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industrial base of their own, industrial development cannot be expected in the normal course of events. Change in such areas would require radical change brought about by external events that could change the course of the area's economic history.

If the industrial economy is restructuring along the lines we have found here, with large firms expanding their use of small suppliers as they streamline operations, the number of jobs in large firms may shrink while those in small firms expand. Due to the high proportions of startup firms that fail, such jobs may be less stable. Benefits paid by the small firms we studied were far less than those of large firms. Few small firms have pension plans, for example. Ultimately, then, questions of benefit replacement will be questions of public policy.

Our findings suggest that the fortunes of many small firms are bound up with those of the large corporations they depend on and their changing policies. This suggests that programs, public or private, to help small businesses should take these interdependent relationships into account in planning intervention or assessing the likelihood of success. Many small firms are not independent of the economy immediately surrounding them, and, depending on what befalls it, may or may not survive regardless of their own managerial competence. They live in a small world and it impinges on them directly.

The web of interdependent relationships among manufacturing firms, large and small, suggests that competition is much more limited than we like to believe, since markets and sources of supply are both limited and specialized. Each small firm has only limited opportunities for competing, and its fate is tied to that of other firms.

RDP

For Additional Reading . . .

Giovanni Dosi, "Sources, Procedures and Microeconomic Effects of Innovation," *Journal of Economic Literature* XXVI (Sept. 1988):1120-1171.

Gregory R. Gajewski and Douglas Duncan

1988 Drought Did Not Dry Up Credit

Following close on the heels of the 1980's farm financial crisis, the 1988 drought aroused concerns that hard-pressed lenders might desert farmers and other rural borrowers. The evidence suggests, however, that farm and rural credit continues to be readily extended, even in areas hit hardest by the drought, and that 1988 was a relatively good year for farm and rural lenders. The combination of drought-induced rises in crop prices, crop stocks left over from earlier years, and Federal disaster assistance seems to have kept farm losses well below what was initially feared.

Severe droughts wipe out farmers' crops, and can leave them unable to repay the money they borrowed to plant. If the financial losses are widespread, farm lenders may be forced out of business. A collapse of this nature can ripple through farm-dependent rural communities as farmers put off spending for local purchases. A big drop in farmer spending can push other rural businesses under, along with local banks. Rural hydroelectric, transportation, and recreational businesses can likewise incur drought-related losses, leaving them unable to repay their lenders as well.

This did not happen during the 1988 drought for a number of reasons. The 1988 drought hit more than the United States. Farm output in Canada and South America was also depressed by a lack of rain. As a result, world crop prices rose dramatically. Many U.S. farmers had accumulated large grain stocks, surplus production from earlier in the decade, that they sold at drought-induced higher prices. For farmers who were hit by the drought and did not have stocks, a Federal

safety net cushioned the blow to their income.

The picture is less clear for rural businesses that may have incurred drought-related losses. But judging from rural commercial bank performance in drought-affected areas, drought-related losses were probably small (fig. 1).

Were farm and rural lenders able to absorb drought-related loan losses? And did the lenders continue to provide an adequate supply of credit? The answers seem to be yes, although some drought-related loan losses may not show up until 1990.

1988 drought hit farmers hard

10,000-15,000 farmers face debt repayment problems
Wheat crop down by 14%
Corn crop down by 30%
Soybean crop down by 20%

But prices rose

Wheat prices up 46%
Corn prices up 31%
Soybean prices up 25%

Overall farm income was roughly unchanged, but went down

13% in the Northern Plains
23% in the Corn Belt

And the Federal Government stepped in to help with

\$ 3.9 billion in disaster assistance payments
\$ 1.3 billion in crop insurance payments
\$ 3.4 billion in FmHA drought-related rural business and industry loan guarantees

And lenders were mostly unaffected

Bank loan losses were down
Bank vulnerability was down
Banks' return on equity was up
16 ag/rural banks failed (but none in drought counties)

Gregory Gajewski is an economist with the Commodity Economics Division, ERS, and Douglas Duncan is an agricultural economist with the Agriculture and Rural Economy Division, ERS.

Figure 1
Most barometers of rural bank health suggest improvement in 1988



The Drought Redistributed Farm Income

The 1988 drought left the overall cash incomes of farmers roughly unchanged from 1987's record high. But the drought did redistribute the income. Drought-induced higher prices boosted the incomes of farmers lucky enough to have adequate rainfall or large crop stocks in storage, while farmers with severe crop damage or crop failure may have had too little income to cover expenses. We say "may," because farmers whose crops failed, but who had purchased federally subsidized crop insurance, were at least protected from catastrophic losses. Federal assistance provided under the Disaster Assistance Act of 1988 also protected many who did not purchase the insurance.

Preliminary analysis of the disaster assistance suggests it was well targeted: farmers with the largest losses appear to have collected most of the aid. Counties hardest hit by the 1988 drought in both the Northern Plains and the Corn Belt had a larger-than-proportional share of financially vulnerable farmers due, in part, to losses incurred during droughts in 1983 and 1987. Farmers in Montana and the Dakotas received nearly 25 percent of the 1988 Federal disaster payments. Farmers in Illinois, Iowa, Minnesota, and Wisconsin, the four major corn-producing States, received nearly 40 percent of the

disaster assistance (see article by Petrusis, Sommer, and Hines elsewhere in this issue).

The U.S. Department of Agriculture (USDA) estimates that, regardless of Federal assistance, 10,000-15,000 farmers faced loan repayment problems due to the 1988 drought, representing about 1.5-2.5 percent of all commercial farmers.

Drought Did Not Derail Lender Recovery

Loan losses at financial institutions tend to lag behind problems experienced by their borrowers. While the 1988 drought began in the early spring, the earliest that drought-related losses would have begun to show up on lenders' books was in the fall, and the scope of drought-related losses would not have become evident until yearend 1988. If the losses had been large, we would have expected to see a surge in loan delinquencies among rural and agricultural lenders in drought-affected areas. And we would have expected to see some local bank failures.

Yet loan delinquencies continued dropping for most farm lenders through 1988, except for the Farmers Home Administration (FmHA). The quality of farm loans held by commercial lenders seems to be rising, approaching the quality seen before the early 1980's farm financial stress. Only 5 agricultural and 11 rural banks failed from January to April 1989, the lowest figures for those months in 5 years. None of the agricultural or rural bank failures were in counties hit hard by the 1988 drought.

Loan problems at FmHA substantially predate the drought and reflect FmHA's mission as farmers' lender of last resort. Delinquencies accounted for about 40 percent of FmHA's farm loans at the end of 1988, in part because it lends to the most risky farmers. Most of FmHA's sour farm loans had been delinquent for more than 3 years. While the drought may have weakened the financial condition of some of FmHA's delinquent borrowers, drought-induced higher prices probably improved the financial condition of many others.

Agricultural commercial banks continued their quick and widespread return to health during 1988, showing their best performance in 5 years, despite the drought. The Farm Credit System (FCS) posted a net income of \$704 million in 1988, after a loss of \$17 million in 1987. While the FCS is still having trouble earning profits on operations, no substantial operating losses were incurred by FCS institutions in areas hit hardest by the drought.

Farmers Expand Plantings, Credit Demand Stabilizes

In the fall of 1988, in response to drought-induced higher prices and USDA's lowered acreage reduction program requirements, winter wheat farmers planted 12 percent more acres than the year before. And in the spring of 1989, farmers planted 29 percent more acres of spring wheat, 8 percent more corn, and 4 percent more soybeans than in 1988.

When farmers expand, they buy more seed, fertilizer, equipment, and land. Farmers can finance an expansion two ways: borrow more or use savings to buy the extra inputs. For late 1988 and 1989, farmers seemed to use more of their savings than new borrowing to expand. That is not because credit is in short supply. It's not. Instead, after having endured the 1980's farm financial crisis, when unmanageable debt burdens pushed farmers out of business, farmers seem more cautious about taking on more debt.

Farmers' demand for credit appears to have stabilized in 1988. Farm debt fell only 3.3 percent, in contrast with the previous 3 years, when debt fell nearly 19 percent. Farm loan volume at commercial banks grew 4 percent in 1988, while FCS loan volume fell 2 percent. FmHA's volume fell 7 percent as the agency wrote off accumulated loan losses and experienced a decline in new lending. Life insurance companies' farm mortgage volume was down for the year in 1988, even though it rose in the last quarter.

Lenders are willing and able to write new farm and rural loans. Agricultural commercial banks' loan-to-deposit ratios, which measure their ability to

meet new loan demands, inched upward in 1988. But surveys indicate that bankers still have far fewer farm loans on their books than they deem optimal. The FCS, helped by Federal financial assistance, is actively seeking new loans.

Commercial Banks in Drought-Stricken Areas are Stronger and Lending More

Rural and agricultural banks in drought-stricken counties posted higher returns on equity, lower

proportions of loans charged-off or delinquent, and generally higher capitalization rates than rural and agricultural banks elsewhere at the end of 1988. Higher capitalization (the owners' stake in the bank, plus money set aside to cover future loan losses as a percent of assets) means the bank is better able to sustain unexpected loan losses.

Less than 6 percent of rural banks in the drought counties are forecast as vulnerable to failure in 1989, compared with nearly 11 percent of rural banks elsewhere (tables 1 and 2). While nearly 7 percent of the agricultural banks in the drought counties are vulnerable to failure, slightly over 13 percent of the agricultural banks elsewhere are vulnerable.

Rural banks in drought counties reported a loan-to-deposit ratio of 59.6 percent, compared with 61.9 percent for rural banks in nondrought counties, and 81 percent nationally. Lower loan-to-deposit ratios signal higher liquidity, and banks with lower ratios can more easily extend new loans.

Loan growth rates are often more indicative of how a bank is serving its community, since deregulation has made banks less dependent on their deposit bases for liquidity. Rural banks in drought counties reported 4.3-percent growth in total loan volume, and nearly 9-percent growth in agricultural loan volume. Total loans grew at about the same rate at rural banks elsewhere, but their agricultural loans grew a bit more slowly.

Agricultural banks (banks with above-average concentrations of farm loans) in the drought-stricken counties reported that their agricultural loans grew by 10.4 percent, compared with 7.9 percent at agricultural banks in nondrought counties. However, total loans grew slightly faster at the agricultural banks outside the drought counties. Nonetheless, the drought did not crimp the flow of credit to rural and agricultural borrowers.

Banks in Northern Plains, Energy Belt Fare Less Well

The performance of agricultural and rural banks in nondrought counties nationwide is weaker partly due to

Table 1—Agricultural banks in Northern Plains drought areas show worst effects of 1988 drought

Drought category ¹	Delinquent loans as percent of total loans	Return on equity	Capital as percent of assets	Net loan losses as percent of total loans
<i>Percent</i>				
Rural banks:²				
Dry	1.68	11.02	9.56	0.46
Not dry	2.04	10.09	9.22	.71
Combined	1.88	10.53	9.36	.60
Agricultural banks:				
Dry	1.91	10.41	9.93	.51
Not dry	2.61	9.09	9.97	.95
Combined	2.25	9.75	9.95	.72
Agricultural banks in Northern Plains States:³				
Dry	2.96	7.44	9.72	1.00
Not dry	2.04	11.49	10.16	.51
Combined	2.79	8.22	9.80	.91
Agricultural banks in Central Lake States:				
Dry	1.05	10.91	9.99	.42
Not dry	1.95	10.50	9.83	.52
Combined	1.75	10.83	9.96	.44
Agricultural banks in Southeast:				
Dry	1.58	11.15	10.18	.51
Not dry	1.57	11.30	9.57	.50
Combined	1.58	11.23	9.88	.50
Agricultural banks in West:				
Dry	3.02	8.16	8.55	.59
Not dry	3.40	6.42	10.32	1.06
Combined	3.17	7.12	9.58	.84

¹ The drought category reflects conditions as of August 6, 1988, the approximate peak of the drought.

² All bank data are for 1988, and are weighted by bank size.

³ Analysis of the 1988 drought called for special regional definitions. See map accompanying this article.

Sources: Palmer drought severity index values used for the drought categories are from the Joint USDA-NOAA Weather Facility. Bank data were computed from the Report of Income and Report of Condition files, Board of Governors of the Federal Reserve System.

Table 2—Generally, no dearth of credit in 1988 drought areas

Drought category ¹	Number of banks	Percent of banks vulnerable	Loans as percent of deposits	Total loan growth	Agricultural loan growth
	<i>Number</i>	<i>Percent</i>			
Rural banks:²					
Dry	3,312	5.53	59.6	4.32	8.98
Not dry	3,793	10.76	61.9	4.40	7.73
Combined	7,105	8.32	60.8	4.37	8.21
Agricultural banks:					
Dry	2,215	6.73	54.3	5.00	10.44
Not dry	2,114	13.10	53.6	6.09	7.85
Combined	4,329	9.84	53.8	5.54	9.22
Agricultural banks in Northern Plains States:					
Dry	314	12.42	51.1	1.78	7.35
Not Dry	66	9.10	48.7	.19	4.74
Combined	380	11.84	49.3	1.49	6.56
Agricultural banks in Central Lake States:					
Dry	1,634	5.07	54.2	6.83	11.48
Not dry	397	2.77	54.9	5.11	12.52
Combined	2,031	4.63	54.1	6.46	11.85
Agricultural banks in Southeast:					
Dry	140	1.43	58.2	-3.79	6.87
Not dry	127	7.09	65.3	6.63	12.50
Combined	267	4.12	61.6	1.35	10.08
Agricultural banks in West:					
Dry	46	32.60	67.2	6.23	9.86
Not dry	104	28.85	59.5	.08	.08
Combined	150	30.00	61.8	2.73	4.10

¹ The drought category reflects conditions as of August 6, 1988, the approximate peak of the drought. See map for regional boundaries.

² All bank data are for 1988 and are weighted by bank size. See box for more data on the vulnerable banks.

Sources: Palmer Drought Severity Index values used for the drought categories are from the Joint USDA-NOAA Weather Facility. Bank data were computed from the Report of Condition and Report of Income files, Board of Governors of the Federal Reserve System.

banks in the energy belt: Texas, Oklahoma, Louisiana, Colorado, and Kansas. These States were spared the worst of the 1988 drought, but their economies have been slow to rebound because of the depressed oil market. Agricultural and rural banks in the energy belt pull down the performance

averages of the nondrought bank group for reasons unrelated to the drought. Nonetheless, when comparing banks in the drought counties with banks elsewhere on a regional level, most regions show the drought group doing about as well as, or better than, the nondrought group.

Agricultural banks in the drought counties of the Northern Plains are somewhat weaker than the region's banks in nondrought counties. Drought county agricultural banks had lower returns on equity, lower capitalization rates, and higher loan delinquency rates than the region's nondrought banks. The region's drought county banks wrote off about 1 percent of their loans as losses in 1988, about double the loss rate of the region's nondrought banks.

Yet the regional weakness did not stop the drought county banks from writing new loans. Loans at agricultural banks in Northern Plains drought counties grew 1.8 percent in 1988, whereas the loan volume at nondrought agricultural banks remained basically flat. Agricultural loans outstanding grew almost 7.4 percent at the region's drought county banks, compared with 4.7 percent at the region's nondrought banks. The same pattern is repeated in most other regions: loan volume at agricultural banks in drought counties grew faster than loan volume at nondrought agricultural banks.

The more rapid loan growth probably reflects some added financial strain experienced by farmers and other rural entrepreneurs in drought areas. With some borrowers feeling a temporary pinch in cash-flow, they probably needed more credit to fulfill their business plans. But this strain is small compared with what some analysts feared as the 1988 drought was unfolding.

There is some other evidence of the drought's stress on banks. Loan repayment rates at agricultural and rural banks in the Chicago and Minneapolis Federal Reserve Districts slowed down in the last quarter of 1988 and the first quarter of 1989. The bankers do not seem overly concerned, however, and most reported that they wanted to increase their farm loan volume.

Farm Credit System and the Drought

The FCS picture is mixed. The bulk of the drought-related farm damage was in the St. Paul, Louisville, and Omaha

About Half of Agricultural Banks in Drought Areas

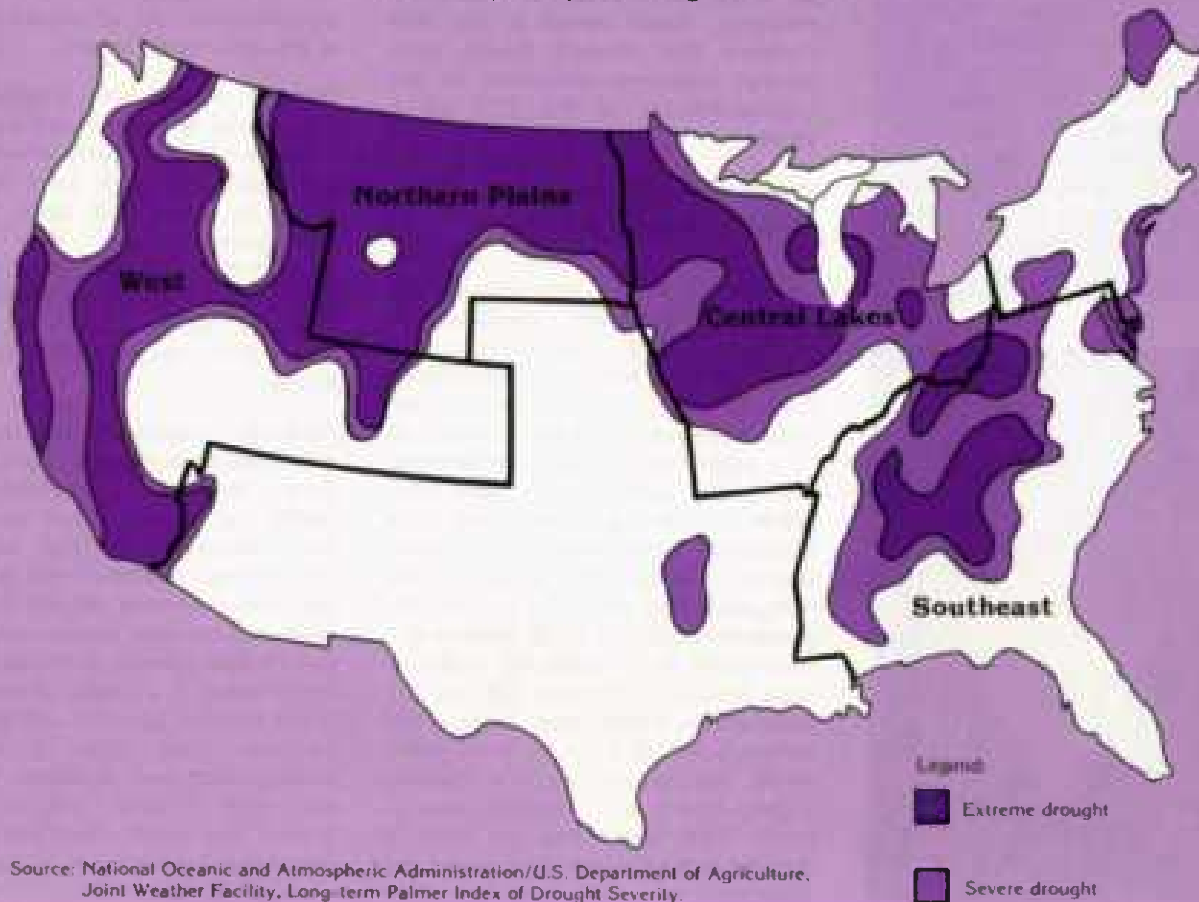
Over 1,300 counties nationwide experienced severe or extreme drought conditions according to the Palmer Index of drought severity on August 6, 1988, the approximate peak of the drought (see map). Forty-five percent of the Nation's 12,742 commercial banks were headquartered in these drought-stricken counties, including about 47 percent of the 7,105 rural banks and about 51 percent of the 4,329 agricultural banks. Agricultural banks are commercial banks with an above-average concentration of farm loans. Most of any drought-related loan losses are occurring in the 3,300 or so rural and 2,200 agricultural banks in the counties that experienced severe or extreme drought conditions. Roughly 1,900 of the agricultural banks in drought counties are headquartered in rural counties.

Farmers can also get loans from the Farm Credit System (FCS), a cooperative owned mostly by its farmer-borrowers. Until recently, the FCS was the largest farm lender. At the end of 1988, the FCS held about \$41.4 billion in farm loans (excluding the Banks for Cooperatives). The FCS now takes second place to the commercial banks, which hold \$45 billion in farm loans. Life insurance companies are also big players in farm real estate lending, holding about \$9.1 billion in farm loans. USDA's Farmers Home Administration (FmHA) is active in farm and rural credit markets, although it has been moving away from direct lending to guaranteeing loans made by private institutions. FmHA held \$25.1 billion in direct farm loans, and \$6.7 billion in direct rural development loans at the end of 1988 (see the June Issue of RDP for an article on FmHA—ed.).

An econometric model that predicts each bank's probability of failure

during a calendar year was used to assess the ability of banks in drought counties to sustain loan losses. A bank is considered vulnerable to failure if it had an above-average forecast probability of failure during 1989. Banks with a high forecast probability of failure cannot sustain large losses, and the losses emanating from the drought could mean failure. Bank failures can disrupt local credit markets. The forecasts of 1989 failure probabilities are based on bank-level financial data reported for mid-1988 and the bank's home-county dependence on the energy sector in 1982. The model's forecasts are accurate: from 1987 through early 1989, about 90 percent of the banks that actually failed were forecast as vulnerable for the year they failed, with the exception of some Texas-based banks that were part of large holding companies. Vulnerable banks that do not fail in a given year are at risk of failure in subsequent years.

The drought's peak: August 6, 1988



Drought Effects Also Felt in 1989

Late summer and early fall rains spelled relief for most farmers, ending the 1988 drought. Farmers in Kansas, Nebraska, Oklahoma, and Texas, buoyed by high wheat prices, expanded their winter wheat plantings by 12 percent that fall. But the winter crop was severely damaged as the drought returned in the fall, and extreme temperatures, winds, hail, insects, and disease stunted growth through the spring. When the crop was harvested in the summer of 1989, output was down 20 percent from the year before. This raises concerns about how much credit will be available to these farmers.

Financial institutions in Kansas, Oklahoma, and Texas have suffered from the double-whammy of the farm financial crisis and the oil-related depression in the Southwest. Yet the winter wheat crop harvested in 1988 was largely spared that drought, and the winter wheat farmers sold their 1988 crop at drought-induced high prices. To further cushion the farmers, Congress approved \$897 million in disaster assistance for farmers suffering crop losses in 1989. These two factors should alleviate any credit crunch and help the farmers move on to a more prosperous year in 1990.



Photo © Quent-Hellman

FCS Districts. Performing loans, those without late payments or collateral problems, shrank in volume at FCS institutions in the Omaha District by 2.6 percent in 1988, were about flat in the St. Paul District, and grew 11.3 percent in the Louisville District. Performing loans of the entire FCS shrank by 0.7 percent. The differences in loan growth rates may reflect differential competitive pressures from local commercial banks more than drought-related pressures.

The three districts above were also among the hardest hit by the farm financial stress of 1983-86. FCS institutions in the three districts have received federally guaranteed financial assistance to help rebuild their capital bases. No surge in loan delinquencies is evident in any of the three districts, and FCS officials say they expect no major drought-related loan losses. Should such losses emerge, institutions in each of the three districts may apply for more federally guaranteed support, and can reasonably expect such support to be forthcoming. So it is unlikely that drought-related loan losses could force an FCS bank out of business. Moreover, there seems to be little evidence that drought losses have lowered investors' evaluation of the creditworthiness of the FCS as a whole.

Federal Programs Helped Mitigate Drought's Effects

Questions arise concerning the adequacy of credit available to marginal farm borrowers with drought-related losses. Farmers Home Administration is well-suited to serve these borrowers, since its mission is to be a lender of last resort for farmers. FmHA was authorized to issue \$2.6 billion in loan guarantees for farm operating loans written by other lenders in fiscal 1989, but as of June had guaranteed only \$762 million. The guarantees cover up to 90 percent of a loan made by a qualifying lender in case the farm borrower defaults. By comparison, FmHA guaranteed \$893 million worth of loans in fiscal 1988. While the guarantees are running slightly higher on a monthly basis in fiscal 1989, there has not been a drought-related surge in demand for guarantees.

Many other subsidized loan programs were available to farmers and rural businesses hit by the 1988 drought. FmHA's emergency disaster loans, lending provisions of the 1988 Disaster Assistance Act, and the Small Business Administration's economic injury loans helped farmers and rural businesses survive the drought. Indirect credit programs, including the federally guaranteed assistance to the FCS, also have helped to keep stressed farm and rural lenders serving their communities in the face of unexpected losses.

Drought Issues

Weather is a major uncontrollable factor in farming. Droughts have occurred fairly frequently in many crop-producing regions of the United States. With that in mind, farmers can take some steps themselves to get through a drought, without having to hope for a Federal rescue.

Sound farm management and lending policies will build in a cushion should farmers or rural borrowers lose most of their output to drought. Irrigation, sound dryland practices, and crop diversification can all reduce the size of drought-related losses.

Drought losses also highlight the importance of using credit prudently. Farmers who are barely able to meet loan payments in a good year are likely to lose their farm through foreclosure when they suffer weather-related losses. Most analysts recommend that farmers should keep their debt below 40 percent of their assets to maintain a reasonable safety margin.

Federally subsidized crop insurance, administered through USDA's Federal Crop Insurance Corporation, in addition to prudent credit use, saved many farmers from ruin last year. Nonetheless, analysts have suggested that many farmers do not buy crop insurance because the farmers believe that Federal disaster assistance will be forthcoming if a major drought hits. Some farmers, however, are put out of business every year by localized weather and pest problems that did not elicit Federal support. Many lenders now require farm borrowers to buy crop insurance to reduce their exposure to risk.

FOP