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THE EFFECTIVENESS OF GOVERNMENT POLICIES TO ALLEVIATE AGRICULTURAL DISTRESS: A CASE STUDY OF THE 1930's

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Abstract

Farm failures rates in the U.S. reached historic heights in the inter-war years. We estimate the dynamic relationship between farm earnings and farm failures and assess the effectiveness of government intervention - state farm foreclosure moratoria, an expanded federal role in farm mortgage lending, and the programs instituted under the Agricultural Adjustment Administration. Our empirical results indicate that the influence of past earnings on farm failures is important and complex. Our counterfactual estimates of a world without government programs suggest that government intervention saved about two hundred thousand farms from failure.

Farm failure rates have risen dramatically since 1980. Concern over this "farm crisis" is widespread: discussions of financial woes and impending failures can be found on a regular basis in local and national newspapers; major television networks run specials analyzing the problem; Newsweek recently ran a cover story on the farm crisis; the plight of farmers is depicted in Hollywood productions; a Farm Aid concert attracted national attention, and so forth.

The three primary farm relief programs now under consideration are either extensions of Great Depression programs that have survived to the present or reincarnations of temporary programs implemented during the 1930s. The Farm Credit System, a major vehicle for alleviating farm distress during the Great Depression and currently the leading agricultural lender, incurred losses of $2.7 billion in 1985.[1] Bailout legislation passed by Congress in December 1985 grants this system access to funds from the U.S. Treasury on the condition it run its affairs in a tougher, more businesslike manner. Yet losses in the first quarter of 1986 were $206 million, almost 20% of the system's loans are delinquent, the system is losing many of its best customers to competitors, and a number of lawmakers are now demanding more leniency for farmers in trouble.[2]

A plethora of commodity programs whose roots date back to the Great Depression are currently in effect. Although direct annual federal outlays for these programs averaged $11.8 billion between 1982 and 1984 (USDA, 1985, p. 31), they have had little success in bringing about a sustained increase in the welfare of U.S. farmers. Few changes have been instituted, however, under the

[1] See "Farm Lender Posts '85 Loss of $2.7 Billion," The Wall Street Journal, February 19, 1986.

[2] See "Farm Lender Reports $206 Million Loss, Increase in Problem Loans for First Period," The Wall Street Journal, May 7, 1986 and "Farm Credit System, Under Orders to Get Tough, Is Hampered by Lawmakers' Pleas for Leniency," The Wall Street Journal, May 29, 1986.

1985 Farm Bill, and interest groups currently are lobbying to further expand benefit programs.

Between 1933 and 1935, twenty-five states legislated temporary moratoria on farm foreclosures. Echoing that legislation, the governor of Iowa recently imposed a moratorium and a number of other farm states are contemplating similar action.

Although case studies of the impact of government programs on particular industries are common, no empirical analysis has been conducted of the likely effects of the preceding government programs on farm failure rates. This, in part, is because the data required to conduct such a study of the current period of distress have not been collected at any aggregate levels since the early 1980s. The present, however, is not the first time that agriculture has suffered unusually high failure rates. During the 1920s and 1930s farms failed at rates that have not since been approached. Moreover, the interwar period witnessed the first extensive intervention into agricultural commodity and mortgage markets. Examination of the effects of government programs during this period will provide information valuable for assessing the effectiveness of policies currently under consideration.

Reported below are estimates of the effects on farm failure rates during the 1930s of (1) the commodity programs of the Agricultural Adjustment Administration, (2) the expanded role of the federal government in the agricultural credit market, and (3) moratorium legislation passed by twenty-five states in the early 1930s. These estimates indicate that each of the programs was important in reducing farm failures and that in total they saved between 146,000 and 278,000 farms from failing.

I. Farm Failures during the Interwar Period

The period between the World Wars witnessed one of the most marked booms in land values and two of the most severe agricultural depressions of this century. Table 1 shows how U.S. farm failure rates and several related variables changed during the period 1913-1939.[3] From 1913 to 1920 the annual rate of farm failure was about three per thousand. It rose to over 18 in the late 1920s, skyrocketed to almost 39 in 1932, and then fell below 13 by 1940.[4]

Columns (2)-(4) in Table 1 indicate that between 1914 and 1920 commodity prices and net farm incomes more than doubled. Rapidly rising land values and mortgage debt suggest that many farmers and creditors expected the high net income levels to continue.[5] Partly because of an unexpectedly rapid recovery by European agriculture, demand for U.S. agricultural commodities fell, and farm prices and incomes plummeted during 1920 and 1921. Concurrent decreases in production costs only partially offset the fall in prices received.[6] Although prices and incomes stablized and increased somewhat after 1921, they did not again approach the high levels of the immediate postwar years during the 1920s.

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[3]Throughout this paper, the term "farm failures" denotes legal foreclosures, loss of farm as a result of bankruptcy, loss of title by default of contract, sales to avoid foreclosures, and surrender of title or other transfers to avoid foreclosure.

[4]The average failure rate since 1940 has been: 1941-1950, 3.2; 1951-1960, 1.7; 1961-1970, 1.3; 1971-1980, 1.3. See Alston (1983) for the sources of these figures.

[5]See Johnson (pp. 178 and 181) for sources of contemporary comments supporting the mistaken view that high prices and income levels would continue.

[6]Although net farm earnings depend on yields as well as commodity and input prices, the substantial declines in agricultural earnings during the interwar period resulted mainly from falling commodity prices (Jones and Durand).

The relative stability of commodity prices and farm incomes from 1923 to 1929 was upset during the early 1930s. By 1932, prices and farm incomes had fallen to less than half their levels in 1929. Recovery came slowly after 1932. Even with the aid of a variety of government programs designed to boost prices and incomes, net farm income in the second half of the 1930s remained below its level of the late 1920s.

Federal and State Action to Alleviate Farm Distress

Federal and state governments acted in three major ways to reduce farm failures during the interwar period: 1) the Agricultural Adjustment Administration attempted to stabilize prices and increase earnings; 2) federal credit agencies increased their lending; and 3) many states imposed moratoria on farm foreclosures.

The Agricultural Adjustment Administration (AAA) was established under the Agricultural Adjustment Act of 1933.[7] AAA policymakers focused initially on increasing farm incomes through programs that induced farmers to reduce output. It was hoped that reductions in supply combined with direct government payments for acreage reductions would accomplish this goal.

How successful was the AAA in meeting its goals? Although incomes rose after 1933, they did not reach their 1929 level during the 1930s. Nevertheless, to the extent that the AAA increased earnings relative to what they otherwise would have been, it played a positive role in alleviating farm distress -- at least in the short run. Nourse, Davis and Black (p. 323) estimated that for the first three years of the AAA, the commodity programs

[7] A thorough historical treatment of the Agricultural Adjustment Act of 1933 and its successor, the Soil Conservation and Domestic Allotment Act of 1936, appears in Saloutos.

increased farmers' incomes by $1.35 to 1.8 billion. Benedict and Stine assessed the impact on gross cash farm income attributable to various AAA commodity programs and found that substantial increases in incomes resulted from the cotton and tobacco programs, that the corn and livestock programs were moderately effective, and that the effects of the wheat program were negligible.[8]

During the interwar period, the federal government became involved directly in farm mortgage markets.[9] In 1916 Congress passed the Federal Farm Loan Act, which created the federal land banks. The relative importance of these banks in agricultural credit markets increased throughout the interwar years. In the early 1920s when many small private creditors experienced financial difficulties and again in 1933, they markedly increased their lending. The initially stated purpose of federal land banks was to make credit available to regions not served by many lenders. Consistent with this goal federal land banks concentrated their activities in the southern, western and mountain states.

With the advent of the Roosevelt administration, the federal credit agencies were reorganized under the Farm Credit Administration and became the principal vehicle for alleviating farm credit problems. A stated objective of these agencies was to increase their involvement the most in those states suffering the most severe farm distress. With funding from the U.S. Treasury, the federal land banks and Land Bank Commissioner -- the latter established to lend to farmers in severe financial distress -- increased their combined

[8]Benedict and Stine (pp. xxiv, xxix, 16 and 109).

[9]The most comprehensive review of farm mortgage markets for the interwar period is contained in USDA, Horton et al. (1942).

holdings of farm mortgage debt from 13 percent of the total in 1933 to 37 percent in 1940.[10]

How effective do we think the federal lending agencies were in alleviating distress? Although federal land banks did not explicitly try to reduce farm failures in the 1920s, they may indirectly have reduced failure rates by writing mortgages with longer payback periods than those of other lenders. After 1933, the Farm Credit Administration acted more directly by refinancing private loans, reducing the principal on some mortgages, decreasing contract interest rates retroactively, and refraining from foreclosing as long as possible.

In addition to the efforts of the federal government, twenty-five state legislatures acted to stem the tide of failures by instituting moratoria on farm foreclosures. These laws increased creditors' costs of foreclosing, thereby allowing many delinquent debtors to retain title to mortgaged land for predetermined or court-determined periods. The allowable reprieve to debtors varied considerably across states, ranging from three months to almost four years.[11]

Although scholars have examined the legal importance and some of the economic consequences on private credit markets of the state moratoria,[12] the extent to which the moratoria achieved their goals of preventing failures has not been determined. Legislators hoped that earnings would rise sufficiently

[10]Calculated from USDA, Horton et al.(1942, p. 222).

[11]U.S. Congress, Central Housing Committee (1936, Appendix No. I).

[12]For a recent assessment of the legal importance of the state moratoria, see Epstein. For an analysis of the impact of the moratoria on interest rates in private mortgage loans and on the number of private mortgage loans, see Alston (1984).

over the moratorium period to enable debtors to make past-due mortgage payments and avert foreclosure. In some instances the legislation was superfluous because many creditors were already being extremely lenient.[13] In addition, the legislation did not prevent bankrupticies or voluntary foreclosures in which the debtor surrendered the mortgaged land to the creditor without going through a formal foreclosure procedure. A farmer might have opted for one of these actions if he did not expect future income to increase sufficiently to meet his debt obligations. Perhaps, also, state moratoria simply postponed the day of reckoning. Upon expiration of the moratorium, if earnings had not risen sufficiently, creditors would foreclose loans they otherwise would have foreclosed earlier.

II. A Model of Farm Failure Frequency

During any period, the viability of a mortgage contract depends on the borrower's and lender's perceptions of the discounted expected net benefits of terminating the contract. If payments on a particular loan are delinquent, the lender must decide whether to grant an extension or to foreclose. If he forecloses, he benefits by replacing the current delinquent loan with new loans, thereby improving the status of his loan portfolio. The magnitude of these benefits depends on differences in the expected abilities to pay of current and prospective new borrowers, differences in interest rates on old and new loans, and the improvement in protection of the lender's principal. These gains must be weighed against the costs of initiating foreclosure proceedings,

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[13] Woodruff argues that this was the case for large insurance companies and the federal land banks.

reappraising land values, conducting an auction, and rearranging his loan portfolio.[14]

In addition to these direct benefits and costs, foreclosures also affect the lender's reputational capital. Extensive foreclosures by a particular lender, especially during periods when many debtors are suffering because of events "beyond their control," may significantly diminish his goodwill capital. On the other hand, foreclosing on a delinquent debtor lets others know that delinquency will not be tolerated, thereby reducing the lender's monitoring costs.

For a given lender, differences in the circumstances of individual borrowers give rise to differences across loans in the benefits and costs of foreclosing. Let F_i be the difference between the discounted expected benefits and costs of foreclosing on loan i. If F_i is positive, the lender forecloses, otherwise he grants an extension. Therefore, the frequency of foreclosure is

$$F_F = [\int_0^{F_{max}} g(f)\,df][PD],$$

where $\int_0^{F_{max}} g(f)\,df$ is the proportion of delinquent loans on which the lender forecloses and PD is the proportion of all loans that is delinquent.

Factors altering this frequency include changes in expected farm earnings (across all borrowers), government programs, and nominal interest rates. A general increase in expected earnings or the initiation of a new farm-

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[14] An important determinant of the magnitude of some of these costs may be the expected social reaction to foreclosures - several accounts can be found of penny auctions, beatings and near lynchings during the 1930s. Today we observe tractorcades, farm aid concerts and again, ill will and violence toward creditors. See, for example, "Troubled Lenders: Many Rural Bankers Face Intensive Pressure in Farm-Credit Crunch," The Wall Street Journal, April 4, 1986.

subsidizing government program shifts the distribution of F_i's to the left, thereby decreasing the frequency of foreclosure. An increase in interest rates raises the opportunity costs of funds tied up in delinqent loans, hence increasing the benefits of foreclosing and the frequency of foreclosures.

A loan agreement may also be terminated if the borrower files for bankruptcy. A declaration of bankruptcy results in costs of court proceedings, moving one's family, and diminished credit ratings, while benefits arise from escaping an onerous obligation. Let B_i be the discounted expected net gains to borrower i from declaring bankruptcy. On those loans with $B_i > 0$, borrowers will file for bankrupty. The frequency of bankruptcy is therefore,

$$F_B = \int_0^{B_{max}} h(b)\,db.$$

This frequency varies with changes in expected earnings, government policies, and interest rates. It may differ from the frequsncy of foreclosure because of differences between lenders and borrowers in expectations of future earnings, and because of differences in the costs and benefits to lenders and borrowers of foreclosure and bankruptcy.

Farm failure resulting from early termination of mortgage agreements can arise from either foreclosures or bankruptcies. The frequency of failure is the frequency of foreclosure plus the frequency of bankruptcy minus the proportion of loans on which borrowers wish to declare bankruptcy and lenders wish to foreclose.

The farm failure process is dynamic for at least three reasons. First, earnings affect savings, which in turn influence borrowers' future abilities to meet mortgage payments. Second, even if current earnings and assets are not sufficient to allow a borrower to make his present mortgage payments, both

parties may choose to extend the contract (rather than foreclosing or declaring bankruptcy) if they expect future income to be sufficient to meet past-due and future mortgage payments. The desire of lenders to protect their reputational capital suggests a third source of dynamics. During economic downturns, lenders' abilities to delay foreclosures (and protect the value of their goodwill capital) depend on their access to capital markets and on the flow of mortgage payments in previous periods.

Both the complexity of the dynamics of the farm failure process and additional reasons for expecting earnings to affect farm failures with a lag are suggested by the following observation on farm distress during the interwar years:

> There was a very irregular lag between the time a farmer first felt the impact of falling incomes against relatively unchanged costs and the time the farm appeared in the foreclosure statistics. This lag was occasioned by a variety of factors. In the first place, the companies avoided foreclosure wherever possible and extended leniency to deserving owner-operators until about two years' unpaid interest had accumulated. Second, the foreclosure proceedings took some time. Third, periods of redemption lasted from a few weeks to several years under the new moratorium laws. These had to run out before the life company obtained a good title. Fourth, there was some difference between companies and between years as to the method of reporting foreclosed farms held subject to redemption (Woodruff, pp. 64-66).

III. Empirical Specification and Results

Specification

Our empirical analysis focuses on the effects of government relief programs on failure rates and on the dynamic relationship between failure rates and earnings. The directions of causation between government programs and farm failures are not one way. While federal credit programs and state legislated moratoria may have affected the incidence of farm failures, they were also political responses to high levels of farm distress. To correct for the

simultaneity problems that result from this joint dependence between failure rates, the activities of federal credit agencies, and state relief legislation, we estimate the following three equation system,

$$(1)\quad FAIL_{it} = \alpha_0 + \sum_{j=0}^{J} \Omega_j\, EARN_{it-j} + \sum_{k=1}^{K} \Theta_k\, EARN01\ldots k_{it} + \alpha_1\, \%FEDDEBT_{it} + \alpha_2\, MOR_{it} + \alpha_3\, POSTMOR_{it} + \alpha_4\, \%FM30_i + \alpha_5\, \%URB30_i + \alpha_6\, (LV20/LV12)_i + \alpha_7\, VAREARN_i + \alpha_8\, (DEBT/VALUE)_{it} + \alpha_9\, INTRATE_t + \alpha_{10}\, PPAID_t + \alpha_{11}\, UNEMP_t + u_{it}$$

$$(2)\quad \%FEDDEBT_{it} = \beta_0 + \beta_1\, FAIL_{it} + \beta_2\, FDRDUM_t + \beta_3\, (FDRDUM_t)(FAIL_{it}) + v_{it}$$

$$(3)\quad MOR_{it} = \phi_0 + \phi_1\, FAIL_{it} + \phi_2\, \%FM30_i + \phi_3\, \%FEDDEBT_{it} + \phi_4\, \%AGINCOME_{it} + \epsilon_{it}$$

To estimate this system we use pooled time series-cross sectional data from the 48 contiguous states for the period 1925-1939. Descriptive statistics and definitions of variables, as well as their sources, are presented in Table 2.

In equation 1, the dependent variable is $FAIL_{it}$, the annual rate of farm failure (per thousand farms) in state i during year t. Aggregate farm income varies across states with the absolute size and relative importance of the agricultural sectors. For example, farm income in California is much greater than farm income in New Jersey. We adjust for such interstate differences by using farm earnings in state i during year t as a percentage of farm earnings in that state in a base period (1924-1925) as our empirical proxy for earnings ($EARN_{it}$).[15]

In the preceding section we provided three reasons why past values of earnings might affect failure rates. Because the dynamics of the farm failure process originate from all of these sources, as well as from those described by

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[15] Because mortgage payments were fixed in nominal terms, we use nominal (rather than real) farm earnings in our empirical analysis.

Woodruff, we do not specify the form of the lag structure on earnings a priori. Instead, we estimate a free-form lag structure in which lagged earnings enter both directly ($EARN_{i,t-k}$) and through interactive terms ($EARNO1_{i,t} = EARN_{i,t} \times EARN_{i,t-1}$, $EARNO12_{i,t} = EARN_{i,t} \times EARN_{i,t-1} \times EARN_{i,t-2}$, etc.). The interactive terms are included because we expect the influence of a change in earnings in a particular year on farm failures in that year and future years to depend on the levels of earnings in neighboring years.

Insofar as the AAA programs achieved their objectives, their effects are captured indirectly by our earnings variable, which includes both cash receipts from farm marketings and government payments. In light of our discussion in Section I, we expect increased involvement in credit markets by federal credit agencies to decrease farm failure rates. The variable included in equation 1 to test for this effect is the percentage of outstanding mortgage debt held by federal credit agencies in state i during year t ($\%FEDDEBT_{i,t}$).

The effects on farm failures of state legislated moratoria on mortgage foreclosures are measured with a dummy variable ($MOR_{i,t}$). If the moratoria simply delayed rather than prevented the failure of some farms, then an increase in farm failures would have followed the expiration of the legislation. To test for this possibility, another dummy variable ($POSTMOR_{i,t}$) is included.

In addition to earnings and government programs, a number of other factors might be expected to influence farm failure rates. Alston (1983) suggests several possible sources of cross-sectional differences, three of which we include as explanatory variables in equation 1. First, we include a variable ($\%FM30_i$) to net out the effects of differences in the prevalence of farm mortgage debt across states. Because a farmer could not be foreclosed without

a mortgage, the greater the percentage of farms mortgaged in a state (ceteris paribus), the higher the rate of farm failure.

Second, previous researchers have suggested that proximity to urban areas provided opportunities to earn off-farm income during periods of depressed farm incomes.[16] In addition, agricultural output prices and land values may have been less volatile in rural areas near urban centers.[17] The variable included to measure these effects is the percentage of each state's population that was urban in 1930 ($\%URB30_i$). We expect that, for a given level of farm earnings, failure rates are lower in more urban states.

During the boom period following WWI, land prices were bid up and mortgage debt was increased by varying amounts in different states. Johnson has suggested that overly optimistic expectations following World War I may have led to "excessive expansion" and increased failure rates later. We include the ratio of land values in 1920 to land values in 1912 ($LV20/LV12_i$) to control for this effect. If Johnson's hypothesis is correct (and if the effects had not been exhausted by the period of our sample), the coefficient on this variable is positive.

A fourth cross-sectional variable ($VAREARN_i$) is included to measure the effects of differences in earnings variation across states. If farm failures result in part because earnings fall below a threshold level, then for any given level of expected earnings, more farms will fall below the threshold the greater the variance in earnings.

$DEBT/VALUE_{it}$, which measures the ratio of farm mortgage debt to agricultural land values in state i during year t, provides an additional

[16] Jones and Durand (pp. 110-112 and 126).

[17] Alston (1983, p. 891).

control for the effects of differences in indebtedness across states. Whereas the percentage of farms mortgaged in each state ($\%FM30_i$) can be viewed as capturing the prevalence of debt, the ratio of mortgage debt to land value is a measure of the financial leverage of debtors. As such, it is expected to have a positive estimated coefficient.

We also include three time series variables to control for additional temporal factors influencing failure rates. $INTRATE_t$, the rate on prime commercial paper in New York, is our measure of interest rates. An increase in interest rates increases the opportunity costs to lenders of granting extensions, thereby increasing failure rates.

The earnings variable used in our empirical analysis is a measure of gross earnings. To estimate the effects of earnings on failure rates, holding costs of production constant, we include a variable ($PPAID_t$) to control for the effects of changes in production costs. The index of production costs is based on national data, so although it varies across years, it is constant across all 48 states in a given year.

Finally, we have included the aggregate annual U. S. unemployment rate ($UNEMP_t$) as a temporal proxy for off-farm earnings. If opportunities for off-farm income become more scarce as the unemployment rate increases, the coefficient on this variable is positive.

Because our motivation for estimating the second and third equations is only to control for bias in the first equation, we shall be brief in discussing their specifications. Explanatory variables for $\%FEDDEBT_{i,t}$ in the second equation include the farm failure rate ($FAIL_{i,t}$), a "Roosevelt dummy variable" ($FDRDUM_t$), and an interactive term between $FAIL_{i,t}$ and $FDRDUM_t$. If the government fulfilled its stated objective of making more loans in distressed areas,

the coefficient on $FAIL_{i,t}$ is positive. The Roosevelt dummy captures changes in policy beginning in 1933. Because the Roosevelt administration greatly expanded the farm loan operations of the federal government, we expect a positive coefficient on $FDRDUM_t$. If the federal loan programs were more responsive to farm distress after 1932, the coefficient on the interactive term between $FAIL_{i,t}$ and $FDRDUM_t$ is positive.

The third equation, whose dependent variable is $MOR_{i,t}$ (a zero-one dummy variable), is estimated as a logistic regression equation. Its specification follows that of Alston (1984). Explanatory variables include the farm failure rate ($FAIL_{i,t}$), the percentage of the state's farms mortgaged in 1930 ($\%FM30_i$), the proportion of mortgage debt held by federal credit agencies ($\%FEDDEBT_{i,t}$), and the proportion of total state income from agriculture ($\%AGINCOME_{i,t}$). If a higher rate of farm failure increases political pressure for a moratorium, the coefficient on $FAIL_{i,t}$ is positive. The greater the percentage of farms mortgaged, the larger is the number of farms at risk to be foreclosed and the greater is the political support for a moratorium; hence, a positive coefficient on $\%FM30_i$. The greater the percentage of agricultural income in a state, the less is the political resistance to, and the greater is the support for, a moratorium; hence, a positive coefficient on $\%AGINCOME_{i,t}$. If the federal land banks were more lenient than other creditors, then there was less pressure for a moratorium the greater was the percentage of mortgage debt held by those banks; hence, a negative coefficient on $\%FEDDEBT_{i,t}$.

Results

Table 3 displays the coefficient estimates and summary statistics from our dynamic specification of the farm failure equation. The variables entering in a dynamic fashion are the earnings variables ($EARN_{i,t}$, $EARN_{i,t-1}$, . . .

$EARN_{i,t-4}$) and the multiplicative earnings terms ($EARNO1_{i,t}$, $EARNO12_{i,t}$, . . . $EARNO1234_{i,t}$). The high-order lag on the earnings variable and the general significance of the multiplicative terms support our prior expectations that earnings influence failure rates in a complex fashion.[18]

The coefficient estimates from this model suggest that the long-run effect on failure rates of a one-unit increase in EARN (evaluated at the sample mean of EARN) is to reduce annual failure rates by 0.335 per thousand farms.[19] A one standard deviation increase in EARN (from its mean) thus reduces the annual failure rate by 7.35 per thousand farms, a reduction of about 38 percent of the mean level of failure rates during this period. Similarly, the short run (contemporaneous) effect of a one-unit increase in EARN is to reduce failure rates by 0.148 per thousand farms.[20] These figures suggest that the effects on failure rates of changes in earnings are economically as well as statistically significant and that a substantial proportion of these effects is not felt within the first period.

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[18]These results differ substantially from those of Shepard and Collins. They estimated their model using farm bankruptcy data aggregated at the national level and found that (1) for the interwar period, their proxy for income did not significantly affect bankruptcy rates and (2) "the explanatory power of the equations was not significantly enhanced by further inclusion of lagged variables" (p. 612).

[19]We obtain this estimate in the following manner. Let E^* and F^* be the initial equilibrium levels of EARN and FAIL. Then $F^* = [-.378 - .259 + .196 - .006 - .242]E^* + .005(E^*)^2 - (2.7E\text{-}5)(E^*)^3 - (7.0E\text{-}8)(E^*)^4 + (1.1E\text{-}9)(E^*)^5 + X\alpha$, and $\partial F^*/\partial E^* = -.689 + .01E^* - (8.1E\text{-}5)(E^*)^2 - (2.8E\text{-}7)(E^*)^3 + (5.5E\text{-}9)(E^*)^4 = .335$ for $E^* = 76.41$.

[20]We obtain this estimate in the following manner. Let $E_{i,t-k} = EARN_{i,t-k}$. From equation 1 in Section III and the coefficient estimates in Table 3, $\partial FAIL_{i,t}/\partial E_{i,t} = -.378 + .005E_{i,t-1} - (2.7E\text{-}5)(E_{i,t-1})(E_{i,t-2}) - (7.0E\text{-}8)(E_{i,t-1})(E_{i,t-2})(E_{i,t-3}) + (1.1E\text{-}9)(E_{i,t-1})(E_{i,t-2})(E_{i,t-3})(E_{i,t-4}) = .148$ for $E_{i,t-k} = 76.41$.

Three conclusions can be drawn concerning the effects of the different government relief programs. First, to the extent that the AAA affected earnings, the negative estimated coefficients of the earnings variables suggest that (at least initially) the programs were successful.[21] Second, the negative and significant estimated coefficient on $\%FEDDEBT_{it}$ is consistent with the hypothesis that the efforts of the federal credit agencies resulted in reduced farm failure rates. Finally, the significance of the estimated coefficient of MOR_{it} suggests that the foreclosure moratoria legislated by roughly half the states during the 1930s had the intended effect on farm failure rates.

The suggestion that state relief legislation simply delayed foreclosures until the moratoria expired is not supported by our results. The negative and statistically significant coefficient of $POSTMOR_{it}$ supports the hypothesis that the beneficial effects of moratoria extended past their expiration dates.

Of the four variables included to control for cross-sectional variation, the estimated coefficients on $\%URB30_i$ and $LV20/LV12_i$ are statistically significant. Of the three variables included to control for temporal variation, only the coefficient of $UNEMP_t$ is significantly different from zero.

The estimated coefficient of the time series-cross sectional variable $DEBT/VALUE_{it}$ included to control for the effects of differences in financial leverage, is positive and significantly different from zero. If the value of future earnings is fully capitalized into the price of land, measurement of the effects of contemporaneous and past earnings on failure rates may be confounded by including a variable ($DEBT/VALUE_{it}$) having an index of land values in its

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[21] In this study we have not tested for the possibility that in the long run (after the value of program payments was capitalized into land values) the programs did not have any effect on farm failure rates. Future research using data extending over a longer time period will address this issue.

denominator. Deletion of DEBT/VALUE$_{it}$ from the regression specification, however, has no effect on the estimated coefficients and standard errors of the other explanatory variables.

To investigate the influences of lagged earnings in our model, we add an index of land values (that varies across states and years) to the farm failure equation. The estimated coefficient on this variable is insignificant (asymptotic t-ratio = .44) and its introduction does not affect the estimated coefficients or standard errors of the other variables. One interpretation of this result is as follows. If the lagged earnings variables are acting primarily as proxies for expected future earnings, they should be highly correlated with land values. The introduction of land values as an explanatory variable would then be expected to result in increased standard errors and reduced t-ratios for the earnings variables. That this does not happen suggests that the lagged earnings variables in our model are measuring the effects on failure rates of changes in such factors as personal savings and the status of lender portfolios.[22]

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[22] The estimated coefficients and asymptotic t-ratios for the second and third equations of our simultaneous system are

$$\underset{}{\%FEDDEBT} = \underset{(1.7)}{4.26} + \underset{(4.1)}{.42FAIL} + \underset{(11.2)}{39.3FDRDUM} - \underset{(-5.9)}{.94FDRDUM*FAIL}$$

$$\underset{}{MOR} = \underset{(-5.4)}{-3.9} + \underset{(2.6)}{.03FAIL} + \underset{(2.4)}{.03\%FM30} + \underset{(1.3)}{.01\%FEDDEBT} - \underset{(-1.9)}{3.3\%AGINCOME}$$

In the second equation, the coefficient on FDRDUM has the predicted sign and is statistically significant. The positive and significant coefficient on FAIL suggests that federal credit agencies played a relatively larger role in areas (or times) of higher distress, even before Roosevelt initiated changes. The negative and significant coefficient on the interactive term between FAIL and FDRDUM is counter to our expectations. In the third equation, FAIL and %FM30 both have the expected signs and are significant at an α level of .05. The estimated coefficients of both %FEDDEBT and %AGINCOME have the wrong signs and marginally significant t-values. Although these equations are formulated and estimated to correct for simultaneity bias in the first equation, the "incorrect" signs raise interesting questions for future research.

IV. The Effects of Government Relief Programs

The regression coefficients in Table 3 can be used in combination with other contemporary information to estimate the magnitude of the effects of the government relief programs. These programs prevented low income farmers from failing by offering attractive mortgages, restricting the rights of lenders to foreclose, and increasing incomes.

Table 4 shows the preventative effects of the expanded role of federal credit agencies. We calculate these effects by first multiplying the change in %FEDDEBT for each year by the coefficient from our regression results (-.488). The resulting change in FAIL (column 4), is per thousand farms. Consequently, we multiply column 4 by column 5 and divide by 1000 to arrive at the number of farm failures prevented. For example, between 1934 and 1935 the federal government increased their percentage of the mortgage debt by 15.9 percentage points. According to our estimates in Table 4, this induced a decline in failure rates of 15.9(.488) = 7.759 per thousand farms and prevented 7.759(6,096,094)/1000 = 47,300 farms from failing.[23]

Whereas a mortgage issued by a federal credit agency provided relief to the same farmer year after year, a given flow of relief from state moratorium legislation and from AAA programs may have prevented different farms from failing in different years. Two extreme assumptions concerning the distributional effects of a given flow of relief from these programs are (1)

[23]In this calculation we assume that the mortgage loans issued by federal credit agencies during the period 1933-1939 did not terminate until after 1939. The small reduction in %FEDDEBT in 1939 indicates that this assumption is not exactly accurate. Because federal credit agencies went to considerable lengths to avoid foreclosures, however, the assumption of no turnover in their mortgage loans from 1933 to 1939 does approximate reality. See USDA, Horton et al. (1942, pp. 102-104 and 121-122) for figures indicating that annual turnover from failure averaged only 2.2 percent on federal land bank loans between 1933 and 1939, and 1.9 percent on Land Bank Commissioner loans between 1934 and 1939.

that they prevented the same farms from failing year after year, and (2) that they prevented a completely different set of farms from failing each year. If individual farmers' relative earnings positions did not change over time so farmers with relatively low earnings one year also had relatively low earnings in other years, the first assumption is appropriate. If relative earnings positions changed greatly so farmers with relatively low earnings one year had relatively high earnings in other years, then the second assumption is appropriate. We estimate the number of farms saved by state legislated moratoria and AAA programs under both of these assumptions to provide upper and lower bounds on the magnitude of their influence. These estimates appear in Tables 5 and 6.

Table 5a provides minimum estimates of the effects of state moratorium legislation, corresponding to the assumption that these moratoria saved the same farms year after year. Table 5b provides maximum estimates of the effects of moratoria, corresponding to the assumption that different farms were saved each year. Compare, for example, the estimated effects of moratoria in 1934. In Table 5a the only new failures prevented are in those four states with newly instituted moratoria. In the other seventeen states with moratoria in effect, the same 28,630 farms were saved (by assumption) in 1934 as in 1933. In Table 5b, farm failures are prevented in the four states with new moratoria, as well as in the other seventeen states with moratoria in effect since 1933. In the latter states, a different set of farms were (by assumption) saved in 1934 than in 1933. The resulting lower and upper bounds on the estimated total number of farms saved from failing by moratoria are 40,946 and 119,784.

Table 6 provides estimates of the effects of the AAA programs. To approximate the impact of these programs on farm failures, we use the estimated

effects of AAA programs on farm revenues developed by Nourse, Davis, and Black (p. 323). These authors estimated that between 1933 and 1935, AAA programs increased gross farm income by $1.35 to 1.8 billion. During the same period, total direct government payments were $1.15 billion. Although data on direct government payments are available for the period 1936-1940, no estimates of the effects of AAA-type programs on farm incomes exist for those years. To approximate the effect of AAA programs, we assume that (1) they resulted in increased revenues of $1.58 billion between 1933 and 1935,[24] and (2) the ratio of government payments to changes in farm incomes due to farm programs from 1936 to 1939 was the same as during 1933-1935. These estimated changes in revenues are shown in column 2 of Table 6, whereas the changes in EARN attributed to AAA programs are displayed in column 3.

Given these assumptions about AAA programs, we use the estimated coefficients of the contemporaneous and lagged earnings and interactive earnings variables of Table 3 to calculate the long-run effect of a one-unit change in EARN on the annual rate of farm failures (column 4). This number is multiplied by our measure of the yearly effects of the AAA on EARN to obtain the annual change in failures per thousand farms resulting from the AAA programs (column 5).

Our upper bound estimates of the number of farms saved by AAA programs are presented in column 7A. The assumption that different farms have the lowest incomes in different years suggests that a given flow of income from AAA programs will save different farms each year. An increase in this income flow, like that in 1934, therefore saved 13,367 (= [5,967,350 x 2.24]/1,000) farms in

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[24] This is the average of Nourse, Davis, and Black's upper and lower bound estimates.

addition to those saved in 1932. Our upper bound estimate of the total number of farms saved from failure by AAA programs between 1933 and 1939 is 80,780, the sum of the entries in column 7A.

The assumption that the same farms have low income year after year suggests that a constant flow of income from the AAA programs only affects farm failures when that flow is initiated. Additional farms are saved if the flow of income increases. If the flow decreases and then increases (as it did between 1935 and 1937), the decrease results in the failure of some farms whose failure was prevented at the higher flow. The ensuing increase then saves a new group of farms from failure. That is, the increased government payments between 1934 and 1935 prevented the failure of a new group of 2972 (= 16,339-13,367) farms. The decrease in 1936 caused the failure of 8674 (= 16,339-7665) of the 16,339 farms that had been saved from failing in earlier years. Increased government payments in 1937 then saved a new group of 1155 farms. Our lower bound estimate of the total number of farm failures prevented by AAA programs is 28,383, the sum of the entries in column 7B (which are the positive increments in column 7A).[25]

The estimates developed in Tables 4 - 6 suggest that the expanded role of federal credit agencies saved 77,061 farms from 1933 to 1939, that state-legislated moratoria saved between 40,946 and 119,784 farms from 1933 to 1939, and that AAA programs saved between 28,383 and 80,780 farms during the same period. Summing across programs, our estimates suggest that the government

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[25]This number represents the total number of different farms saved from failing for at least one year by AAA programs. A more meaningful figure may be the number of farms saved from failing throughout the period 1933-1939. This would be the minimum of the entries in column 7A, or 4029 farms.

relief programs saved between 146,390 (= 77,061 + 40,946 + 28,383) and 277,625 (= 77,061 + 119,784 + 80,780) farms during the 1930s.

We suspect that there is relatively little temporal movement of farmers within the income rankings (i.e., the same farmers have trouble meeting their mortgage payments year after year), so the actual number of farms saved by these programs probably is closer to the lower than to the upper estimate. If, for example, one assumes 70 percent of the farms prevented from failing by relief from the AAA or state moratoria in a particular year were also prevented from failing in the following year, then a rough approximation of the number of farms saved is 186,000.[26]

V Conclusions

Our empirical results are consistent with the hypothesis that government programs successfully alleviated farm distress during the 1930s. Before our estimates are used to assess the welfare implications of government intervention, however, several issues must be considered. First, although it is often assumed that preventing farm failures is beneficial, some level of failures is a sign of a healthy, growing economy. In the absence of a model of the optimal level of farm failures, we cannot determine whether government relief programs of the Great Depression corrected a "market failure" or interfered with properly functioning market processes. Second, we have not determined whether the government programs instituted in the 1930s yielded

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[26]We obtain this figure by interpolating between the high and low estimates for the effects of AAA programs and moratoria and then summing across all these programs. That is, 186,000 ≈ 77,061 + [40,946 + .3(119,784-40,946)] + [28,383 + .3(80,780 - 28,383)]. The dynamics of the farm failure process suggest that it probably took most farmers several years to get into or out of "trouble" on their mortgages, and that an estimate of 70 percent may still be lower than the true percentage.

benefits extending beyond that decade. Third, although measuring the costs of intervention is beyond the scope of this paper, it is possible to indicate the sorts of costs imposed on various parties.

State moratorium legislation imposed costs on lenders by restricting their abilities to exercise an option originally included in their contracts with borrowers. In response, they reacted by increasing interest rates on later mortgage contracts and by more carefully rationing mortgage loans to farmers (Alston, 1984). Such responses imposed costs on prospective farmers who were precluded from obtaining mortgage loans under the more restrictive policies.

The modified programs of federal credit agencies imposed costs on taxpayers and private creditors. The U.S. Treasury subsidized the activities of the federal land banks and Land Bank Commissioner, thereby enabling them to finance loans at lower interest rates and reduced principal. In addition, expanded lending by federal credit agencies may have "crowded out" private lenders. Finally, the programs initiated by the AAA had both direct costs (administrative as well as transfer payments to farmers) and less apparent efficiency costs. In all likelihood, the long-run costs associated with the AAA dwarfed the costs of the other programs.

Despite the initial and continuing costs of government intervention in the farm sector, they might be justified if this intervention results in long-run stability. The current distress in the farm community, however, suggests that although we continue to pay the costs of agricultural programs, they may no longer be as effective in reducing failure rates as they were in the Great Depression.

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Table 1
U.S Average Failure Rate per 1000 Farms, 1913-1939

Year	(1) Failure Rate	(2) Index of Prices Received	(3) Index of Prices Paid	(4) Net Farm Income	(5) Index of Land Values	(6) Mortgage Debt Outstanding
1913		101	101	3,873	100	4.348
1914		101	100	3,569	103	4.707
1915		98	105	3,804	103	4.991
1916	avg. =	118	124	4,737	108	5.256
1917	3.2	175	149	7,048	117	5.826
1918		202	176	8,759	129	6.537
1919		213	202	9,332	140	7.137
1920		211	201	6,921	170	8.449
1921		125	152	3,725	157	10.221
1922	avg. =	132	149	4,208	139	10.702
1923	10.7	142	152	4,951	135	19.786
1924		143	152	5,228	130	10.665
1925	17.4	156	157	6,223	127	9.913
1926	18.2	145	155	5,790	124	9.713
1927	~~14.7~~ 17.6	139	153	5,766	119	9.658
1928	14.7	149	155	5,699	117	9.757
1929	15.7	146	153	6,130	116	9.757
1930	18.7	126	145	4,430	115	9.631
1931	28.4	87	124	2,829	106	9.458
1932	38.8	65	107	1,898	89	9.214
1933	28.0	70	109	2,692	73	8.638
1934	21.0	90	123	3,766	76	7.887
1935	20.3	108	125	4,500	79	7.786
1936	18.1	114	124	5,064	82	7.639
1937	14.3	121	130	5,095	85	7.390
1938	13.5	95	122	4,232	85	7.214
1939	12.6	93	121	4,261	88	7.071

column (1): Failure rate per thousand farms per year. Sources: USDA, "The Farm Real Estate Situation," annual issues, 1926-1942.

column (2): Prices received for all food groups (August 1909-July 1914 = 100). Source: USDA, Agricultural Statistics, 1940 (Table 693, p. 573).

column (3): Prices paid for all commodities bought for use in production and family maintenance (calendar years 1910-1914 = 100). Source: USDA, Agricultural Statistics, 1940 (Table 692, p. 572).

column (4): Realized net income including government payments (millions of dollars). Source: USDA, Farm Income Situation (December 1952 January 1953, Table 1, p. 4).

column (5): (1912-1914 =100) Source: USDA, Agricultural Statistics, 1940 (Table 702, p. 585).

column (6): (millions of dollars) Source: USDA, Horton, et al. (1942, Table 1, p. 1).

Table 2
Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
$FAIL_{it}$	19.52	11.74	2.00	78.30
$EARN_{it}$	76.41	21.92	22.99	140.24
$EARN_{it-1}$	78.19	23.10	22.99	141.67
$EARN_{it-2}$	80.11	23.70	22.99	141.67
$EARN_{it-3}$	80.97	23.88	22.99	141.67
$EARN_{it-4}$	82.80	24.43	22.99	141.67
$EARNO1_{it}$	6.37E+3	3.35E+3	697.42	1.99E+4
$EARNO12_{it}$	5.62E+5	4.08E+5	2.33E+4	2.46E+6
$EARNO123_{it}$	5.03E+7	4.50E+7	8.82E+5	2.80E+8
$EARNO1234_{it}$	4.59E+9	4.79E+9	3.10E+7	2.79E+10
$ZFEDDEBT_{it}$	26.79	16.76	0.00	77.66
MOR_{it}	.15	.35	0	1
$POSTMOR_{it}$	.09	.29	0	1
$ZFM30_i$	42.97	11.65	17.40	67.00
$ZURB30_i$	46.02	19.73	16.60	92.40
$LV20/LV12_i$	170.80	30.37	129.90	229.90
$VAREARN_i$	424.50	174.99	134.05	964.84
$DEBT/VALUE_{it}$	1.26	.28	.08	2.61
$INTRATE_t$	2.16	1.70	.60	5.50
$PPAID_t$	37.36	4.25	32	47
$UNEMP_t$	16.86	6.11	3.20	24.90
$FDRDUM_t$	.64	.48	0	1
$ZAGINCOME_{it}$	.12	.09	- .16	.42

$FAIL_{it}$ - Failure rate per 1000 farms in state i during year t - (Mar. 15 of year t - Mar. 1 of year t+1). Sources: USDA, "The Farm Real Estate Situation," annual issues, 1926-1942.

$EARN_{i,t-k}$ - Earnings (cash receipts from farm marketings and government payments) in year t-k as a percentage of earnings in a base period (average of earnings in 1924 and 1925) in state i. Source: USDA (January 1946).

$EARNO1...k_{it}$ - Interactive term between $EARN_{it}$, $EARN_{it-1}$; . . . $EARN_{it-k}$.

$ZFEDDEBT_{it}$ - Percentage of total debt held by federal credit agencies in state i as of time t. Source: USDA, Larsen (August 1945).

MOR_{it} - dummy variable to indicate whether foreclosure moratorium legislation was in effect in state i in year t. This variable is assigned a value of 1 if such legislation was in effect for at least 6 months of a given year, and a value of 0 otherwise. Source: U.S. Congress (April 1936).

$POSTMOR_{it}$ - Dummy variable assigned a value of 1 for two years following the expiration of moratorium legislation, and a value of 0 otherwise. Source: U.S. Congress (April 1936).

$ZFM30_i$ - Percentage of farms in state i mortgaged in 1930. Source: U.S. Department of Commerce (1943, Table 17).

$ZURB30_i$ - Percentage of population in state i that was urban in 1930. Source: U.S. Department of Commerce (1942, Table 8).

$LV20/LV12_i$ - Ratio of indexes of land values (1920/1912) in state i. Source: USDA, "Farm Real Estate Situation," Circular No. 662 (November 1942, pp 4-5).

$VAREARN_i$ - Variance of EARN in state i for the period 1924-1940.

$DEBT/VALUE_{it}$ - Debt to value ratio in state i as of year t. Sources: Index of per acre land values is found in USDA, Regan and Johnson (November 1942). An index of farm mortgage debt is contructed (base year = 1924) from data on farm mortgage debt found in USDA, Horton et al. (1942).

$INTRATE_t$ - Prevailing rates on customer's prime commercial paper (4-6 months) in New York in year t. Source: Federal Reserve Bulletins, Volumes 10-25.

$PPAID_t$ - National index of prices paid by farmers in year t for family living and production expenses, and interest, taxes and wages. Source: U.S. Bureau of the Census (1975, p. 489).

$UNEMP_t$ - U.S. annual average unemployment rate in year t. Source: U.S. Bureau of the Census (1975).

$FDRDUM_t$ - "Roosevelt dummy." This variable is assigned a value of 0 for years prior to 1933 and a value of 1 for 1933 and after.

$ZAGINCOME_{it}$ - Proportion of total income from agriculture in state i in year t. Source: Hanna (1959, pp. 28-29 and 248-49).

Table 3
Determinants of Farm Failures, 1929-1939*

Dependent Variable: $FAIL_{i,t}$

Independent Variable	Coefficient Estimate	Asymptotic t-ratio
Constant	40.57	1.63
$EARN_{i,t}$	-.378	-4.77
$EARN_{i,t-1}$	-.259	-3.72
$EARN_{i,t-2}$	.196	3.88
$EARN_{i,t-3}$	-.006	-.12
$EARN_{i,t-4}$	-.242	-5.13
$EARN01_{i,t}$	.005	4.00
$EARN012_{i,t}$	-2.7E-5	-2.45
$EARN0123_{i,t}$	-7.0E-8	-.74
$EARN01234_{i,t}$	1.1E-9	2.03
$\%FEDDEBT_{i,t}$	-.488	-4.05
$MOR_{i,t}$	-11.2	-3.18
$POSTMOR_{i,t}$	-6.24	-2.99
$\%FM30_{i}$	.056	.51
$\%URB30_{i}$	-.201	-2.16
$LV20/LV12_{i}$	.091	1.92
$VAREARN_{i}$	.013	1.39
$(DEBT/VALUE)_{i,t}$	7.96	3.24
$PPAID_{t}$	.104	.21
$UNEMP_{t}$	.522	1.73
$INTRATE_{t}$	.505	1.08
R^2	.771	
Sum of Squared Errors	14684	
degrees of freedom	498	
$\hat{\rho}$**	.706	
Standard error of $\hat{\rho}$	.035	
Root Mean Squared Error	5.43	
Mean of Dependent Variable, 1929-1939	19.52	

*The two-stage least squares regression estimates displayed in this table are obtained using an algorithm for estimating nonlinear simultaneous-equations systems. Earnings data for 1925-1929 are used as presample values for the lagged EARN variables. Regional dummy variables are also included in this equation to correct for possible omitted variable bias.

**Estimated coefficient of the first-order autoregressive disturbance.

Table 4
Estimated Effects of the Expanded Role
of Federal Credit Agencies on Farm Failures,
1933-1939

Year	(1) %FEDDEBT	(2) Change in %FEDDEBT	(3) $\frac{\partial FAIL}{\partial \%FEDDEBT}$	(4) Change in FAIL due to change in %FEDDEBT	(5) Number of farms in the U.S.	(6) Number of farm failures prevented
1930-32	12.4	---	---	---	---	---
1933	12.8	+ .4	-.488	- .195	5,838,605	1139
1934	16.2	+ 3.4	-.488	-1.659	5,967,350	9900
1935	32.1	+15.9	-.488	-7.759	6,096,094	47300
1936	37.4	+ 5.3	-.488	-2.586	5,987,977	15485
1937	39.1	+ 1.7	-.488	- .830	5,879,860	4880
1938	39.3	+ .2	-.488	- .098	5,771,743	566
1939	38.5	- .8	-.488	+ .390	5,663,626	- 2209
				Total number of farm failures prevented, 1933-1939		77,061

column (1): See Table 2 for definition and sources.
column (2)$_t$ = column (1)$_t$ - column (1)$_{t-1}$
column (3): Estimated regression coefficient from Table 3
column (4) = [column (3)]x[column (2)]
column (5): Source for 1935 is the U.S. Census of Agriculture. Numbers for noncensus years are estimated by linear interpolation between census years. To better approximate the number of farms that could be mortgaged, we delete the number of farms operated by sharecroppers from the census figures. This procedure was first suggested in USDA, Wiecking (October 1927, p. 35).
column (6) = [column (4)]x[column (5)]/1000

Table 5a
Minimum Estimated Effects of State Moratoria
on Farm Failures, 1933-1939

Year	(1) Number of states instituting moratoria	(2) Number of farms in states instituting moratoria	(3) $\frac{\partial FAIL}{\partial MOR}$	(4) Number of farm failures prevented
1932	0	---	---	---
1933	17	2,556,224	-11.2	28630
1934	4	476,063	-11.2	5332
1935	4	623,558	-11.2	6984
1936	0	---	---	---
		Total number of farm failures prevented, 1933-1935		40,946

Table 5b
Maximum Estimated Effects of State Moratoria
on Farm Failures, 1933-1939

Year	(1) Number of states with moratoria in effect	(2) Number of farms in states with moratoria in effect	(3) $\frac{\partial FAIL}{\partial MOR}$	(4) Number of farm failures prevented
1932	0	---	---	---
1933	17	2,556,224	-11.2	28,630
1934	21	3,074,376	-11.2	34,433
1935	18	2,476,295	-11.2	27,735
1936	16	2,059,741	-11.2	23,069
1937	4	414,087	-11.2	4,638
1938	1	114,224	-11.2	1,279
1939	0	---	---	---
		Total number of farm failures prevented, 1933-1939		119,784

column (1): Source: See source for MOR_{it} in Table 2.
column (2): Source for 1935 is the U.S. Census of Agriculture. Numbers for noncensus years are estimated by linear interpolation between census years.
column (3): Estimated regression coefficient from Table 3.
column (4): [column (2)]x[column (3)]/1000

Table 6
Estimated Effects of Agricultural Adjustment Administration Programs on Farm Failures, 1933-1939

Year	(1) EARN	(2) Change in revenues due to AAA ($million)	(3) Change in EARN due to AAA	(4) $\frac{\partial FAIL}{\partial EARN}$	(5) Change in FAIL due to AAA	(6) Number of farms in the U.S.	(7) Number of farm failures prevented (A)	(B)
1932	44.75	---	---	---	---		---	---
1933	51.33	180	1.69	-.406	-.69	5,838,605	4029	4029
1934	63.91	613	5.77	-.389	-2.24	5,967,350	13367	9338
1935	72.20	787	7.42	-.361	-2.68	6,096,604	16339	2972
1936	81.58	394	3.71	-.344	-1.28	5,987,977	7665	---
1937	86.89	504	4.70	-.320	-1.50	5,879,860	8820	1155
1938	77.00	662	6.24	-.302	-1.88	5,771,743	10851	2031
1939	81.87	1109	10.45	-.333	-3.48	5,663,626	19709	8858
					Total number of farm failures prevented, 1933-1939		80,780	28,383

column (1): See Table 2 for definition and sources.
column (2)$_t$ = [direct government payments in year t]x[1.58/1.15]
column (3)$_t$ = difference between EARN$_t$ with and without increased revenues from AAA program.
column (4): Estimated regression coefficients from Table 3 are used to calculate these long-run dynamic effects (see footnote #19 in the text). The presence of the interactive earnings terms necessitates some assumption concerning the "long-run equilibrium" levels of EARN$_t$. In this table, we assume that the equilibrium value of EARN$_t$ was EARN$_{t-1}$.
column (5) = [column (4)]x[column (3)]
column (6): Source for 1935 is the U.S. Census of Agriculture. Numbers for noncensus years are estimated by linear interpolation between census years. To better approximate the number of farms that could be mortgaged, we delete the number of farms operated by sharecroppers from the census figures. This procedure was first suggested in USDA, Wiecking (October 1927, p. 35).
column (7A) = [column (5)]x[column (6)]/1000
column (7B) = column (7A)$_t$ - column (7A)$_{t-1}$ if column (7A)$_t$ - column (7A)$_{t-1}$ > 0
= 0 otherwise.