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Inefficiency and Structural Adjustment in
American Agriculture: Who Will
Quit and Why?

Carlisle Ford Runge

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Department of Agricultural and Applied Economics

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Introduction

The agricultural economy is currently experiencing structural adjustment due to complex forces affecting commodities prices, farm costs, agricultural technology and asset values. These forces interact in many ways, presenting a confusing picture: although large numbers of farms are in or near bankruptcy, creating a general perception of farm crisis, many remain profitable. This has led some observers to conclude that the failing farms must be too small and inefficient, and that market forces are culling the technologically weak from the herd. This view is countered by the observation that many of the farms most deeply in trouble are in fact quite large and technologically advanced, but are heavily indebted. If the usual logic of economic survival is applied, the view that those that survive are the most "efficient" is surely correct. However, the broad concept of efficiency invoked to explain this outcome tells us little about the causes of farm quits and provides little or no foundation for policy other than to allow these forces to continue until a new equilibrium, based on substantially fewer farms, is reached.

This paper questions this approach, and argues for more attention to the underlying causes of the high rate of farm quits. In particular, it develops the distinction between technological, and financial (or "pecuniary"), economies in agriculture. This distinction, originally used by Scitovsky (1954) to distinguish alternative types of economic interaction, is based on the difference between engineering and market interdependence. Technological effects imply direct interdependence arising from physical or engineering processes; financial effects operate through the prices of goods and assets in the market. Technological economies therefore result from the optimal combination of engineering inputs (fertilizer, water, etc.), while financial economies result from

the optimal combination of pecuniary inputs (such as collateral and credit) in
the purchase of goods and assets.

Both theoretical and empirical evidence fail to support the contention that
technological economies alone have led to larger farms. This evidence suggests
that increasing farm size, especially since the 1970's, has resulted not only
from quits by technologically inefficient producers, but from financial factors.
What are these factors? A major one is the debt/asset position, or "leverage,"
of individual farm producers. As farm assets rose in value throughout the
1970's, increased acreage was attractive as an inflation hedge, especially
because inflation kept real interest levels low. Beginning in 1980-81, major
devaluations in farm assets together with increases in real interest costs
created extreme financial pressures for farmers that acquired large levels of
debt to purchase these assets. Many of these farmers were young, well-educated,
and technologically advanced. Hence, financial inefficiency, generally the
result of forecasting errors in which asset devaluations were not forseen, now
may dominate technological inefficiency as a cause of structural change in agri-
culture.

This result, if correct, has important implications for three reasons.
First, it suggests that some of the most technologically advanced farm producers
may be driven from the sector due to changes in financial conditions arising
largely from outside of agriculture or agricultural policy. Second, the level
of financial stress in agriculture will be highly skewed toward younger farmers,
many of whom are more well-educated and more rapid adopters of new technology
than older producers. Their quits will therefore represent higher social costs
in terms of foregone returns to investments in agricultural research and educa-
tion. Third, if current trends continue, the remaining producers may be less
indebted but also less technologically efficient than those that quit. This

could lead to declines in the overall technological efficiency of the agricultural sector, and reductions in the global competitiveness of American farmers.

This paper is organized as follows. First, a discussion of farm size and the role of technical change in agriculture is presented, together with an analysis of financial stress arising especially from falling land values. Second, a specific empirical example is developed illustrating the significance of financial stress on even technologically efficient producers. Third, the implications of these results for policy are explored. The fourth section is a conclusion.

Farm Size and Technical Change in Agriculture

Farm size in the United States has grown substantially over the past half-century. From 1930 to 1980, land area per farm increased over 2.5 times, while the number of farms decreased from 6.3 to 2.7 million. Despite continued warnnings of corporate takeovers of agriculture, American farms are likely to remain almost entirely family units, even if incorporated for tax reasons. As of 1979, only 2.4 percent of all farm and ranchland in the United States was cultivated by nonfamily corporate farms (U.S.D.A., 1979). Increases in farm size have occurred primarily as a result of expansion purchases by some farmers of other retiring or quitting farmers' acreage (see Emerson and Raup, 1985).

Despite rhetorical warnings of impending "superfarms," the historical record suggests that the death of the family farm as an institution is exaggerated. Studies of the late 19th Century Bonanza Farms of the Red River Valley, in which 20,000 to 55,000 acres were cultivated using hired labor forces and equipment, indicated major technological inefficiencies (Briggs, 1932). These farms ceased to operate and were broken into family-sized units and sold in the early 1900's.

In an analysis of the sources of changing farm size, Kislev and Peterson (1982) developed an equilibrium theory of the size of the family farm which showed that out-migration (or quits) of farm labor and the growth of farm size are two aspects of the same economic process. Increasing urban incomes serve as an incentive to leave farming; the remaining land is left to fewer but larger farms. Their analysis concentrated on three factors: input prices, nonfarm income, and technology, although it specifically excluded land values, inflationary expectations, and dynamic adjustments as factors in determining farm size.

The dominance of the family unit in agriculture and of the
large corporation in the nonfarm sector testifies to the
lack of significant economies of scale in most farming
operations and the their existence in other industries.
Owners of large amounts of wealth therefore invested
their capital in the nonfarm sector. Where large farm
enterprises ran into scale diseconomies they were sub-
divided into family units. The American family farm was
preserved by ample nonfarm investment oppoertunities
(Kislev and Peterson, p. 587).

Current rates of return in agriculture compared to the nonfarm sector suggest

that the family farm continues to be unattractive to corporate raiders.

The primary factor responsible for the growth in farm size has not been

off-farm corporate acquisition, but the change in the relative opportunity cost

of farm labor in relation to that of farm machinery (see Kislev and Peterson, p.

588, Table 3). From 1930-70, the ratio of wage to machine costs increased 2.8

percent per year. The increasing opportunity costs of farm labor, reflected by

the relatively higher real wages available in the non-farm sector, induced

substantial substitution of mechanical power, leading to increases in the ratio

of machine to labor inputs by 4.8 percent over the period (Kislev and Peterson,

p. 590). The same forces which attracted labor out of agriculture also freed

land resources and prompted substitution of larger mechanically-driven tech-

nology for labor. The farm family, able to cultivate larger acreage, purchased

or rented the land left behind, and farm size grew. The process of tech-

nological change from 1930-70 thus involved the application of new engineering

principles to land freed by off-farm migration. What made increases in farm

size possible was improved mechanical technology (with biological technology

enhancing production per acre, but not farm size per se).

Between 1970 and 1976, however, the opportunity cost of farm labor relative

to machine costs was reversed. The reversal, which has persisted, means that

the ratio of wages in relation to machinery costs has fallen. This has created

incentives for fewer and smaller farm machines. If the findings reported by

Kislev and Peterson continue to hold, then farm size should stabilize and perhaps even decline on grounds of technological efficiency (1982, p. 592).

However, farm size continued to grow in the 1970's and early 1980's, increasing from a national average of 389 acres in 1969 to 440 acres in 1982. In a recent report evaluating the impact of technology on farm structure, the Office of Technology Assessment noted that arguments against the efficiency of scale economies in farming fail to consider advantages to buying and selling in large quantities and access to credit granted to farms with a larger land base. "There is some evidence," the report noted, "that inclusion of such pecuniary economies would lower the average production costs for large farm units and would shift the conclusion about the size of the most competitive farm" (OTA, 1985, pp. 27-28). Additional support for the importance of financial advantages accruing to large farms is provided for North Dakota small-grain production by Dalsted (1972) and for Texas cotton production and marketing by Smith, et. al. (1984).

If the explanation for increasing farm size in the 1970's and early 1980's is not technological economies, then the factors intentionally omitted from Kislev and Petersons' analysis may take on added importance. These factors are land values, inflationary expectations, and dynamic adjustments, all of which loomed large in the financial decision of many farmers to expand in the 1970's. The University of Minnesota has compiled land market data which provides a useful basis for evaluating the unusual changes in the value of farm land assets during the 1970's and 1980's (see Figure 1). A time series of this data, expressed in both nominal and real terms (deflated by the Consumer Price Index), shows that the 1970's and early 1980's saw an historically unprecedented departure of real and nominal land values, and equally unprecedented increases in both. Throughout the period, most farmland purchase continued to be by

expanding farmers, with the majority of sales to those within the same county and often the same township (Emerson and Raup, 1985). Indeed, the proportion of expansion buyers increased in Minnesota from approximately 55 percent in 1970 to 79 percent in 1984. In nominal terms, Minnesota farmland increased over four-fold in value between 1972 and 1981 before beginning on equally steep decline. This increase and decline was repeated throughout the farmbelt, and has had disastrous effects on the debt/asset position of those who used land in the 1970's as collateral to acquire substantial additional debt.

In retrospect, the decision to base farm expansion on continued appreciation in land values was extremely unwise. Yet during the 1970's high levels of inflation, expanding export markets and low real interest rates made farm expansion, including land purchases, a seemingly rational strategy. Increases in farmland prices made entry into agriculture, in turn, increasingly expensive for beginning farmers who did not inherit a full complement of land and equipment. Many borrowed heavily to gain entry to the sector, which promised to reward the investment through asset appreciation if not profits.

Farmers were not alone in their bullish views of land assets. Farm lenders and some agricultural economists promoted expansion. Major investments were made in services and infrastructure by private investors, including the major grain companies, in the expectation that an export-driven expansion in the farm economy would continue. In addition, until 1979 most of the deposit instruments and rates charged borrowers at rural lending institutions were regulated, leading to borrowing which when combined with inflation often made the real cost of funds negative.

In 1980-81 the bubble burst. A strengthening dollar, the 1979-80 grain embargo, and rapid increases in acreage planted to grain crops in Europe and Latin America led to steady erosion in export markets which has continued.

Deregulation of rural credit markets led to rapid increases in nominal interest rates. Substantially lowered levels of inflation pushed the real costs of borrowed funds from negative levels in 1979 to historic highs by 1985. Increased real interest rates, supported by the huge federal borrowing needs required to finance $200 billion dollar deficits, attracted foreign investors to U.S. Treasury securities. In order to purchase these instruments these investors required dollars, helping to reinforce the strength of the currency, which continued to float in late 1985 at levels substantially above those of 1981. This dynamic interaction reinforced the weakness of export markets, commodities prices, and land values.

In short, the factors omitted from the earlier analysis of technology and farm size - land values, inflationary expectations, and dynamic adjustments - were fundamental to the motivation for farm expansion, debt acquisition, and the resulting dislocation that has accompanied the disappointment of prior expectations. These factors are also fundamental to an understanding of the causes of the "farm crisis." In the main, this crisis appears to result from financial forces arising largely from outside of agriculture - primarily monetary and fiscal policy and exchange rate adjustments. The financial picture of the farm sector which emerges is striking, both in terms of the magnitude of what is owed by farmers and the rapid deterioration of debt repayment capacity in the face of weak demand and falling commodities prices.

A recent survey of farm financial conditions revealed that in January 1984, 16.6 percent of all farm operators were experiencing some sort of financial stress, indicated by debt/asset ratios in excess of 40 percent. A year later, the proportion of farm operators under financial stress had more than doubled. In January 1985, farm operators with debt/asset ratios greater than 40 percent held nearly two-thirds of a total farm debt of approximately $212 billion, while

an estimated 34.4 percent of this total was held by farm operators who face
extreme financial stress, with debt/asset ratios greater than 70 percent
(Barickman, 1985, p. 16). The overall balance sheet of the farm sector is shown
in Table 1. A separate survey documented that this debt is heavily skewed to
younger farm operators, who are generally better educated and more inclined to
adopt new techniques of production (see Table 2). A final observation is that
this debt is disproportionately borne by large farms (see below). In part, this
is because these farms became large by assuming debt; in part, it is because
large farms must finance higher investments in equipment and other expenses.

The general implication of this analysis is that financial factors may have
dominated technological factors in the 1970's and early 1980's as the cause of
large numbers of farm quits. Farms continued to grow in size in the absence of
clear technological economies, with financial factors the dominant reason for
both farm expansion and subsequent farm failure. If this hypothesis is
accurate, then whether or not farm operators are technologically efficient, many
will quit due to financial inability to maintain positive net returns. If tech-
nological and financial inefficiency are positively related, those who fail to
manage their operations well in one area may also fail to do so in the other.
More disturbing, however, is the converse possibility that during the 1970's and
early 1980's technological and financial efficiency were negatively related.
Keeping abreast of technological change may have required the assumption of
excess farm debt, so that those who are now most financially stressed represent
some of the most technologically efficient producers in the sector. To date, no
systematic attempts have been made to distinguish these possibilities or to
determine their relative validity. Some insight, however, can be gained from
careful evaluation of farm management records, to which we now turn.

Farm Management

Data from the Minnesota farm management associations provide a picture of
the relative impact of current financial conditions on different sizes and cate-
gories of farms (Eidman, 1985). In August, 1984, survey data indicated that
the percentage of operators with higher debt/asset ratios increased with size of
farm. Thirty-one percent of farms with annual sales of $40,000 to $199,999 and
56 percent of operations with sales over $200,000 reported debt/asset ratios
that exceeded 40 percent. These ratios were highest in the export-dependent
cash grain sector, concentrated in Southeastern and Southwestern Minnesota,
where the average debt/asset ratios were 49 and 47 percent respectively.

Simulations of some representative farms in Southwestern Minnesota were
conducted by Eidman based on mid-1985 projections of the world and U.S. economy.
These simulations were designed to measure the impact of the complex forces
discussed above on both a large (775 acre) crop farm and a medium (400 acre)
crop-hog farm typical of the grains sector of the Upper Midwest. Crop yields on
these representative farms reflect the application of enhanced technology.
Yields on them have grown at rates 18 to 20 percent above the county average in
the Southwestern Farm Management District. Swine yields are near the asso-
ciation average.

Utilizing the Food and Agricultural Policy Research Institute (FAPRI) model
and projections from Wharton Econometrics in May and June, 1985, the performance
of these farms was simulated over the period 1985-89. This simulation was
designed to capture the impact of monetary, fiscal and trade policy conditions
as of late 1985. The assumptions used were:

1. Continued federal deficit spending in the range of $200 billion.

2. Real GNP growth of 2.6 - 3.5 percent annually.

3. Unemployment decreases from 7.4 to 6.7 percent.

4. GNP deflator increases from 3.7 to 4.9 percent.

5. Three month Treasury-bill rates averaging from 6.9 to 8.4 percent.

6. Modest declines in the value of the dollar, equal to 16 percent from 1986-89, with most of the decline coming during 1986-87,

7. Average annual gross domestic product (GDP) growth of 3.6 percent in Latin America, 6.0 percent in the Pacific Basin, 2.2 percent in Europe, and 3.3 percent in the Centrally Planned Economies.

These assumptions were combined with farm support prices (deficiency payments and loan rates) set equal to those of 1984-85 (see Appendices 1 and 2). This assumption is likely to slightly overstate farm income in light of the emerging farm bill, which will lead to some downward adjustments in loan rates. In addition, it was assumed that farmers could exercise the option to repay loans at the lower of the two values represented by the loan rate or the market price. The costs of the new farm bill are unlikely to allow the Secretary of Agriculture this discretion, again leading to slight overstatement of farm incomes in the simulations.

Two simulations were conducted. One was based on average management levels in comparison to the Farm Management Association as a whole. The other was based on a high level of management, equivalent to that of the most efficient producers in the association. These management levels, together with the yield assumptions cited above, provide a proxy for technological efficiency and its relative impact on farm profitability compared to financial factors. It should be emphasized that farmers participating in the surveys are generally an above average sample, so that the simulations tend to grant the benefit of the doubt to the representative farms in terms of production efficiency. In order to test the impact of initial debt/asset position on farm survival a .30 ratio was com-

pared to a .70 ratio. This comparison allows the relative effect of financial stress to be guaged.

Net farm income, adjustments in the value of farm equity (assets), and the probability of survival in each management category are shown in tables 3, 4, and 5. With average levels of management, net farm income (tables 3 and 4) improves over the 1986-89 period for both sizes of farms with a beginning debt/asset ratio of .30. However, the same farms experience negative net farm income with a beginning debt/asset ratio of .70, which persists over most of the period. The large crop farm shows a more sustained negative net loss than the combined operation.

With high management levels, a debt/asset ratio of .30 leads to increased net farm income over the period, moving from $31,668 to a healthy $51,430 for the crop farm and $20,283 to $27,702 for the crop-hog operation. With debt/asset ratios of .70, however, this improvement is substantially reduced on both operations. In either case, net farm incomes with an initial debt/asset position of .70 are likely to be very marginal, and will probably induce large numbers of quits.

When combined with the somewhat optimistic assumptions of farm price supports underlying the simulations, the conclusion that emerges is that the initial debt/asset position of the farm is a better indicator of the likelihood of who will quit than relative technological and managerial efficiency. The significance of financial relative to technological factors is thus given support.

In table 5, specific estimates for the probability of survival of the two representative farms are presented. These estimates are based on beginning equity values, estimated decreases in equity due to land price declines, and the resulting probability that the farm will have debt/asset ratios in excess of 1.0 or .8 at the end of 1989. A debt/asset ratio of 1.0 is generally unsurvivable;

a value of .8 places the survival of the operation in considerable jeopardy. As the table indicates, with average management the large crop farm and the smaller crop-hog farm are both relatively certain to survive if initial debt/asset ratios are .30. If the initial debt/asset position is .70, however, the probability that the large crop farm will survive is reduced considerably, with only an 80 percent probability of an ending debt/asset ratio less than one, and no probability of a debt/asset less than .80. The crop-hog farm is placed in even greater danger by an initial debt/asset ratio of .70, with only a 55 percent probability of an ending debt/asset ratio less than one and no probability of an ending position less than .80.

Shifts from average to high management do not affect the survival capacity of either farm in the initial .30 debt/asset position. Both farms remain relatively secure as before. High management somewhat improves the probability of survival at an initial debt/asset ratio of .70. This improvement is not striking, however, again suggesting the relative importance of financial factors for farm survival. The large crop farm continues to show only an 80 percent chance of an ending debt/asset ratio less than one, and its chances of an ending ratio less than .80 are now only 25 percent. The crop-hog farm shows a certain ending debt/asset ratio less than one, but only a 25 percent chance of a ratio less than .80.

These results are driven largely by projected changes in the value of land (Eidman, 1985). Regardless of technological and managerial efficiency, and despite optimistic assumptions about support prices, the financial impacts of land price devaluations on farm finances continue to dominate the survival capacity of farms in both large and medium size categories.

Some Policy Implications

While the data presented above are in no way conclusive, they provide some insight into the impact of agricultural and general economic policy on the future structure of American agriculture. Three main implications emerge from the analysis.

First, financial or pecuniary factors may have dominated technological factors in the decision by many farmers to increase their acreage and/or indebtedness during the 1970's and 1980's. As long as nominal and real land values increased, inflation remained high and real interest rates low, and export markets grew, land and machinery acquisition seemed to make financial sense even if technological economies were not realized. Beginning in 1980-81, when expectations that these trends would continue proved incorrect, the position of those whom had taken on large debts in order to finance this expansion rapidly deteriorated. In the face of this reversal in trends, financial economies became financial diseconomies, leading farms with high debt/asset ratios rapidly toward bankruptcy and increasing the number of farm quits. The farms most affected were generally larger than average for the reasons described. Hence, it can be argued that trends resulting from changes in monetary, fiscal and exchange rate policy have been a more important cause of farm bankruptcies than technological inefficiency.

If true, this suggests that the 1985 farm bill, acting alone, can do little to alleviate the stresses being felt in the agricultural sector. Instead, three financial factors emerge as of paramount importance to farm recovery. First, without substantial reductions in real interest rates, either via reduced borrowing costs, increased inflation, or both, financial pressures will continue. Second, land value declines will place those with high debt/asset ratios in an increasingly tenuous position, encouraging the most highly leveraged pro-

ducers to quit farming, at least in the short run. Third, a strong exchange rate will continue to affect export markets, especially in the grain sector. Weak demand for U.S. agricultural exports will in turn contribute to increases in surplus stocks, reducing world market prices and raising the costs of U.S. farm price support programs. These program costs will continue to fuel a federal budget deficit that puts direct upward pressure or interest rates and indirect upward pressure on exchange rates, exacerbating the difficulties identified above. If past trends in farm land purchases are any guide, those farms with lower leverage positions will purchase farm land and equipment from neighbors, somewhat increasing average farm size. However, in the absence of renewed strength in commodities prices or land values, the financial rewards to farm expansion are likely to be far less significant in the late 1980's than in the 1970's and early 1980's. If, given relative costs of labor and mechanical inputs, no clear technological economies to larger farm size reemerge, there seems little reason to suppose that farms will grow in size as rapidly as in the past.

A second implication concerns the impact of current trends on the age distribution of farm operators. The data reported above indicate that many of the farmers that took on debt in the 1970's and 1980's were younger and generally better educated. The burden of downward price adjustments in land values fell with particular force on this group. Many of these farmers were the products of the land-grant colleges, educated in the ways of expansive, technologically sophisticated, export-oriented agriculture. If large numbers now quit the sector, it will constitute a substantial loss of human capital and technological expertise, possibly leading to a "missing generation" in American farming. Although many economists have argued that excess capacity in the farm sector requires large numbers of quits to restore equilibrium, the question of

<u>who</u> will quit has not been squarely addressed. In fact, if those that remain continue to farm much of the land left behind, substantial reductions in the number of farmers may have little effect on farm output, as has been true in the past. But if the quitters are drawn disproportionately from a group of highly educated and technologically sophisticated producers who are also heavily in debt, the social costs in terms of foregone returns to investment in agricultural research and education may be substantial. This argument is reinforced by the generally high rates of return resulting from these investments (Ruttan, 1982).

A final implication for policy concerns the future competitiveness of American farmers. If the burden of adjusting to new financial conditions in agriculture falls on those most heavily indebted, and these producers are disproportionately made up of young, well-educated and technologically advanced producers, the aggregate technological impact may be negative. This may erode the competitive advantage represented by the level and quality of human capital in American agriculture. This human capital resource is as important as our soils, water, climate, and infrastructure in guaranteeing long-term competitiveness in world markets. The foregone benefits of this loss of competitiveness are extremely difficult to estimate, and the costs of preventing these producers from bankruptcy may not justify them. These issues are beyond the scope of this paper, which has attempted to diagnose the nature of structural changes in agriculture, rather than provide specific prescriptions.
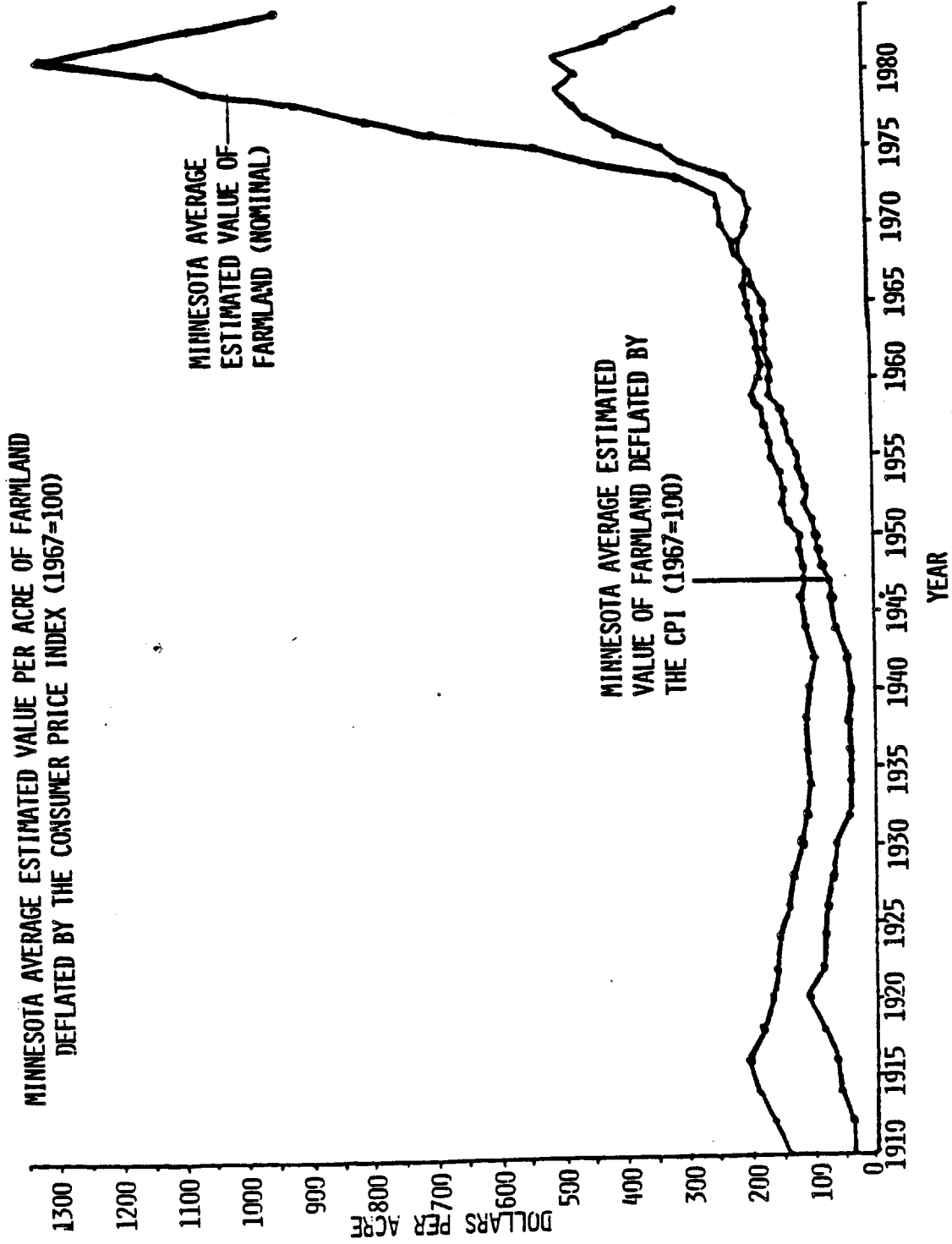
Conclusion

The causes of the farm financial crisis are complex, involving trends largely outside the reach of traditional agricultural policy instruments. This paper has provided an initial argument over the importance of financial factors for both the growth of farm size and the current farm crisis. Interest rates, exchange rates, and land values may dominate technological change as an explanation for farm quits. These financial factors may also help to explain the growth of farm size during the 1970's and 1980's, and the lack of strong incentives to increase farm acreage in the near future. The impact of these factors requires a new orientation for agricultural policy, focused less on agricultural programs then on fiscal, monetary and trade policy. Like other export-dependent, interest rate-sensitive sectors of the economy, American agriculture is in danger of losing its international competitiveness. The burden of current policies appears to fall disproportionately on younger, more well-educated producers, leading to reduced returns to previous investments in human capital in agriculture.

Unfortunately, comparatively little attention has been given by agricultural policy analysts to the question of whether those who quit farming will leave behind the group of farmers most capable of advancing the overall competitiveness of the agricultural sector. If current trends are allowed to continue, financial adjustments may lead to declines in technological efficiency, further eroding American agriculture's advantage, which rests in large part on its human capital base. In dynamic economies with agents that do not have perfect foresight the discipline of the market effectively culls those who cannot compete. Whether the consequence is efficient is in doubt.

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Figure 1

MINNESOTA AVERAGE ESTIMATED VALUE PER ACRE OF FARMLAND
DEFLATED BY THE CONSUMER PRICE INDEX (1967=100)

MINNESOTA AVERAGE
ESTIMATED VALUE OF
FARMLAND (NOMINAL)

MINNESOTA AVERAGE ESTIMATED
VALUE OF FARMLAND DEFLATED BY
THE CPI (1967=100)

DOLLARS PER ACRE

1300 1200 1100 1000 900 800 700 600 500 400 300 200 100 0

YEAR

1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980

Source: University of Minnesota, Department of Agricultural and Applied Economics.

Table 1. Balance sheet of the farming sector as of January 1, 1977, 1981, 1984-
1986.

	1977	1981	1984	1985[a]	% Change from 1984-85	1986[b]	% Change from 1985-86
Assets							
Real estate	496.4	828.4	764.5	749.2	− 2.0	738.0	−1.5
Nonreal estate	134.2	228.6	216.5	221.1	+ 2.0	224.4	+1.5
Financial assets	33.7	42.8	50.1	52.1	+ 3.9	54.4	+4.4
Total assets	664.1	1089.8	1031.1	1022.4	− .8	1016.8	− .5
Claims							
Liabilities							
Real estate	55.2	95.5	111.6	110.9	− .6	110.0	− .8
Nonreal estate	48.7	86.5	103.0	101.3	− 1.6	101.8	+ .5
Total liabilities	103.9	182	214.7	212.1	− 1.2	211.8	− .2
Owner equity	560.2	907.8	816.4	810.7	− .7	805.0	− .7
Total claims	664.1	1089.8	1031.1	1022.4	− .8	1016.8	− .5
Debt to asset ratio	15.6	16.7	20.8	20.7	− .5	20.8	.4

[a] preliminary

[b] forecast

Source: United States Department of Agriculture,
Agricultural Finance Outlook and Situation, December 1984, cited in
Barickman, 1985, p. 16.

Table 2. Debt/asset ratios of farmers, by age and region of the country
The average farmer under 35 years in the Central United States owes $63 for every $100 of land and equipment owned.

	Under 35	35-44	45-54	55-64	65+
Central	63%	61%	46%	24%	10%
South	42	45	35	24	6
West	44	43	26	20	15
East	54	27	18	12	9

Source: Joint study by Food and Agricultural Policy Research Institute and the Farm Journal, March, 1985.

Table 3. Projected net farm income for the large crop farm.
(in $1,000)

Beginning Debt/asset	1985	1986	1987	1988	1989
		Average Management			
.30	16,341	18,995	26,189	25,250	32,536
.70	-17,532	-24,904	-14,456	-3,406	-4,098
		High Management			
.30	31,668	33,981	43,057	42,599	51,430
.70	5,483	7,517	15,484	13,306	19,188

Source: Eidman, Vernon, "Description of Minnesota Agriculture,"
briefing before the Minnesota Senate Committee on
Agriculture and Natural Resources, November 21, 1985;
prepared by the Department of Agricultural and Applied
Economics, University of Minnesota.

Table 4. Projected net farm income for the medium crop-hog farm.
(in $1,000)

Beginning Debt/asset	1985	1986	1987	1988	1989
			Average Management		
.30	10,679	17,223	23,510	24,486	17,025
.70	-3,798	2,551	7,933	7,617	-347
			High Management		
.30	20,283	26,261	33,299	34,505	27,702
.70	5,274	11,731	18,695	19,661	12,580

Source: Eidman, Vernon, "Description of Minnesota Agriculture,"
briefing before the Minnesota Senate Committee on
Agriculture and Natural Resources, November 21, 1985;
prepared by the Department of Agricultual and Applied
Economics, University of Minnesota.

Table 5. Equity adjustments and probability of survival over the 1985-89 period.

Beginning Debt/asset 1/1/85	Beginning Equity 1/1/85	Average Management			High Management		
		Equity 12/31/89	Prob. of D/A < 1	Prob. of D/A < .8	Equity 12/31/89	Prob. of D/A < 1	Prob. of D/A < .8
	$	$	%	%	$	%	%
			Large Crop Farm				
.30	499,106	413,550	100	100	483,710	100	100
.70	213,852	40,856	80	0	75,015	80	25
			Medium Crop-Hog Farm				
.30	274,363	235,634	100	100	283,267	100	100
.70	116,737	4,477	55	0	51,217	100	25

Source: Eidman, Vernon, "Description of Minnesota Agriculture," briefing before the Minnesota Senate Committee on Agriculture and Natural Resources, November 21, 1985; prepared by the Department of Agricultural and Applied Economics, University of Minnesota.

Appendix 1

VARIABLE LOAN RATE POLICY PROPOSAL

Assumes: A. Target prices and loan rates are set at minimum 1984/85
              levels, and
          B. Farmers have the option of repaying loans at the loan rate
              or at a market price, whichever is lower.

Values for Selected Parameters

	1985/86	1986/87	1987/88	1988/89	1989/90
Loan Rate - Corn	2.55	2.55	2.55	2.55	2.55
Target Rate - Corn	3.03	3.03	3.03	3.03	3.03
Set Aside - Corn	10%	20%	20%	20%	20%
Loan Rate - Soybeans	5.02	5.02	5.02	5.02	5.02
Farm Price - S.W. MN					
Corn ($/bu)	2.35	1.91	2.10	2.32	2.34
Soybeans ($/bu)	4.99	4.83	5.22	5.97	6.03
Hogs ($/cwt)	45.00	43.00	45.00	47.00	45.00

Appendix 2

Description of Southwestern Minnesota Farm

	Large Crop Farm	Medium Size Crop-Hog Farm
Cropland Owned (acres)	500	200
Cropland Leased (acres)	275	160
Breeding Herd (no. of sows)	––	48
Market Value of Assets 1/1/85		
Land	$531,160	$217,980
Other Real Estate	70,634	80,000
Farm Machinery	109,338	79,585
Livestock for Breeding	––	9,822
Total	$711,130	$387,387
Labor Supply		
Family Labor (full-time equivalents)	1.5	1.0
Hired Labor (full-time equivalents)	.25	.03
Average Management Levels		
Corn Yield (bu/acre)	106.5	106.5
Soybeans Yield (bu/acre)	35.2	35.2
Slaughter Hogs (direct cost/sow)	––	$722
(bu. corn/sow)	––	180.3
High Management Level		
Corn Yield (bu/acre)	117.2	117.2
Soybean Yield (bu/acre)	38.7	38.7
Slaughter Hogs (direct cost/sow)	––	$686
(bu. corn/sow)	––	171.3