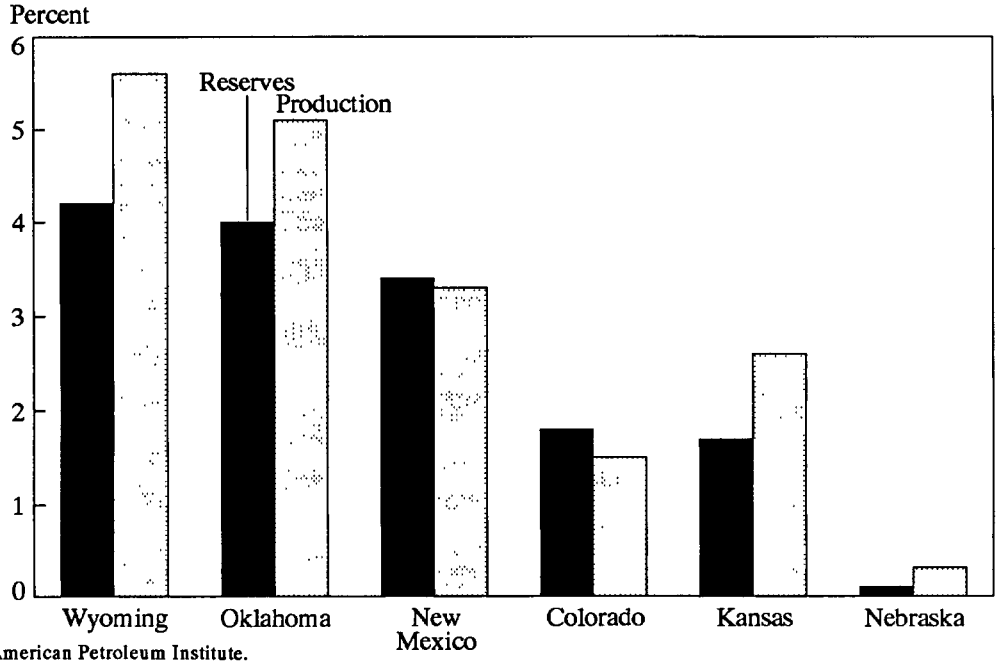
Reserves. The district's 3 billion barrels of oil reserves represent about 15 percent of total U.S. oil reserves.[2] These reserves, with a 1989 market value of about $53 billion, are scattered throughout the region but are concentrated in Wyoming and Oklahoma. Figure 1 shows the approximate location of the district's oil fields. Chart 1 shows the relative size of reserves in district states, ranking the states by their share of total U.S. reserves. Wyoming and Oklahoma hold the largest oil reserves with over half the district total. These holdings together represent nearly 8 percent of the nation's 26.5 billion barrels of oil reserves. The Hartzog Draw field, part of the energy-rich Powder River basin in northeastern Wyoming, is the region's largest single oil reserve. This field contains 273 million barrels of oil (Petzet).

Production. The district produces nearly *a*

Chart 1

Oil Reserves and Production, 1989

(Shares of U.S. total)



Source: American Petroleum Institute.

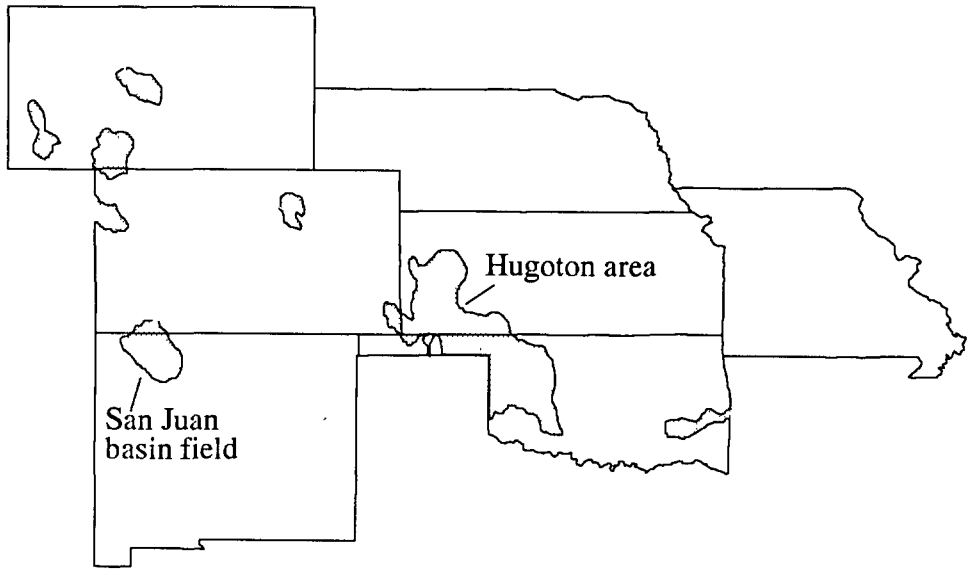
fifth of the nation's total oil output. In 1989, the district pumped 386 million barrels of oil with a market value of nearly $7 billion.[3] Several district states pump sizable quantities of oil, but production is concentrated in Oklahoma, Wyoming, and New Mexico (Chart 1). Oklahoma alone produced 5.6 percent of domestic oil in 1989. The largest producing field in the district was Oklahoma's Sho-Vel-Tum field, which pumped almost 17 million barrels of oil in 1989 (McCaslin).

Special features. The district's oil industry is characterized by an abundance of low-volume wells. These "stripper wells" are common throughout the district because many of the district's oil reserves, particularly those in Kansas and Oklahoma, lie in small shallow pockets of underground rock formations. Over 40 percent of the district's oil comes from stripper wells, which average only about three barrels a day.[4] In contrast, only 14 percent of the nation's oil comes from stripper wells. Because the costs of production are spread across a small volume of output, stripper wells become unprofitable in a low-oil-price environment, making them subject to abandonment.

Natural gas

Natural gas has become increasingly important to the district.[5] The region's shares of the nation's gas reserves and production have increased steadily in the past 20 years. While the district has only about half as many natural gas as oil wells, the region's gas reserves have greater value than its oil reserves. In 1989, the market value of the district's gas reserves exceeded the value of oil reserves by more than $30 billion. But the region's natural gas reserves are located far from the major markets for gas. As a result, pipeline capacity becomes a critical factor in the outlook for

Figure 2
Gas Fields in the Tenth District



Source: Petroleum Information Corporation.

district gas production.

Reserves. The district's 56 trillion cubic feet of natural gas reserves account for 36 percent of the nation's total gas reserves.[6] District reserves are scattered throughout the seven district states but are concentrated in Oklahoma and New Mexico (Figure 2, Chart 2). The two states' 31 trillion cubic feet of reserves account for nearly a fifth of the nation's gas reserves. The region's largest known gas reserve—holding over 12 billion cubic feet—lies in the Hugoton field area of southwestern Kansas and northwestern Oklahoma.

Production. District natural gas production reached 4.5 trillion cubic feet in 1989 with a market value of $6.8 billion.[7] This production, which comes from all parts of the district, accounts for *a fourth of the nation's total natural gas production.* Oklahoma leads the district states in natural gas production with over 12 percent of national production (Chart 2). New Mexico's 4.8 percent share of national production places it a distant second.

Special features. Location is a key factor in the production of the natural gas in the district. Production from the large gas reserves in the district is much greater than the demand for gas in the region. To move the gas to industrial and residential users in other regions, such as California and the Northeast, district producers must access the interstate pipeline grid, which connects major gas supply basins with major markets. While access to markets in the upper Midwest has generally been good, few major pipeline corridors exist to carry district gas directly to important markets in California (Spiegel, Johnson, and others).

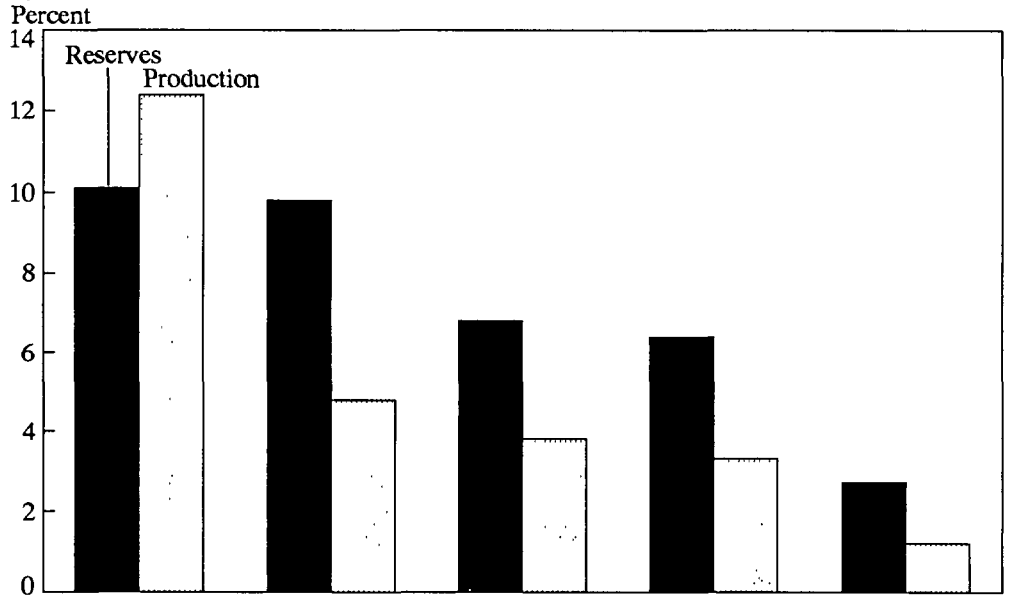
Coal

Coal is an important energy resource to the

Chart 2

Natural Gas Reserves and Production, 1989

(Share of U.S. total)



Source: American Petroleum Institute.

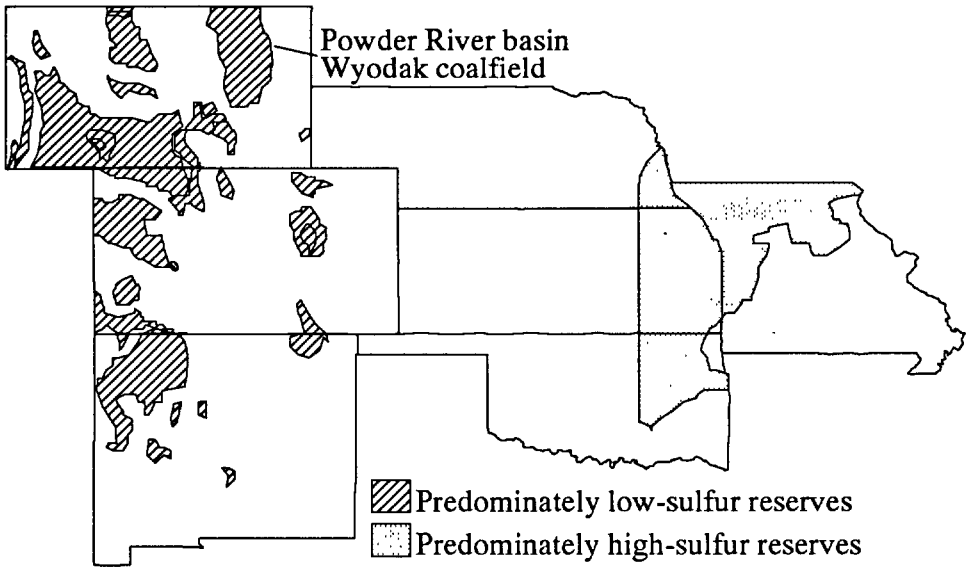
Tenth District by several measures, even though the district's coal mines provide less than a tenth as many jobs in the region as the oil and gas industry. Coal reserves and production, concentrated in Wyoming, have increased substantially over the past 20 years. Moreover, the market value of coal reserves in the district—over $100 billion in 1989—is higher than the value of either oil or natural gas reserves. A unique feature of the district's coal reserves is their low sulfur content.

Reserves. The Tenth District holds a considerable amount of the nation's coal resources. At 8.5 billion tons, recoverable coal reserves in the district—the amount of coal that can be mined from coal deposits at active producing mines—account for almost 40 percent of the nation's coal reserves.[8] Wyoming and New Mexico hold more than 80 percent of the district's total coal reserves and a third of the nation's reserves (Figure 3, Chart 3). Wyoming, with its enormous Powder River coal field, leads the nation in recoverable reserves and has over three times the deposits of West Virginia, the state with the second-largest reserves.

Production. The district's massive coal reserves supply a substantial share of the nation's coal. District states produced 218 million short tons of coal in 1989, *22 percent of the nation's total coal output.* Wyoming and New Mexico, the district's largest coal producers, together produce a fifth of the nation's total coal (Chart 3). Moreover, Wyoming has led the nation in coal production since overtaking Kentucky in 1988. The coal bed with the largest production in the district is Wyoming's Wyodak coal bed in the Powder River basin. Wyodak produced nearly a sixth of the nation's coal in 1989.

Special features. Most of the coal reserves in the Tenth District contain low-sulfur coal,

Figure 3
Coal Reserves in the Tenth District



Note: Sulfur content varies within individual coal deposits, but deposits in the western part of the district generally contain low-sulfur coal.

Source: Energy Information Administration.

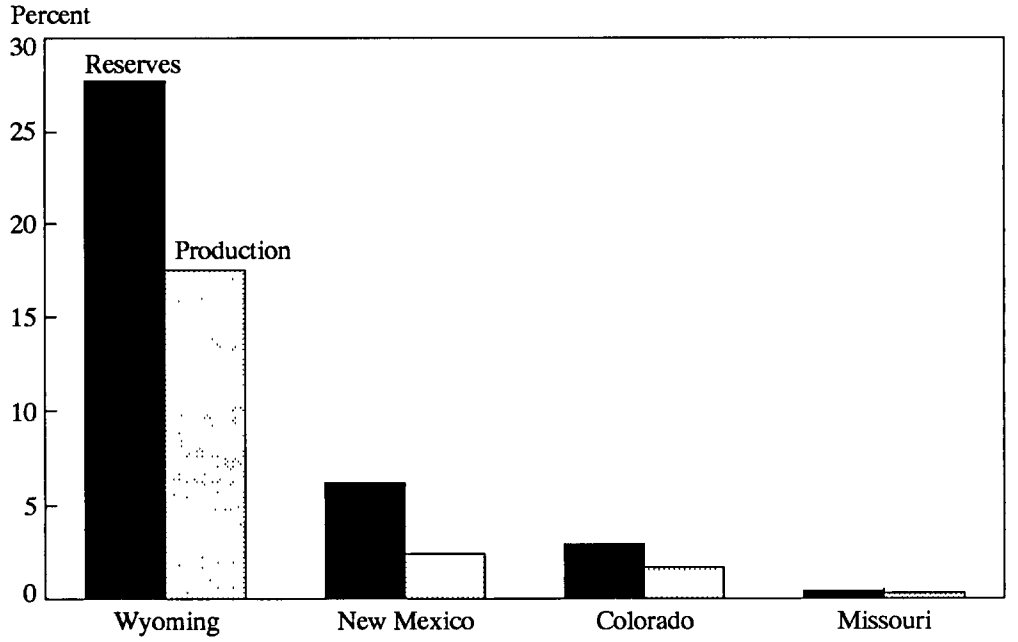
which produces less heat per ton than coal mined east of the Mississippi.[9] But its low sulfur content has made it increasingly attractive to the nation's coal-fired electric power plants. Environmental regulations have increasingly required expensive plant modifications to reduce the harmful emissions that result from burning high-sulfur coal. As a result, district coal can compete effectively with high-sulfur eastern coal even though it must be shipped longer distances.[10]

Another important feature of the district's coal reserves is the ease with which the coal can be mined. The region's coal beds are thick and lie close to the surface, enabling efficient strip mining techniques to be used. Strip mines are highly productive, combining large investments in capital equipment with relatively few laborers. As a result, Tenth District states produced almost a fourth of the nation's coal in 1989 with only 3 percent of the nation's coal mines. The average district coal mine produces seven times more coal than the national average. Moreover, the average Wyoming mine produces 18 times more coal than the national average, making Wyoming mines the most productive in the nation.[11]

The Outlook for District Energy Production

The outlook for district energy production will be driven largely by overall energy market factors, but the special features of the district's energy resources will also help shape the outlook. This section examines how overall market conditions will combine with the special features to affect future production of district oil, natural gas, and coal. The outlook for energy prices and national energy produc-

Chart 3
Coal Reserves and Production, 1989
(Share of U.S. total)



Source: Energy Information Administration.

tion reflects the most recent long-term energy forecast from the U.S. Department of Energy (Energy Information Administration 1991).[12]

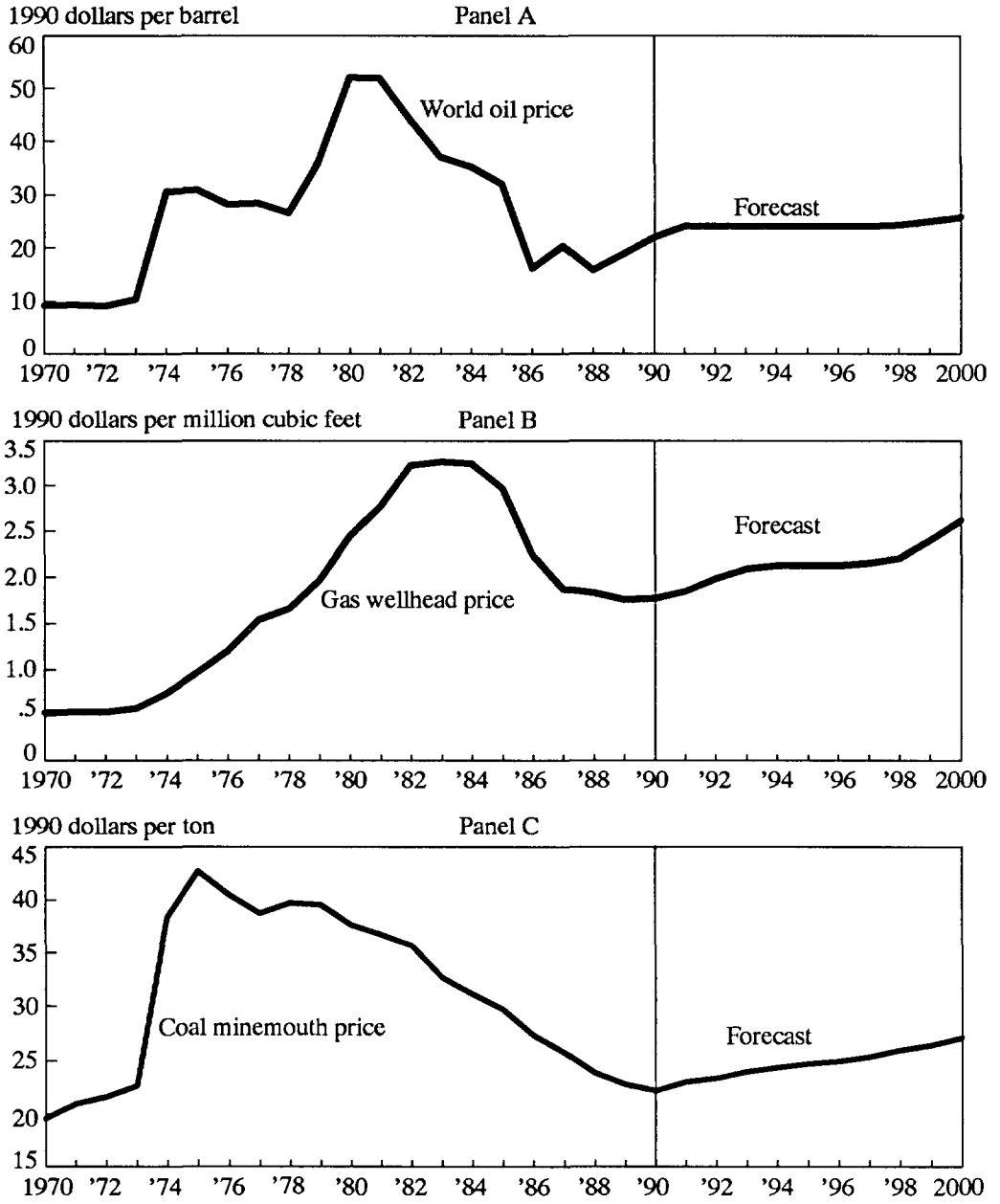
Further decline for oil

Oil prices and environmental policy will likely depress district oil production in the 1990s. In addition, the district's reliance on low-output stripper wells and high drilling costs in some areas will put further downward pressure on the region's oil output.

Oil prices will probably not increase enough during the 1990s to stem the decline in oil production—both in the nation and the district—that began in the late 1980s. Oil prices are expected to remain flat in real terms until steady increases in demand push up prices near the end of the decade (Chart 4, Panel A). Prices are forecast to hold steady until then due to increases in OPEC production capacity and further gains in energy efficiency. In the United States, rising demand for oil is expected to be increasingly satisfied with imports as domestic production shrinks. Imports reached 42 percent of U.S. petroleum consumption in 1989 and are expected to range between 50 and 65 percent by the end of the current decade (Energy Information Administration 1991).

Environmental policy is another factor dimming the outlook for domestic oil production. Automobile-related pollution, acid rain, and global warming have prompted new national environmental legislation.[13] Amendments to the Clean Air Act signed into law in November 1990 will bring oil production under pressure if consumers and businesses switch to cleaner fuels, such as natural gas. Moreover, the environmental impact of oil drilling and production will likely come under closer

Chart 4
Energy Prices



Source: Energy Information Administration.

scrutiny in the decade ahead. New air and water quality provisions in the Clean Air Act will increase drilling and production costs to oil producers (Nulty).

Heavy reliance on *low-output stripper wells* will reinforce the downward trend in district oil production. The cost of pumping oil from these wells increases as their reserves are drawn down. As a result, the soft oil prices in prospect will cause many district stripper wells to be abandoned as their operating costs eventually exceed the revenues from their meager output. Moreover, an abandoned stripper well is not likely to be reopened because the drilling costs would exceed the expected revenues even at much higher prices.

Advanced recovery technologies under development could prevent abandonment and enhance recovery from some existing oil fields, such as the Cherokee platform in southeast Kansas and the Anadarko basin in Oklahoma (Figure 1). One way that advanced recovery may become more prevalent in the region is through the Department of Energy's Oil Research Program, which aims to promote and disseminate such technological developments. But this effort is unlikely to significantly boost production in district oil fields until after the year 2000 (Koen).

High drilling costs in some parts of the district will probably discourage exploration, thereby limiting expansion in production capacity. Although average drilling costs are lower in the region than in the nation, drilling costs in Wyoming, New Mexico, and Oklahoma are near or above the U.S. average.[14] Moreover, the modest increase expected in oil prices in the 1990s is not likely to induce a new drilling binge in areas such as Kansas where drilling costs are low. In these areas, now dominated by stripper wells, the payoffs to exploration are also low.

Declining production and a lackluster outlook for exploration and development in the district oil patch mean that oil-related employment and income in the region probably will continue to shrink. Unfortunately, employment and income data are only available for the combination of oil and gas extraction. However, past trends in employment and income reveal that big increases in both employment and income came in the late 1970s and early 1980s when high oil prices led to a drilling boom in the region (Chart 5, Panel A). Since then, employment and income have fallen to pre-boom levels. Barring another oil price shock, a recovery of jobs and income in the oil patch is not in prospect during the 1990s.

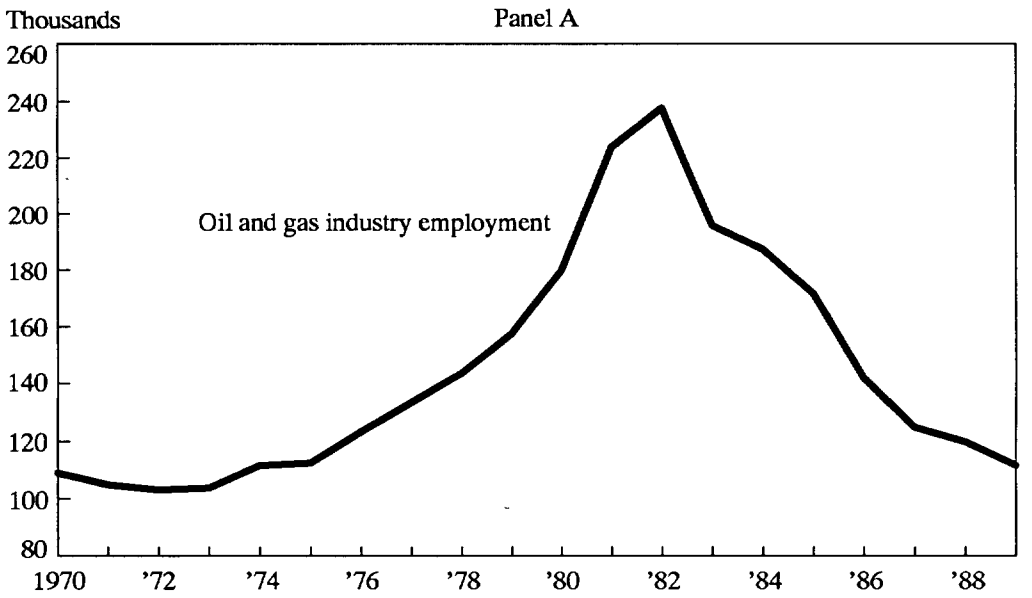
A brighter outlook for natural gas

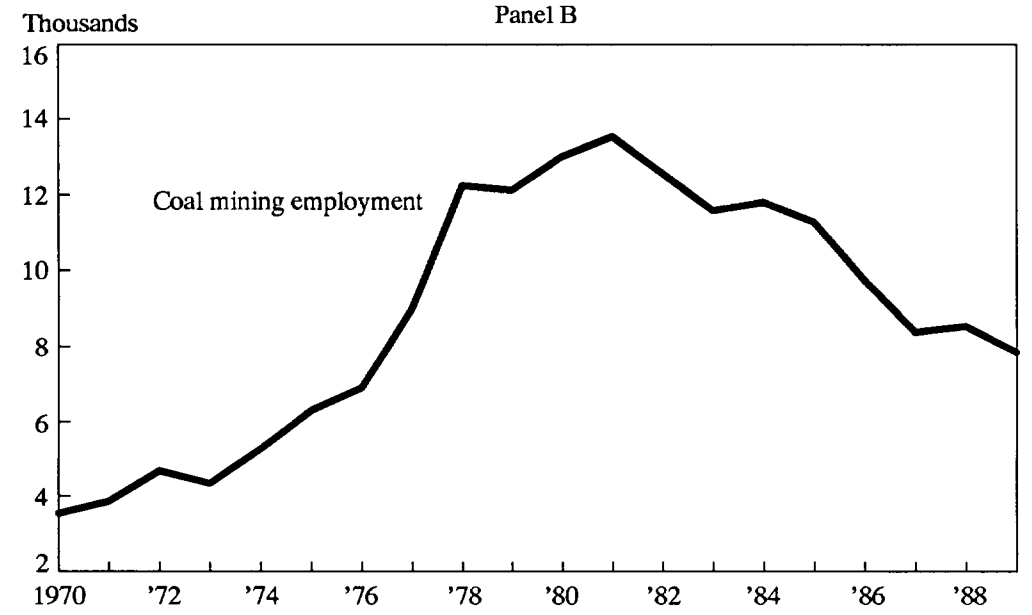
More favorable natural gas prices and stricter environmental policy in the 1990s will likely boost district natural gas output. Moreover, development of new pipelines may allow further expansion of district gas production.

Natural gas prices are expected to rise modestly until the end of the 1990s (Chart 4, Panel B). More importantly, the gas prices in prospect are low compared to projected oil prices. As a result, the demand for natural gas should increase as some utilities and industrial oil users shift to the lower priced natural gas. This switching should push up natural gas prices and stimulate gas production. Abundant supplies of gas are expected to limit real increases in wellhead gas prices throughout the first part of the decade. By the end of the decade, stronger demand and tighter supplies are expected to push prices up more rapidly.[15]

Environmental policy is another factor pointing toward increased demand for and production of natural gas. Provisions in the Clean Air Act Amendments of 1990 will likely

Chart 5
Energy Employment
Tenth District





Sources: Panel A - American Petroleum Institute; Panel B - Energy Information Administration.

lead to some growth in the use of compressed natural gas (CNG) in vehicles. Increased use of natural gas in the transportation sector will combine with increased demand from the nation's utilities and factories to lead to substantial increases in consumption. By the year 2000, consumption of natural gas is projected to range from 20.8 trillion to 22.4 trillion cubic feet, compared with 18.8 trillion cubic feet in 1989 (Energy Information Administration 1991). Expanded imports from Canada may satisfy some of this increased consumption, but domestic producers—including those in the Tenth District—will satisfy the lion's share of the nation's growing appetite for gas.[16]

New pipelines could add further impetus to production in the district. For example, the proposed Kern River pipeline project would connect major natural gas fields in Wyoming with the lucrative California market. Other proposed pipeline developments would link New Mexico's San Juan basin with the existing interstate pipeline system. This system will carry natural gas from major supply basins to markets in the West, Midwest, Northeast, and Gulf Coast. While it is uncertain which pipeline projects will actually be built, the pipelines serving the California market appear to be the most feasible among the several proposals nationwide.[17]

The generally positive outlook for natural gas production should continue to stimulate drilling activity and help stabilize oil and gas extraction employment in the district. Gas drilling in the Hugoton basin in Kansas has already added over 2,000 new wells since 1987, becoming the chief source of energy-related jobs in the state.[18] Technological advances and a tax credit for unconventional fuels have also stimulated drilling and brought jobs to New Mexico's San Juan Basin, where natural gas is found in coal seams.

Coal on the rise

Higher coal prices will continue to support a strong upward trend in national and district coal production. In the district, a high concentration of low-sulfur coal may boost district output further.

Coal prices are projected to rise throughout the 1990s, due mainly to increased demand and slower productivity growth (Chart 4, Panel C). Average coal prices at the minemouth are expected to increase 19 percent in real terms from 1989 to 2000. Rising demand for coal by electric utilities should reverse the steady decline in coal prices that began in the late 1970s. Moreover, productivity in coal mining is expected to level off in the 1990s after achieving rapid gains in the 1980s. These gains were due mostly to the opening of bigger mines, such as the large surface mines in Wyoming's Powder River coal field.[19] While fewer large new mines are likely to be developed in the 1990s, existing mines will be mined more intensively.

An abundance of *low-sulfur coal* will probably boost coal output in the district more than the national average in the 1990s. The reason for the stronger growth in district coal output can be found in the Clean Air Act Amendments, particularly the acid rain provisions that mandate reduction in sulfur dioxide emissions at the nation's electric utilities. Under the new provisions, switching from high-sulfur to low-sulfur coal could provide a low-cost way for existing coal-fired power plants to meet emissions standards.[20] As new plants are built near the end of the decade, however, new technology could provide low-cost ways to burn high-sulfur coal cleanly. Thus, the 1990s could be the last decade of rapid growth for district coal production.

Higher transportation costs, however,

could limit future gains in district coal output. Currently, rail rates are low enough to make the district's low-priced, low-heat coal attractive to electric utilities that are located closer to sources of more expensive, high-heat coal. However, growth in output of western coal in the 1990s is certain to put pressure on rail capacity. The resulting increases in transportation costs or the expense of rapidly expanding rail capacity could push up delivered prices of district coal. An increase in the delivered price of district coal might discourage use of district coal, but probably not enough to offset the increase caused by the Clean Air Act Amendments. Moreover, new techniques, such as coal drying to boost the heat content of low-sulfur coal, may enhance the value of district coal. If so, power plants could hold down their transportation costs by generating more power with the same amount of coal.

The rise in district coal output will bring income to the region's coal producers and severance tax revenue to district states, but jobs at district coal mines will probably continue to decline in the 1990s.[21] Productivity in district coal mining increased faster than production in the 1980s, causing a decline in coal mining employment in the region (Chart 5, Panel B). This trend is expected to continue in the 1990s, but growth in output and a possible leveling off of productivity gains in the 1990s should slow the decline.

Summary

The Tenth District holds vast reserves of energy resources. While the oil boom of the late 1970s and early 1980s focused attention on the district's oil, other energy resources are also important in the region. In fact, some of the nation's richest natural gas and coal reserves are found within the district boundaries.

The district's diverse portfolio of energy resources will be especially important in the decade ahead. Market conditions will likely lead to further declines in oil production, especially in the district where stripper wells dominate production. But at the same time, market conditions will likely boost production of natural gas and coal. Moreover, proposed pipelines should help support increased gas production in the district, and stricter environmental regulations will provide a boost for the district's unique low-sulfur coal. While the ultimate impact of this energy outlook on district economic activity is uncertain, there is little doubt that the region will be better off in the 1990s with its diverse energy portfolio than if it depended entirely on oil.

Endnotes

[1] The Tenth District also holds a large share of the nation's uranium and oil shale reserves, but this article focuses only on oil, gas, and coal because these resources currently generate almost all of the energy-related jobs in the region. Moreover, little or no growth is expected in the district's uranium and oil shale industries until well beyond the end of the decade.

[2] This share has remained relatively constant over time despite fluctuations in the district's reserves. For example, district oil reserves fell by 30 percent from 1970 through 1981 as oil production exceeded discovery. But reserves grew by more than 10 percent from 1981 to 1985. After oil prices collapsed in 1986, reserves fell again to their current level of 3 billion barrels. The discussion of oil considers the reserves and production of the lower 48 states as the national total. Alaska is excluded due to its distance from the markets, relative cost of exploration, and large increase in production during the period. In 1989, Alaska produced 684 million barrels of oil with reserves of 6.7 billion barrels, one-quarter of the U.S. total and second only to Texas in each category.

[3] After rising in the early 1980s, oil production in the district fell continuously following the collapse of oil prices in 1986. From 1986 to 1989, district oil production

fell 14 percent with U.S. oil production following a similar pattern. Accordingly, the region's share of the nation's oil production has remained relatively constant.

[4] Other district wells produce at a volume roughly five times greater than stripper wells.

[5] Natural gas at the wellhead contains many gasses including methane, propane, butane, pentane carbon dioxide, helium, hydrogen, and nitrogen. Although each of these gasses has some value when processed, processing plants separate the high-heat producing methane from the other gasses to produce pipeline-quality natural gas.

[6] The district's natural gas reserves, like its oil reserves, fluctuate with changes in market conditions and regulations. Despite the fluctuation, however, the district's share of U.S. gas reserves has nearly doubled over the past 20 years. The complex regulatory history of the natural gas industry has had important effects on gas reserves and production in the district and the nation (Tussing and Barlow, Tobin and Trapmann). The discussion of natural gas considers the reserves and production of the lower 48 states as the national total. Alaska is excluded due to its distance from the markets, relative cost of exploration, and large revisions in reserves during the period. In 1989, Alaska produced 394 billion cubic feet of natural gas with 8.9 trillion feet of reserves, 2 and 5 percent of the U.S. totals, respectively.

[7] District gas production began to seesaw when relaxation of natural gas price regulation in the 1980s caused gas prices to increase. The increase in prices led to an increase in gas production in the district and elsewhere in the nation. The resulting abundance of natural gas, often called the "gas bubble," eventually brought gas prices back down and caused production to fall. Since 1986, however, district gas production has rebounded sharply with expectations of future increases in gas prices.

[8] A consistent series on recoverable coal reserves is only available beginning in 1978. Coal is measured in 2,000-pound short tons. Despite some ups and downs, district coal reserves were over 50 percent higher in 1989 than in 1978.

[9] Low-sulfur coal contains less than 0.61 pounds of sulfur per million Btu, medium-sulfur coal contains from 0.61 to 1.67 pounds per million Btu, and high-sulfur coal contains more than 1.67 pounds per million Btu. Although coal type does not determine sulfur content, subbituminous and lignite coals generally have lower sulfur content than hotter-burning bituminous coals. For example, 59 percent of the nation's bituminous coal is high sulfur. In the Tenth District, only 35 percent of the bituminous coal is high sulfur and 5 percent of the subbituminous coal is high sulfur. Overall, district coal reserves are 72 percent subbituminous, 24 percent bituminous, and 4 percent lignite.

[10] The region's coal production is 86 percent subbituminous and 14 percent bituminous, while the nation's coal production is 24 percent subbituminous and 67 percent bituminous.

[11] Comparisons of district and Wyoming coal production with the national average are based on total 1989 production.

[12] Although the Department of Energy considers several alternative outlook scenarios, its "reference case" outlook predicts a decline in oil production accompanied by a modest increase in natural gas and coal production and a large increase in energy imports—mostly oil through the end of the decade. The "reference case" assumes average annual growth in real Gross National Product of 2.1 percent and a mid-level path for world oil prices (constant in real terms at $24 a barrel for the next few years, and then rising to $34 by 2010).

[13] Amendments to the Clean Air Act mandate changes in the composition of gasoline and diesel fuel used in cars and trucks. These changes, to be phased in between 1992 and 2010, will have the biggest direct impact on marketers of petroleum products and on the small refining segment of the district's oil industry. In the Tenth District refining accounts for only about 8 percent of oil and gas industry employment. Extraction, on the other hand, accounts for 70 percent.

[14] The costs of drilling exploratory or developmental wells change over time and space. Drilling costs were higher during the early 1980s when competition bid up material and labor costs. After the collapse of oil prices in 1986, drilling costs fell dramatically. According to Petroleum Information Corporation, average drilling costs during the 1980s were 20 percent higher than the national average in Wyoming. Drilling costs were 3 percent higher than the national average in New Mexico and 90 percent of the national average in Oklahoma. Costs were considerably lower in Colorado, Missouri, and Kansas. Tippe and Beck discuss trends in drilling costs.

One expensive but promising new technology is horizontal drilling. This technology costs more than conventional vertical drilling but results in greater initial production. Some analysts foresee an increase in horizontal drilling in the Rocky Mountain region (Lang and Jett).

[15] The Natural Gas Decontrol Act, signed into law July 1, 1989, deregulates domestic natural gas wellhead prices by January 1, 1993. Prices of old gas— held below

market levels by price controls—should rise as contracts covering this gas expire, terminate, or are renegotiated. As a result, district prices will increase to market levels. Thus, the overall movement in the market prices is likely to be the guiding force in the long-term outlook for district gas production.

[16] Gas imports from Canada should increase through 1995 as pipeline capacity rises. However, the level of recoverable reserves in Canada is expected to limit the overall volume of imports through the next decade (Energy Information Administration 1991). The U.S. International Trade Commission expects a negligible impact on U.S. energy markets from a Free Trade Agreement with Mexico, although there may be some small increase in U.S. natural gas exports to Mexico (U.S. International Trade Commission).

[17] Spiegel, Johnson, and Fisco discuss the outlook for pipeline proposals in all markets and conclude that projects proposed to serve California are the best-positioned projects.

[18] Before January 1, 1987, no more than one well could drain 640 acres. After that date, infill drilling provided the option to drill a second well on a 640-acre plot. These wells are being phased in gradually until 1993.

[19] In fact, Wyoming mines are the most productive in the nation. In 1989, the average Wyoming coal mine produced 6 million short tons of coal, or 18 times the national average (Energy Information Administration 1989).

[20] Other options, such as switching to natural gas or installing scrubbers on smokestacks, are available to electric utilities. But with current technology, these options can be considerably more expensive than switching to low-sulfur coal.

[21] Severance taxes are taxes levied by states on production of mineral resources including oil, gas, and coal. Tax rates vary considerably from state to state.

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Tenth District Cities: Recent Growth and Prospects for the 1990s

By Glenn H. Miller, Jr.

Contrary to the Tenth District's rural image, almost two-thirds of its people live and work in metropolitan areas. Rural industry, such as farming and mining, is still a mainstay of the district economy, but the share of economic activity in the district's metropolitan areas is both larger and faster growing. It can be said, therefore, that the future performance of state economies in the district may well depend on how strongly their metropolitan areas grow.

Citizens and public officials often rank overall economic growth high among state goals. Yet knowing where economic activity is concentrated and growing rapidly may help policymakers tailor policies to foster that goal. In brief, spending to enhance a state's economic growth may be more wisely targeted toward geographic areas promising substantial returns.

This article examines the growth of population and economic activity in the Tenth District's metropolitan areas. The first section discusses the relatively strong performance of the district's metropolitan areas in the 1980s. The second section examines the prospects for district metropolitan areas in the 1990s. The article concludes that the district's metropolitan areas are likely to be the region's primary source of growth again in the 1990s.

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A Decade of Strong Growth for the District's Cities

Population and economic growth in the Tenth District's metropolitan areas have been relatively strong over the past ten years. This section defines metropolitan areas and looks closely at

three central questions: Have population and economic growth in the district been stronger in metropolitan or in nonmetropolitan areas? How does the recent growth in the district's metropolitan areas compare with metropolitan growth nationwide? And, where has the district's metropolitan growth been strongest?

Metropolitan areas defined

The metropolitan area concept has been used since the 1950 census to identify the concentration of population in cities and their suburbs. A metropolitan area typically comprises a central city with a population of 50,000 or more, the county containing that city, and surrounding counties tied economically and socially to the central city. Commuting-to-work patterns help establish a metropolitan area's extent. A typical metropolitan area unit is now called a metropolitan statistical area, or MSA.

In 1989, the Tenth District had 22 MSAs (Table 1).[1] Two MSAs, Denver and Kansas City, have populations of 1 million or more. Six MSAs have populations between 400,000 and 1 million. The remaining 14 MSAs have populations less than 250,000. In 1989, MSAs accounted for nearly two-thirds of the population of the seven district states and for more than two-thirds of the district's personal income and employment.

The metropolitan share of population varied substantially across district states, ranging from 29 percent in Wyoming to 82 percent in Colorado. In three states—Nebraska, New Mexico, and Wyoming—less than half the population resided in metropolitan areas. Metropolitan income and employment were more than half of total income and employment in every district state except Wyoming.

Table 1

Population of Tenth District MSAs, 1989

(in thousands)

Denver, Colo.	1,645
Kansas City, Mo. - Kans.	1,599
Oklahoma City, Okla.	962
Tulsa, Okla.	730
Omaha, Nebr.	629
Albuquerque, N. Mex.	502
Wichita, Kans.	489
Colorado Springs, Colo.	402
Boulder-Longmont, Colo.	219
Lincoln, Nebr.	215
Ft. Collins-Loveland, Colo.	186
Topeka, Kans.	167
Greeley, Colo.	137
Joplin, Mo.	137
Pueblo, Colo.	128
Lawton, Okla.	119
Santa Fe, N. Mex.	116
St. Joseph, Mo.	85
Lawrence, Kans.	78
Cheyenne, Wyo.	77
Casper, Wyo.	63
Enid, Okla.	57

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Has growth been stronger in MSAs or nonmetro areas?

Growth in the district's MSAs far outstripped growth in its nonmetro areas in the 1980s, making MSAs the principal location of population and economic growth in the decade. MSA population and income grew three times faster than nonmetro population and income. MSA employment grew twice as

Table 2

MSA and Nonmetro Annual Percent Growth in the 1970s and 1980s, United States and Tenth District States

	Population		Nonfarm Employment		Real Income	
	1970s	1980s	1970s	1980s	1970s	1980s
Tenth District						
Total	1.3	.9	3.1	1.7	4.3	1.7
MSA	1.4	1.2	3.1	2.0	4.1	2.2
Nonmetro	1.1	.4	3.0	1.1	4.6	.7
United States						
Total	1.1	1.0	2.3	2.1	3.3	2.6
MSA	1.0	1.1	2.3	2.3	3.2	2.9
Nonmetro	1.3	.6	2.6	1.5	4.2	1.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

fast as nonmetro employment. By the end of the decade, per capita income was 30 percent higher in the district's MSAs than in its nonmetro areas.[2]

MSAs were the district's population growth centers in the 1980s. MSA population increased 1.2 percent per year from 1979 to 1989, while nonmetro population grew only 0.4 percent per year (Table 2). MSA growth outpaced nonmetro growth in all district states but Wyoming (Table 3). New Mexico and Colorado posted the fastest growth in population among district states, both for MSAs and nonmetro regions. Otherwise, nonmetro growth was generally slow, with modest declines recorded in Kansas and Nebraska.

Employment and real income in the district also grew faster in MSAs than in nonmetro areas in the 1980s. Employment and income grew about 2 percent per year in MSAs, compared with about 1 percent per year in all nonmetro counties (Table 2). MSA employment and income grew faster than nonmetro employment and income in all district states but Missouri and Wyoming. MSA employment and income grew the fastest in New Mexico and Colorado.

Having grown considerably faster than nonmetro areas, district MSAs closed the 1980s with much higher per capita incomes (Table 4).[3] For the district as a whole, per capita income was 30 percent higher in MSAs than in nonmetro counties. Across district states, per capita income in MSAs ranged from 10 percent higher than nonmetro regions in Wyoming, to 40 percent higher in Missouri.

The much stronger relative growth of MSAs in the 1980s contrasted sharply with the 1970s, when the rural areas in the district outgrew the metropolitan areas. The relative gains by MSAs in the 1980s were due mostly to a sharp slowdown in rural growth. Nonmetro population growth, for example, fell

Table 3

MSA and Nonmetro Annual Percent Growth in the 1970s and 1980s, Tenth District States

	Population		Nonfarm Employment		Real Income	
	1970s	1980s	1970s	1980s	1970s	1980s
Colorado						
Total	2.8	1.5	5.1	2.5	5.9	2.6
MSA	2.9	1.7	5.0	2.6	5.9	2.8
Nonmetro	2.4	.9	5.8	2.0	6.3	1.7
Kansas						
Total	.5	.7	2.7	1.5	3.8	1.4
MSA	.6	1.5	3.2	2.2	3.9	2.3
Nonmetro	.4	-.2	2.2	.6	3.7	.3
Missouri						
Total	.5	.5	1.8	1.8	3.1	1.9
MSA	.3	.6	1.6	1.8	2.6	2.2
Nonmetro	.9	.4	2.3	2.0	4.3	1.3
Nebraska						
Total	.6	.3	2.5	1.3	3.4	.9
MSA	1.0	.9	2.7	2.0	3.4	1.7
Nonmetro	.3	-.2	2.4	.4	3.4	.2
New Mexico						
Total	2.4	1.8	4.4	2.3	5.6	2.4
MSA	2.8	2.3	5.1	3.3	5.7	3.4
Nonmetro	2.0	1.2	3.6	.9	5.4	1.3
Oklahoma						
Total	1.6	.9	3.2	1.1	5.0	1.0
MSA	1.9	1.2	3.5	1.4	5.0	1.3
Nonmetro	1.3	.3	2.7	.5	5.0	.5
Wyoming						
Total	3.2	.5	5.8	.0	7.6	-1.0
MSA	2.6	.1	5.0	-.7	6.8	-1.5
Nonmetro	3.5	.6	6.2	.4	8.1	-.8

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Table 4

MSA and Nonmetro Per Capita Income, 1989, United States and Tenth District States

	Total	MSA	Nonmetro
United States	$17,592	$18,771	$13,557
Tenth District	15,837	17,351	13,365
Colorado	17,504	18,075	14,923
Kansas	16,525	17,937	14,862
Missouri	16,447	18,357	12,714
Nebraska	15,697	16,755	14,721
New Mexico	13,221	15,028	11,456
Oklahoma	14,111	15,385	12,285
Wyoming	14,553	15,636	14,104

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

from 1.1 percent per year in the 1970s to just 0.4 percent per year in the 1980s (Table 2). Similarly, rural employment growth fell from 3.0 percent to 1.1 percent, while growth in real income fell from 4.6 percent to 0.7 percent.

Booms in the farm and energy sectors fueled rapid growth in the rural economy during the 1970s, while corresponding farm and energy busts led to a sharp slowdown in the rural economy through most of the 1980s. Even though both industries were in recovery when the 1980s ended, they still accounted for most of the swing in the district's rural economy between the two decades. The boom and bust cycle in agriculture and energy also affected several district MSAs, especially their real estate and financial sectors. But the slowing of MSA growth was more attenuated than the slowdown in the rural economy.

How does MSA growth in the district and the nation compare?

Overall, growth in the district's MSAs trailed growth in the nation's MSAs during the 1980s. District MSAs fared well in population growth but trailed the nation's growth in employment and income. By the end of the decade, per capita income was about 8 percent lower in district MSAs than in MSAs nationwide.

Population growth in the district's MSAs was slightly faster than in the nation in the 1980s. Population of MSAs in the district grew 1.2 percent per year from 1979 to 1989, while MSAs across the nation averaged 1.1 percent per year. The district's edge in population growth was due mainly to rapid growth in the MSAs of Colorado, Kansas, New Mexico, and Oklahoma.

Economic growth, on the other hand, was slower in district MSAs than across the nation in the 1980s. In the district, employment in MSAs increased 2.0 percent per year, compared with 2.3 percent per year in metropolitan areas nationwide. Real income growth in district MSAs averaged 2.2 percent per year, compared with 2.9 percent nationally. Employment in the MSAs of Colorado and

Table 5

District MSA Annual Percent Growth in the 1980s

	Population	Rank	Employment	Rank	Income	Rank
Colorado Springs, Colo.	2.7	1	4.0	1	4.5	1
Ft. Collins-Loveland, Colo.	2.5	2	3.7	2	3.9	3
Santa Fe, N. Mex.	2.2	3	3.4	4	4.0	2
Albuquerque, N. Mex.	2.0	4	3.2	5	3.2	5
Lawrence, Kans.	1.6	5	2.5	6	2.6	6
Boulder-Longmont, Colo.	1.6	6	3.7	3	3.6	4
Denver, Colo.	1.5	7	2.2	8	2.6	7
Tulsa, Okla.	1.4	8	1.4	15	1.3	17
Oklahoma City, Okla.	1.3	9	1.5	14	1.4	16
Lincoln, Nebr.	1.3	10	1.7	12	1.7	12
Greeley, Colo.	1.3	11	2.0	9	1.8	11
Kansas City, Mo.-Kans.	1.1	12	1.9	11	2.1	9
Wichita, Kans.	1.1	13	1.3	16	1.5	14
Cheyenne, Wyo.	1.0	14	.9	18	.7	19
Topeka, Kans.	.8	15	1.5	13	1.8	10
Joplin, Mo.	.8	16	2.5	7	2.2	8
Omaha, Nebr.	.7	17	2.0	10	1.6	13
Lawton, Okla.	.4	18	.9	19	1.3	15
Pueblo, Colo.	.2	19	-.3	20	.0	20
St. Joseph, Mo.	-.4	20	1.1	17	1.1	18
Casper, Wyo.	-.9	21	-2.3	22	-3.4	22
Enid, Okla.	-1.0	22	-.8	21	-.6	21

Source: U.S. Department of Commerce, Bureau of Economic Analysis

New Mexico grew faster than employment in MSAs across the nation (Table 3). Income grew faster in New Mexico's MSAs than in MSAs nationwide.

Per capita income in MSAs was smaller in the district than across the nation in 1989. In the district, MSA per capita income was about 8 percent lower than the national average. Per capita income ranged widely across the district, from about 2 percent less than the national average in Missouri's MSAs to nearly 25 percent less in New Mexico's MSAs.[4]

Population growth and economic growth in MSAs were slower in the 1980s than in the 1970s in the district, but growth was better maintained in MSAs nationwide. MSA growth slipped more in the district than across the nation, causing the district to trail the nation in both income and employment growth for MSAs.[5]

Where has MSA growth in the district been strongest?

The district's 22 MSAs have very different economic attributes. Thus, it is not surprising that population and economic growth in MSAs varied widely across the district in the 1980s (Table 5). Population, employment, and income grew most rapidly in Colorado Springs, Colorado. At the other extreme, employment and income declined most in Casper, Wyoming, and population fell most in Enid, Oklahoma.

Population and employment grew faster in the district's larger MSAs than in its smaller ones in the 1980s. For the eight MSAs with populations of 400,000 or more, the median rate of population growth was 1.4 percent per year in the decade. For the 14 MSAs with populations under 250,000, the median annual rate of growth was 0.9 percent. Median employment growth in the decade was 2.0 percent in the larger MSAs and 1.6 percent in the smaller ones.

Prospects for District MSAs in the 1990s

MSAs in the Tenth District are expected to continue to grow in the 1990s, outpacing growth in the district's nonmetro areas and making up ground on the nation's MSAs. But growth will not be uniform across the district's diverse mix of MSAs.

Will district MSAs continue to grow strongly in the 1990s?

Population growth and economic growth in the district are likely to be stronger in MSAs than in nonmetro areas in the 1990s. And after trailing national MSA growth in the 1980s, MSA growth in the district may catch MSA growth across the nation in the 1990s.

Projections prepared by the Bureau of Economic Analysis appear to support this view. The BEA projections show significantly faster population and employment growth in the 1990s for district MSAs than for district nonmetro areas (Table 6).[6] Real income growth is projected to be moderately faster in the district's MSAs than in its nonmetro counties. MSA growth is expected to be more rapid than nonmetro growth in every district state.

While the district's MSAs will outpace nonmetro areas in the 1990s, MSA growth is still projected to slow from the 1980s. Population, employment, and income are projected to grow more slowly in district MSAs in the 1990s than in the 1980s, both in the aggregate and for most MSAs individually. Still, as national MSA growth is expected to slow even more in the 1990s, the projected growth of district MSAs differs little from MSA growth nationwide.

The district's economic growth will be concentrated in its MSAs mainly because economic growth in nonmetro areas probably will remain weak in the 1990s. The district's rural economy depends heavily on agriculture and energy, and both industries appear likely to grow slowly in the 1990s. Both sectors are subject to volatile swings in international markets, but farm and energy businesses alike have become more restrained in their responses to such swings. The energy industry, for example, responded cautiously to the runup in oil prices associated with the Gulf War. Consequently, no boom developed.

The district's energy industry has a moderate outlook, with little prospect for boosting rural economic activity. A bright outlook for the district's plentiful natural gas and coal deposits will be at least partly offset by weakness in the region's oil industry (Smith and Sheesley).

Table 6

MSA & Nonmetro Annual Percent Growth in the 1990s, United States and Tenth District States

	Population	Employment	Real Income
Tenth District			
Total	.6	1.0	2.0
MSA	.7	1.2	2.1
Nonmetro	.3	.7	1.8
United States			
Total	.7	1.1	2.0
MSA	.8	1.2	2.0
Nonmetro	.5	.8	1.8

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

In the case of agriculture, uncertainties abound. The industry faces the challenges of competing in world markets that are potentially more open, responding to environmental concerns, and adopting bold new technologies. Even if such challenges can be overcome, sweeping changes in the industry's structure may diminish agriculture's influence on nonmetro economic growth (Drabenstott and Barkema).

In short, the 1990s should resemble the 1980s, when economic growth migrated to the district's MSAs. Farm and energy booms, which led district growth away from the cities in the 1970s, are not likely to be repeated soon. Even if world markets for food and oil do turn up, industry responses may be restrained after the painful lessons of the 1980s.[7]

Meanwhile, MSA growth in the district is expected to compare favorably with MSA growth nationwide. The district's relative improvement is due mainly to a big slowdown in MSA growth nationwide.

Growth in the district's MSAs might benefit in the 1990s from further expansion of MSAs elsewhere, especially in coastal areas. In some large coastal MSAs, potential new businesses and existing firms may face higher costs due to the negative side effects of growth. Increased congestion, more pollution, higher labor costs, and higher housing costs may push people and jobs inland from some large coastal MSAs.

District MSAs thus may become more attractive as business locations in the 1990s. MSAs in the district may offer important business advantages to new or expanding firms, including qualified labor, proximity to raw materials and markets, and cheap power. Growth in district MSAs might also be expected to occur while generating few additional costs from materials bottlenecks, traffic congestion, and air pollution that might offset the benefits of new growth (Fox and Smith).

Where is district MSA growth likely to occur?

Overall, while district MSAs may grow no faster than the nation's MSAs in the 1990s, growth prospects range widely across the district's diverse collection of cities. Based on economic characteristics and other features, most district MSAs generally fall into one of four categories.[8]

Nodal centers are regional centers for health care, transportation, communications, wholesale trade, and related financial and business services (Frey and Speare, p. 90). These centers have a strong, diverse base for economic growth in the 1990s.

Magnet cities are MSAs that attract certain segments of the population. Metropolitan areas that can successfully attract members of large and mobile groups, such as retirees, find that those groups can become sources of rapid growth.

Specialized cities rely heavily on one or two major sectors for their economic health. Such MSAs tend to experience volatile economic growth, prospering when their major sectors boom and risking sharp downturns when those major sectors go bust.

Small cities, MSAs with populations under 250,000, may grow slowly in the 1990s. In the 1980s, small MSAs generally grew slowly because many of them lack the characteristics to be strong growth centers.[9]

Nodal centers. The potential for MSAs to grow as nodal centers depends on their current level of development and whether they have the right ingredients for further development. Growth prospects in nodal centers are enhanced by a solid general infrastructure to support economic activity—adequate roads, water and sewerage systems, electricity, communications, railroads, and airports. Amenities such as attractive natural surroundings and lack of congestion also enhance growth in these cities.

Growth in nodal centers is likely to be a primary support for overall MSA growth in the district in the 1990s. Omaha has strong communications and information processing sectors, due partly to a sophisticated telecommunications infrastructure and a work force well suited to the industry. Telecommunications services are also making Kansas City a major center of telecommunications expertise and growth. The share of the local work force employed in the industry in Kansas City is twice the national average. Denver is also developing as a nodal center, due to its size, location, and the breadth of its advanced services sector.

Magnet cities. Not all MSAs attract the same segments of the population. The attractions that served as magnets for strong growth in the 1980s are also likely to increase MSA growth in the 1990s. Some MSAs appear to be especially attractive to baby boomers, serving as magnets for a generation reaching its most productive and affluent years. In the 1980s, baby boomers were attracted to large, diversified MSAs with a high quality of life and high-level employment opportunities. Other MSAs attracted the increasingly mobile and affluent elderly. In the 1980s, migrants to retirement destinations caused several sunbelt cities to be among the fastest growing in the nation. Finally, some MSAs on the east and west coasts, and in states that border Mexico, served as magnets for flows of immigrants.

Only a few district MSAs appear likely to be growth magnets in the 1990s. Attractiveness to baby boomers appears to be the only magnet favorable for MSA growth in the district. Denver and Colorado Springs ranked among the nation's strongest baby boomer magnets in the 1980s and may appeal to boomers again in the 1990s, as may a few other MSAs in the district. Few if any district MSAs

are likely to be attractive enough to retirees to make their inmigration a source of substantial growth. And drastic changes in patterns of population inflows from outside the United States would be required to make immigration a major source of growth for district MSAs.

Specialized cities. Specialized cities lack a diversity of industries to sustain economic health. To escape recurring downturns, specialized cities often try to diversify their industrial bases.

A number of specialized cities in the Tenth District have significantly influenced MSA growth in the region. The boom and bust of the energy sector in the 1970s and 1980s affected the economies of Oklahoma City and Tulsa. Perhaps the best example, however, is Casper, Wyoming. Driven by the energy boom, Casper's population grew 3 percent per year in the 1970s, while its employment increased 6 percent per year. But as boom turned to bust, Casper's population declined 1 percent per year in the 1980s, while employment dropped 2 percent per year.

Several district cities, including some specialized energy centers, now appear to be on the road toward diversification. That path may be easier for larger MSAs like Oklahoma City and Tulsa than for smaller ones like Casper. In any case, stronger MSA growth in the district in the 1990s will likely require diversification in specialized cities.

Small cities. Many small MSAs appear to lack the ingredients necessary for rapid growth. Some may not be large enough to offer "urbanization economies," the cost savings that arise when economic activities are concentrated in urban areas. Across the nation, many small MSAs went from rapid growth in the 1970s to much slower growth or decline in the 1980s. This performance was not confined to any one region, for "the slowdown of growth in smaller metropolitan areas has become pervasive" (Frey, p. 12).

Nearly all of the district's 14 MSAs with populations under 250,000 grew slower in the 1980s than in the 1970s in population and employment. Four of these showed declines in at least one measure. If the pervasive slowdown in the growth of smaller MSAs persists, district MSA growth will be limited because nearly two-thirds of the MSAs in the district are small cities.

Conclusion

The Tenth District's MSAs are likely to grow faster than its nonmetro areas again in the 1990s, making MSAs the most probable source of population and economic growth for the region as a whole. Yet MSA growth in the district may be held to a pace like that of MSAs nationally. A number of factors suggest only moderate MSA growth for the district: the presence of a number of specialized cities just now on the road toward diversification, a majority of MSAs in the smaller size group, and only limited attraction from growth magnets. Still, the possibility of benefiting from an inland movement of jobs and people, and the potential for further growth of nodal areas, suggest at least moderate growth for district MSAs.

In states where overall economic growth is a goal, citizens and public officials might value the information that faster growth is likely to occur in metropolitan areas, where population and economic activity are already concentrated. State governments with limited resources must adapt their policies to get the most "bang for the buck" from attempts to stimulate economic growth. Targeting their economic development efforts by geographic areas might be one way to adapt. Such targeting now appears to be limited, however. A

recent study shows that only 11 of 50 states—only two in the Tenth District—target specific geographic areas in their economic development strategy (Clarke). Public officials may want to consider what is known about where economic activity is concentrated and growing fastest, as they seek to improve a state economy's overall performance.

One of the most significant changes in state development policy over the past ten years may work toward this end. That change is the growing emphasis on strengthening a state's existing economic base. With a large share of district economic activity already located in MSAs, directing further resources toward those areas might well be the best way to improve the performance of a state's overall economy.

Policies directing more economic development resources toward MSAs would not necessarily abandon the rest of a state. Such policies are intended to improve the economic welfare of the people of a state, not to shore up particular places. The purpose of tilting economic development efforts toward MSAs would be to boost economic growth where it is more likely to occur and to produce higher per capita incomes. Policies for nonmetro regions might best be targeted at preparing their citizens to be successful wherever economic opportunities are to be found, often in MSAs.

Endnotes

[1] This number does not include MSAs in Tenth District states but not in the Tenth District proper, such as Las Cruces, New Mexico, and St. Louis, Missouri. Aggregate MSA and nonmetro data by state used in this article include full state data, however.

[2] The metropolitan population of a state or a region is the total of all residents of the metropolitan counties in that state or region; the nonmetropolitan population consists of all residents of the remaining parts of the state or region. Aggregations of metropolitan and nonmetropolitan economic data are similar. This article's analysis of metropolitan area growth uses a "constant boundary" measure of metropolitan change. When a "constant boundary" measure is used, the geographic definition of each metropolitan area is held constant for the period under analysis. For example, in comparing growth from 1979 to 1989, the counties in an MSA in 1989 are included in that area for 1979, even though they might not have been officially part of the MSA in the earlier year. When a "variable boundary" measure of metropolitan change is used, the geographic definition of each MSA is allowed to change just as it actually did during the period being studied. Thus, in a "variable boundary" analysis of growth from 1979 to 1989, an MSA's population including residents within its boundaries as defined in 1979 would be compared with that MSA's population within its boundaries as defined in 1989.

[3] The per capita income comparisons do not allow for differences in the cost of living between MSAs and nonmetro counties, as local area price measures are not available.

[4] In contrast, nonmetropolitan per capita income in the district was only slightly smaller (1.4 percent) than nonmetropolitan per capita income nationally in 1989, and has been slightly larger in some years.

[5] Contrasting performances in the 1970s and 1980s were a national phenomenon. Long-run trends toward concentration of U.S. population and economic activity in metropolitan areas were interrupted in the 1970s. According to one expert on American demography, "No deviation from the trend toward population concentration has been greater than in the 1970s, when nonmetropolitan and metropolitan growth patterns changed direction completely (Frey, p.7)." In contrast with earlier periods, smaller metropolitan areas grew faster than the large areas and nonmetropolitan areas grew faster than metropolitan areas as a whole. The patterns that emerged in the 1970s evoked labels such as "rural renaissance" and "metropolitan turnaround." Speculation that these developments might be longer run phenomena was at least temporarily ended when the 1980s brought an apparent return to earlier trends of metropolitan growth. The national "rural renaissance/metropolitan turnaround" thus appears to have been short lived, as the 1980s apparently brought a return to trends in the relative growth of MSA and nonmetro population and economic activity. MSAs again grew faster than nonmetro counties, and large MSAs again grew faster than smaller MSAs.

The national growth patterns of the 1970s and 1980s also had regional dimensions (Frey, pp. 14-17), and the Tenth District states did not simply reflect the national metropolitan turnaround of the 1970s and its reversal in the 1980s.

[6] The BEA projections are baseline projections and assume no major policy changes.

[7] One explanation of the contrast between the 1970s and the 1980s views the 1970s as a one-shot deviation from long-term trends that were resumed in the 1980s. According to this explanation, the 1970s were a one-time period of nonmetropolitan turnaround and rural renaissance centered in the district's farm and energy sectors. The 1980s brought a return to earlier trends due mainly to reversals in those industries. This explanation, which represents a return to earlier trends after the dissipation of several special influences of the 1970s, certainly appears apt for Tenth District performance. This explanation has been called a "period" explanation. Other explanations of the reversals of trends in the 1970s include a "deconcentration" explanation and a "regional restructuring" explanation (Frey, pp. 10-11).

[8] The four categories are not inclusive of all MSAs in the district. Some MSAs may not fit any of the categories, and others may fit more than one. Wichita, Kansas, for example, has a solid though specialized manufacturing base along with many attributes of a nodal center. Wichita grew moderately in the 1980s. The Lawrence, Kansas, and Boulder-Longmont, Colorado, MSAs grew rapidly in the 1980s, partly from their bases as university cities but also for other reasons, such as Boulder's location and amenities. At the same time, their positions as smaller MSAs did not appear to constrain their growth.

[9] The categorization of MSAs and the discussion of their characteristics draw heavily on Frey.

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Economic Review

July/August 1991, Vol. 76, No. 4

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

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Economic Review
Federal Reserve Bank of Kansas City
Kansas City, Missouri 64198-0001
July/August 1991, Vol. 76, No. 4