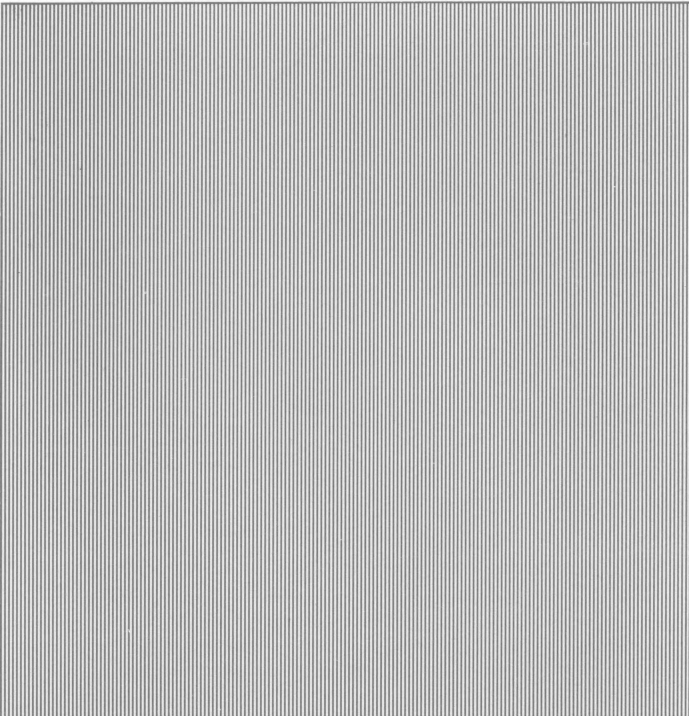# THE EFFECTS OF SIZE ON FARM SURVIVAL AND SUCCESS IN THE EL PASO VALLEY

THE AGRICULTURAL EXTENSION SERVICE ● THE AGRICULTURAL EXPERIMENT STATION

THE TEXAS A&M UNIVERSITY SYSTEM

COLLEGE STATION, TEXAS

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THE EFFECTS OF SIZE ON
FARM SURVIVAL AND SUCCESS
IN
THE EL PASO VALLEY[1]

by

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Introduction

Policy makers and agricultural economists in the U.S. have been interested in the effects of size on farm survival and success for many years. However, the current controversy surrounding enforcement of the 160 acre limitation of the Reclamation Act of 1902 has given new impetus to efforts to identify and quantify these effects. This limitation would permit a farmer to own no more than 160 acres (320 acres with a spouse) of land irrigated from a Bureau of Reclamation project. While many arguments have been presented for and against this limitation on farm size, it was not the purpose of this study to restate these arguments or advocate a particular policy position. Instead, this study was conducted to provide estimates of the effects of size on farm survival and success to policy makers, farmers, lenders, and other interested parties.

The El Paso Valley was selected for the study because it would be affected by enforcement of the 160 acre limitation more than any other area in Texas. Approximately 69,000 acres in this valley are irrigated with Bureau of Reclamation water supplied from the Rio Grande Project by the El Paso County Water Improvement District #1. This area, located in the far western tip of Texas, receives less than 10 inches of rainfall annually, and irrigation is required for production of all crops. Principal crops are cotton, alfalfa, grain, pecans, and vegetables. Ground water is available as a secondary irrigation source, but it is of poor quality and poses a problem of salinity.

Methodology

A computerized farm model was developed in this study to simulate the operation of a farm through a 10 year period to estimate the chance of survival and success for various sizes of farms with selected levels of beginning equity and land ownership situations. The farm sizes which were analyzed were 160, 320, 640, and 960 acres. Beginning equity levels of 25, 50, and 100 percent were considered; and combined ownership with cash lease of 320 acres was compared to full ownership of land. Crop prices, crop yields, and water allotments could fluctuate based on chance, i.e., based on historical probabilities. Each farm situation was simulated 100 times for each year of the 10 year period to develop a stream of annual net cash flows (after taxes, family living expenses, and loan principal payments). The net cash flow results for each farm tenure and beginning equity situation were then analyzed to provide estimates of the chances of survival and success for each farm size.

A farm was considered to be surviving as long as it was solvent. Net cash flow deficits were met by refinancing machinery and land assets. However, the farm was declared insolvent when net worth fell below 20 percent of total assets.

Economic success was measured in terms of after-tax return on initial investment, i.e., beginning owner equity. The discounted rate of after-tax return was calculated for each simulated situation using present value analysis with a discount rate of 7.5 percent. This discount rate was selected to represent a rate of return which is currently available to investors, e.g., a 10 percent interest rate less a marginal tax rate of 25 percent. The farm in a given simulation was considered to be successful if the after-tax rate of return on initial investment was equal to or greater than the specified 7.5 percent rate.

Input data for the model were developed from published reports and verified by interviews with farmers and lenders in the area. Since the simulation process in-

volved future projection of farm operations, critical assumptions were required regarding the rate of inflation in prices and the value of farmland. The annual rates used for this study were 10 percent for farmland, 7 percent of crop prices, and 8 percent for other expenses. Crop yields were inflated at 1 percent per year. Family living expenses for the base year ($15,000, $18,200, $24,600, and $31,000 for the 160, 320, 640, and 960 acre farms, respectively) were inflated at 7 percent annually to maintain the family's purchasing power over the planning horizon. Family living expenses were specified by using a labor charge for family labor of approximately $12,000 and a management charge of $20 per acre.

The simulation results from this study which are presented in Tables 1 and 2 are arranged by farm size and situation. Farm size refers to the total number of acres farmed. The situation is denoted by a roman numeral and an alphabetic letter. The roman numeral designates the beginning level of equity (where I=50 percent; II=100 percent). The alphabetic letter designates the ownership situation (where A=320 acres cash leased and the remainder owner; B=all land owned) for the land included in the farm. For example, situation I-A describes a farm operation where 320 acres is cash leased, the remainder is owned, and the farmer begins the period with net worth equal to 50 percent of the total value of land, buildings, machinery, and equipment. The 25 percent beginning equity level and total cash lease operations were analyzed, but results are not presented since neither situation provided a significant chance of survival or success. Insolvencies in these situations generally occurred prior to the end of the fourth year because net cash flow deficits greatly exceeded appreciation in the value of farmland.

The projected chance of survival over the next ten year period is shown in Table 1 for the selected sizes of farms under alternative situations in the El Paso Valley. The 160 and 320 acre farms had a significant chance of survival under situation II-B where the farm included only owned farmland and no real estate or machinery debt (100 percent beginning equity). However, in the lower beginning equity situation (50 percent), the chance of survival was projected to be very low. The 640 acre farm had a relatively high chance of survival under all situations except the 50 percent beginning equity with combined ownership and cash lease of the land (I-A). The 960 acre farm had a relatively high chance of survival under all four situations.

For a given beginning equity ratio and ownership situation, the chance of survival increased directly with farm size. The chance of survival also increased directly with the beginning equity ratio for a given farm size and ownership situation.

Table 2 shows the chance of success for the selected farm sizes and situations in this study. No significant chance of success was projected for the 160 and 320 acre farms under any situation; and the 640 acre farm had a significant chance of success in only one case, 100 percent beginning equity and ownership of all the farmland (II-B). The 960 acre farm had a high chance of success under the 100 percent beginning equity situation, however, the chance of success was less than 50 percent for both lower beginning equity situations (I-A and I-B). As in the case of survival, the chance of success increased directly with farm size and beginning equity ratio.

The relationship between the land ownership-cash lease situation and chance of survival and success is much less consistent than the relationships with farm size and beginning equity. The comparison can be made between the same size of farms with different situations, e.g., 960 acres with all owned land versus 960 acres with 320 acres cash lease; or the comparison can be made between farms with the same owned acreage, e.g., 640 acres owned versus 320 acres owned with 320 acres cash leased. As shown in Table 1 for 640 acres owned with 320 acres cash leased. As shown in Table 1 for 640 acres with 50 percent beginning equity, the first comparison (640 acres, I-B versus 640 acres, I-A) showed a decrease in the chance of survival from 88 percent to 5 percent. However, the second comparison (640 acres, I-B versus 960 acres, I-A) showed an increased chance of survival from 88 percent to 90 percent. This same type of inconsistency exists in the results for chances of success (Table 2). Therefore it can

Table 1: The Projected Chance of Survival for Selected Sizes of Farms Under Alternative Beginning Equity and Land Ownership Situations, El Paso Valley, 1979-88.

Item	Chance of Survival			
Situation	I-A[a]	I-B[b]	II-A[c]	II-B[d]
Farm Size:	-------------------------------------%-------------------------------------			
160 Acres	N/A	1	N/A	100
320 Acres	N/A	14	N/A	100
640 Acres	5	88	100	100
960 Acres	90	100	100	100

[a]50 percent beginning equity; 320 acres cash leased, remainder owned

[b]50 percent beginning equity; all owned land

[c]100 percent beginning equity; 320 acres cash leased, remainder owned

[d]100 percent beginning equity; all owned land

SOURCE: James W. Richardson, Tom P. Zacharias, Gary D. Condra, and Donald D. Stebbins, *Economic Analysis of Alternative Farm Sizes in El Paso County, Texas*, Departmental Technical Report No. 79-1.

Table 2. The Projected Chance of Success for Selected Sizes of Farms Under Alternative Beginning Equity and Land Ownership Situations, El Paso Valley 1979-88.

Item	Chance of Success			
Situation	I-A[a]	I-B[b]	II-A[c]	II-B[d]
Farm Size:	-------------------------------------%-------------------------------------			
160 Acres	N/A	0	N/A	0
320 Acres	N/A	0	N/A	6
640 Acres	0	0	11	80
960 Acres	14	44	94	100

[a]50 percent beginning equity; 320 acres cash leased, remainder owned

[b]50 percent beginning equity; all owned land

[c]100 percent beginning equity; 320 acres cash leased, remainder owned

[d]100 percent beginning equity; all owned land

SOURCE: James W. Richardson, Tom P. Zacharias, Gary D. Condra, and Donald D. Stebbins, *Economic Analysis of Alternative Farm Sizes in El Paso County, Texas*, Departmental Technical Report No. 79-1.

only be said that for a given size of farm, the chances of survival and success are higher if the land is all owned. Analysis of these results revealed that the appreciation in land value played a major role in providing increased net worth which, in turn, strongly influenced the chance of survival. In other words, the cash lessee received no benefit from increased land values, whereas the land owner received this benefit in increased credit capacity.

There are several conclusions which can be drawn from the results of this study. First, there is a very well-defined, direct relationship between farm size and/or beginning equity level and the chances of survival and success for farms in the El Paso Valley; i.e., the chances of survival and success increase as farm size and/or beginning equity level increases. This relationship is consistent throughout the results of this study, which covers a range of farm sizes from 160 acres to 960 acres. The results also suggest that this relationship extends beyond the 960 acre size, however, no conclusions can be drawn regarding this hypothesis.

The second major conclusion from this study is that the straight cash lease farm operation has little chance of survival and success. Cash lease as a traditional growth strategy for young farmers does not appear to hold great promise in the El Paso Valley since the results show that the farmer needs to have at least 50 percent beginning equity in 640 acres of owned land before cash lease of 320 acres can be expected to improve his chances of survival and success.

The third conclusion from this study is that the minimum size farm and beginning equity situation which will provide a reasonable chance of survival and success in the El Paso Valley for the next 10 years is 100 percent beginning equity in 640 acres of owned farmland. 'Reasonable chance' in this case should be interpreted to be greater than a 50-50 chance of achieving both objectives, survival and success. This is not to say that a smaller size farm and/or a lower beginning equity level cannot survive or succeed. It simply says that a farm in less than the minimum situation (640 acres owned with 100 percent beginning equity) will not likely survive the next 10 years; and if it survives, it will likely deteriorate in financial condition over that period. This implies a situation in which the farmer does not replace worn-out equipment or practice conservation practices which require capital investment. He would simply be depleting his equity. Certainly it is not likely that this farm will generate the required capital for growth — and based on this study, growth to a larger size or beginning equity level is the only path to achieving a reasonable chance of success.

The capital requirements for a 640 acre farm, owned land with 100 percent equity, were assumed to be $1,651,570 for this study. Given that this is the net worth the farmer must start with to achieve a reasonable chance of survival and success, there are serious implications concerning the mechanisms, or strategies, by which young people will be able to enter farming in the El Paso Valley. In other times and areas, the young farmer could lease land and eventually accumulate capital to purchase his own farm, but this does not appear to be a viable approach for the El Paso Valley over the next 10 year period.

There are very real limitations which must be placed on the results and conclusions of this study. First, the results are very sensitive to assumptions regarding the future rates of inflation for the prices of crops, inputs, family living expenses, and land. Secondly, specialty crops received limited consideration because of high capital requirements and/or market risk. Thirdly, it was assumed that land would be valued by the market. However, even with these limitations, these findings have serious implications for any public policy action which would tend to establish limitations on growth in land ownership in the El Paso Valley at a point below 640 acres. It appears likely, from these results, that such a move would discourage the beginning farmer and force the established farmer in the El Paso Valley to quit farming or accept less than the market rate of return for his time and/or capital. Certainly, this may have been the case with some public policies in the past, but it must be assumed that this was not the intent of these policies, or the policy makers.