Do Government Payments Influence Farm Business Survival?

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Abstract. Using a unique farm-level panel data set derived from three U.S. Agricultural Censuses, we estimate a Cox proportional hazard model to examine the effect of direct government payments on the survival of farm businesses, paying particular attention to the differential effect of payments across farm size categories. For identification the study exploits variation in payments resulting from historical differences in 'base acreage' in otherwise similar farms. We find an increase in government payments has a small but statistically significant positive effect on the rate of farm survival, and the magnitude of this effect increases with farm size. (L10, Q12, Q18)

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I. Introduction

Economists and policymakers have long been interested in the role of government payments in the growth and survival of farm businesses (e.g., Shepard, 1982; Leathers, 1992; Tweeten, 1993; Atwood, Watts, and Baquet, 1996; Huffman and Evenson, 2001). With government payments to farmers exceeding $20 billion in 1999, 2000, 2001, and 2003 – the role of farm payments has received greater public scrutiny, with some maintaining that the subsidies unfairly advantage large operations (e.g., Williams-Derry and Cook, 2000; Becker, 2001). These concerns spurred congressional efforts to tighten payment caps on large-scale producers during the 2002 Farm Act debate (e.g. Nelson, 2002). The effect of payments on farm survival continues to be an important issue in on-going international trade negotiations, where distortions created by agricultural support programs are a major source of contention.

This study uses a unique limited-access farm-level panel data set created from the 1987, 1992, and 1997 Censuses of Agriculture to derive the first estimates of the effect of government payments on the survival of individual U.S. farm businesses. Specifically, we estimate a Cox proportional hazards model to examine the effect of government payments on the instantaneous probability (hazard rate) of a farm business failure. The data allow us to examine how government payments influence the survival of individual businesses, controlling for the size, location and organizational structure of the operation, and the age, race, sex, and career specialization of the operator. We derive separate estimates of the effect of payments on business survival for six farm-size categories.

This study exploits an exogenous source of variation in government payments – differences in payments that result from differences in 'base acreage' in otherwise similar farms. Farmers that operate the same amount of land, located in the same county, producing the same crop may receive different levels of government payments if they have different amounts of land enrolled as 'base acres' – land enrolled in a particular commodity program based on past plantings. Prior to 1996, restrictions on what could be planted on base acreage elicited less than full participation in government programs – between 60 to 85 percent of qualified acres for most crops (USDA-ERS). Due to historical variation in participation, similar farms had different base acres and received different amounts of government payments.

We find that government payments have a small but statistically significant negative effect on the instantaneous farm business failure rate. We also find that government payments reduce the failure rate proportionally more for larger farms. These results suggest that past agricultural support payments have contributed disproportionately to the survival of large operations.

II. Literature

There is a substantial theoretical and empirical literature relating to firm size and firm survival. Jovanovic (1982), Ericson and Pakes (1992) and Pakes and Ericson (1998) present models in which firms (or entrepreneurs) are uncertain about their own efficiencies at startup. In these models, firms gradually learn about their abilities over time. The longer a firm operates in the market, the more information is gained. Firms who revise their perceptions of their ability upward over time tend to expand, while those revising downward tend to contract or exit. Consequently, the longer a firm has existed, the bigger it will be and the less likely it will be to fail. Empirical studies generally confirm these theoretical predictions (Dunne, Roberts and Samuelson, 1988; Baldwin and Gorecki, 1991; Audretsch, 1992; Audretsch and Mahmood, 1995; among others).

For small businesses, the personal characteristics of the owner, such as educational attainment, can be important for small business survival (Bates, 1990; Taylor, 1999). The operator's age may be another important determinant of firm size and survival. Age may be correlated to knowledge about the firm's competitive abilities – with older owners able to acquire more information (Jovanovic, 1982). Alternatively, the operator's age may be related to financial liquidity. In the presence of liquidity constraints, it may take many years for business owners to accumulate sufficient net worth to obtain a certain scale of production (Evans and Jovanovic, 1989; Holtz-Eakin, Joulfaian, and Rosen, 1994).

Government payments could influence farm business survival through a variety of mechanisms. Farms receiving high payments per-acre could bid up prices of fixed resources – especially land – causing low payment-per-acre farms to shrink or exit. Payments could also influence farm survival through capital market mechanisms. Government payments effectively raise a farm's net worth. This could make it less costly for the farm to obtain financing when liquidity constraints cause a farm's cost of capital to depend on its net worth (Hubbard, 1998). If large farms are liquidity constrained and small farms are not then an increase in payments per acre can cause large farms to expand and increase in number, which bids up land prices causing small farms to shrink and decline in number (Key and Roberts, 2005). Higher payments may also make agriculture more profitable relative to alternative occupations, which could reduce the incentive to exit farming.

Although a limited number of econometric studies have attempted to explain changes in the size and survival of farms based on characteristics of the farm operator or farm (Sumner and Leiby, 1987; Hallam, 1993; Zepeda, 1995; Weiss, 1999; Kimhi and Bollman, 1999), none have considered the role of government payments. A few studies have examined the relationship over time between government payments and *aggregate* measures of farm structure, including the national agricultural bankruptcy rate (Shepard and Collins, 1982), the total number of farms (Tweeten, 1993), and average farm size (Huffman and Evenson, 2001). To our knowledge, this is the first study to examine the effect of government payments on the survival of individual farms.

III. Data

The data used in this study are from the Census of Agriculture files maintained by the National Agricultural Statistics Service.[1] The Census is conducted every five years and includes all U.S. farms. Since we are interested in the effect of government payments on farm survival, and to reduce sample heterogeneity, we restrict our analysis to "program crop farms" – those operations

[1] More information about the Census of Agriculture can be found at: http://www.nass.usda.gov/census/.

with Standard Industrial Classification (SIC) codes indicating specialization in wheat, corn, soybean, rice, cotton, or “cash grains”.[2] Farms with these six SIC codes receive the largest shares of government farm payments.

Using the Census data, table 1 presents the survival rates of program crop farms that initiated production in 1982 by SIC code.[3] About 50% of new farms failed within the first five years. After 10 years, about 32% of farms remained in business, and after 15 years 22.5% remained in business. These survival rates are comparable to what has been reported for non-agricultural firms (e.g., Audretsch, 1991; Mata et al., 1995; Disney et al, 2003). Consistent with past studies, the probability of survival generally increases with the age of the firm (Evans, 1987a; Evans, 1987b; Audretsch, 1991). The survival rate does not vary considerably across farm types distinguished by their primary crop.

Because of the way information in the Census of Agriculture is collected, we focus on the duration of a farm business continuously operated by the same individual. The Census collects information as to when the current operator began to operate the farm, but not about how long the farm has been operating. Hence, there is no way to estimate the life of a farm business unless the same operator manages it.[4] Consequently, we define a surviving farm as one remaining in

[2] The three-digit SIC codes for wheat, corn, soybean, or rice are assigned if any one of these crops account for at least 50% of sales. An operation is classified as a “cash grain” farm if a combination of these crops, or another cash grain not elsewhere classified totals at least 50% of sales.

[3] More precisely the sample consists of farms that were first observed in the 1982 Census – these farms might have initiated production between 1979 and 1982, as 1978 was the year of the previous Census.

[4] The Census tracks operations over time using a Census File Number (CFN). The Census defines a farm as out of business if there is no response to the Census questionnaire or the questionnaire is returned stating that the farm is no longer operating. However, if a farm changes operators through a business transaction or inheritance, the CFN may change even though the business is still operating. Hence it is not possible to estimate the duration of a farm business based on how long the CFN appears in the Census.

business and having the same operator; farms remaining in business with a different operator were removed from the sample.[5]

We examine the role of government payments in the survival of program crop farms that were in business in 1987 – the first year the Census of Agriculture began collecting information on government payments. Our sample includes the 255,477 program crop farms that had at least 10 acres of land and $1000 of sales in 1987 and for which information on all variables was available. The Census allows us to identify whether a farm business ceased operating between 1987 and 1992, or between 1992 and 1997, or whether it was still operating in 1997. In addition, the Census records the year in which the current operator began managing the operation. Therefore, the spell or life of the farm business is defined as 1987 minus the year the operator initiated farming on the operation plus 2.5, 7.5, or 10, depending on whether the operation failed by 1992, failed by 1997, or remained in business in 1997, respectively. If the operation remained in business in 1997, the spell is right censored.

Because of the way we define the age of the business, all spells are left truncated. We do not begin to observe businesses until 1987 - a known time after they began operating, and the risk set does not include businesses that failed prior to 1987. For example, of all businesses initiated in 1980, we only observe those businesses in 1987 that survived at least seven years. We do not observe farms that failed before 1987. Hence, for businesses that began in 1980 the spell is left truncated at seven years. The observed spell is therefore conditional on the period of truncation being exceeded.[6]

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[5] A farm is considered to have the same operator if the age of the operator differs by five years between consecutive Censuses. About 8% of continuing farms had operators whose age differed by more or less than five years, and were therefore eliminated from the sample.

[6] Left truncation is accounted for in the estimated likelihood function associated with the Cox proportional hazard model and the product-limit survival function estimates discussed in the next section (See SAS 9.1 PHREG Procedure, p. 2998, for details).

IV. Methods and Results

First, we compare the average spell of farm businesses of different sizes and different shares of government payments in total sales. Table 2 shows that for all sales quantiles examined, a larger share of government payments in sales corresponds to a longer average spell.[7] For example, for farms between the 75th and 100th sales percentile (more than $84,268 in sales), those in lowest payments share quartile have an average spell of 24.57 years compared to 28.19 years for those in the highest payments share quartile.

Next, we compare Kaplan-Meier nonparametric survivor function estimates for farm businesses with high and low government payments as a share of sales in 1987 (the first year of the study). Figure 1 illustrates that farms in the bottom government-payments-as-a-share-of-sales quartile (*govpaycat*=25) are less likely to survive than are those in the top quartile (*govpaycat*=75). The Kaplan-Meier estimation does not account for the left truncation of the spells mentioned above, so the estimated survival probabilities are biased.[8] However, a comparison of the survival functions illustrates a clear difference between the groups. After 30 years, only about 42% of farms in the bottom payments-share quartile survived compared to about 58% of farms in the top quartile. Farms in the bottom payment-share quartile have an estimated mean life span of 27.4 years, compared to 34.5 years for farms in the top quartile. Statistical tests reveal that it is very unlikely that the survivor functions are identical across the government payment strata. Both the Savage (log-rank) test and the Wilcoxon test indicate a

[7] The average spells reported in table 2 do not account for left truncation or right censoring, meaning the average spells should not be interpreted as estimates of average life spans.

[8] Survival probability estimates are biased upward as short-lived businesses are disproportionately excluded from the sample.

significant difference in the survival rates of farms that did not receive government payments in 1987 and those that did receive payments.[9]

A statistically significant difference between the estimated survival functions is not strong evidence that government payments influence survival because other factors may be correlated with both payments and survival. For example, high-payment farms are larger on average, are more concentrated in certain types of farms and in certain regions, and are more likely to grow certain crops. If these factors are correlated with both government payments and duration of farm survival, we may observe a relationship between payments and survival that is not causal. To control for these factors we use the more general Cox proportional hazard model (Cox, 1972).

The Cox model assumes a parametric form for the effect of the explanatory variables on survival, but allows the form of the underlying survivor function to be unspecified. Cox's semiparametric model has been widely used to explain firm survival (e.g., Mata et al, 1995; Audretsch and Mahmood, 1995; Disney et al, 2003). The survival time of each member of the population is assumed to follow a hazard function given by:

$$(1) \qquad h_{it} = h_0(t)\exp(x_i'\beta),$$

where $h_0(t)$ is the baseline hazard function, x_i is a vector of explanatory variables, and β is a vector of parameters.[10] To estimate β, Cox (1972, 1975) proposed a partial likelihood function,

[9] The Log-Rank test has a chi-square statistic of 4155.8 with an associated P-value less than 0.0001; the Wilcoxon test has a chi-square of 4082.7 with an associated P-value less than 0.0001.
[10] The hazard function h_{it} is the rate at which spells will be completed at duration *t*, given that they last until *t*.

which eliminates the unknown baseline hazard function and accounts for the fact that survival times are censored.

Explanatory variables include characteristics of the farm business and farm operator in the initial period, 1987. Firm characteristics include business size (logarithm of total agricultural sales), indicator variables for the Standard Industrial Classification (SIC) of the farm, and an indicator for the organizational structure of the farm (family-owned or otherwise). We also experiment with fixed effects for the state in which the farm is located, for sales categories, and for sales categories interacted with the SIC code. In terms of operator characteristics, we use indicators for ten operator age categories, for the operator's race (white or otherwise), and the operator's main occupation (farming or otherwise). Because the distribution of government payments (like sales) is highly skewed, we use the natural logarithm of government payments, and set the value to zero when payments equal zero.[11] This transformation also facilitates interpretation of the coefficient.

Results reported in table 3 illustrate the stability of the estimates to changes in model specification. In the first column, the effect of government payments on the hazard is estimated controlling for farm size, SIC category, and the age of the farm operator. Consistent with other studies discussed above, we find that larger businesses are less likely to fail than smaller ones.

As many farm business fail when the operator retires, it is not surprising that being younger than 70 years old (the missing category is 70 years or older) reduces the exit hazard, and that the magnitude of this reduction in the hazard shrinks rapidly for farmers 55 and older. Holding all else constant, operators 30-34 years old faced the smallest hazard, which increased

[11] We also tried using government payments as a share of receipts (sales plus payments) which has the advantage of being bounded between zero and one. The main results obtained using this specification did not differ substantially from the results obtained using the logarithm of payments.

gradually with age until farmers are 50-54 years old. This result means we find no evidence to suggest that age is positively related to financial liquidity or to the acquisition of information in a way that enhances the likelihood of survival.

Column 2 introduces additional controls for operator and farm business characteristics. Hazard rates are significantly lower on farms that are family-owned, or have an operator who is male or white. The hazard rate is not significantly associated with the operator having farming as a primary occupation.

Column 3 introduces 38 state fixed effects. Column 4 includes fixed effects for the four sales categories and for the 24 sales-SIC interaction effects. These interaction indicators classify farms into one of four sales quartiles in one of the six SIC crop categories. The coefficient associated with the logarithm of government payments is statistically very significant and consistent across the four model specifications.

To interpret the payments coefficient, we can rewrite (1) as:

(2) $$\ln h_{it} = \ln h_0(t) + x_i'\beta \ .$$

Let β_g be the coefficient associated with the natural logarithm of government payments ($\ln g_i$), an element of x_i. It follows that:

(3) $$\beta_g = (dh_{it}/dg_i)(g_i/h_{it}).$$

That is, β_g is the responsiveness of the conditional probability of farm business failure to a change in government payments, expressed as an elasticity. Hence, the full model (column 4) indicates that a 10% increase in government payments reduces the instantaneous rate of business failure by 0.43%.[12]

To estimate how the influence of farm payments on farm survival varies with farm size, the full model is estimated separately for six farm-size categories. The results presented in table 4 indicate that the effect of payments increases proportionally with farm size up to the top size quartile. A 10% increase in the government payments reduces the instantaneous rate of farm failure by 0.23%, 0.44%, 0.64%, and 0.91% for farms in the smallest to largest sales quartiles, respectively. This relationship between scale and effect size is expected as farm income represents a larger share of total farm household income for larger farms. However, the magnitude of the effect of payments does not seem to increase beyond the 75th farm-size percentile: A 10% increase in payments reduces the hazard by 0.91%, 0.92%, and 0.88% for the largest 25%, 10% and 5% of farms, respectively.

A large reduction in government payments could have substantially different implications for farms of different sizes. Table 5 illustrates the effect of a 50% reduction in direct government payments on expected life spans.[13] The effect of the payment reduction is shown separately for payment recipients and for all farms. Larger operations experience a greater reduction in life duration for two reasons. First, the marginal effect of a reduction in payments is greater for larger operations. Second, a greater percentage of large farms receive government payments (97.0% for the largest quartile, compared to 50.1% for the smallest quartile). The table

[12] In theory, farmers could respond to realized or expected government payments. Realized payments provide a noisy estimate of expected payments because a large component of expected payments are transitory. Consequently if farmers respond to expected payments, our estimated coefficient likely underestimates the effect of a change in expected payments.

[13] Government payments have fluctuated by 50% or more in consecutive years. For example, total direct payments fell from $20.7 billion in 2001 to $10.9 billion in 2002, and rose again to $17.4 billion in 2003. (http://www.ers.usda.gov/Data/FarmIncome/finfidmu.htm)

shows that a 50% drop in direct government payments shortens the expected life of the largest farms by 5.6% from 14.66 to 13.84 years, and shortens the expected life of the smallest farms by 0.6% from 7.41 to 7.37 years.

V. Conclusions

The study found that government payments have a small but statistically significant positive effect on farm business survival. This finding could be explained by several factors. Farms receiving relatively high payments may be able to bid up the price of land and other fixed resources – causing farms receiving lower payments to exit. Government payments may also relieve liquidity constraints allowing farms receiving more payments to achieve a more efficient scale and remain in business longer. Additionally, higher payments may make farming more profitable relative to alternative occupations, thereby reducing incentives to exit agriculture.

The study also found that government payments increase business survival rates proportionally more for larger farms. This result is probably attributable to the fact that government payments' share of farm household income increases with total sales. While payments appear to disproportionately benefit larger operations, the long run consequences of an increase in payments for agricultural structure are ambiguous. Lower failure rates for larger farms do not necessarily imply an increase in the concentration of production. Further work would be needed to understand how government payments influence the size distribution of farm businesses.

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Table 1. New Program Crop Farm (1982) Survival Rates over Time by Farm Type

	1982	1987	1992	1997
All program crop farms	140,876	70,478	45,122	31,630
		(50.0)	(32.0)	(22.5)
Wheat (SIC=111)	20,592	10,534	6,678	4,697
		(51.2)	(32.4)	(22.8)
Rice (SIC=112)	1,750	864	525	330
		(49.4)	(30.0)	(18.9)
Corn (SIC=115)	46,150	23,091	14,876	10,363
		(50.0)	(32.2)	(22.5)
Soybean (SIC=116)	34,875	15,398	9,311	6,392
		(44.2)	(26.7)	(18.3)
Cash Grain (SIC=119)	32,643	18,330	12,396	8,927
		(56.2)	(38.0)	(27.3)
Cotton (SIC=131)	4,866	2,261	1,336	921
		(46.5)	(27.5)	(18.9)

Notes: The survival rate (in parentheses) is defined as the number farms surviving in a given period, as a percentage of the total number of new program crop farms established in 1982.

Table 2. The Average Farm Business Spell by Sales and Government Payments as a Share of Sales

Sales Quantiles	Government Payments as a Share of Sales (θ) - Quartiles			
	0-25% (θ<0.09)	25-50% (0.09≤ θ <0.20)	50-75% (0.20≤ θ <0.34)	75-100% (θ ≥0.34)
0-25% (Sales < $10,963)				
Years	22.61	23.08	23.55	24.73
(Std. Err.)	(0.080)	(0.181)	(0.172)	(0.124)
Obs.	34,052	6,975	7,639	15,202
25-50% ($10,963 ≤ Sales < $32,868)				
Years	24.81	25.11	26.59	28.04
(Std. Err.)	(0.118)	(0.125)	(0.122)	(0.111)
Obs.	15,463	14,564	15,039	18,803
50-75% ($32,868 ≤Sales < $84,268)				
Years	24.86	26.78	28.37	28.51
(Std. Err.)	(0.154)	(0.102)	(0.099)	(0.102)
Obs.	8,214	18,290	19,198	18,168
75-100% (Sales ≥ $84,268)				
Years	24.57	27.13	28.18	28.19
(Std. Err.)	(0.156)	(0.077)	(0.083)	(0.118)
Obs.	6,141	24,039	21,994	11,696
90-100% (Sales ≥ $161,500)				
Years	25.02	27.52	28.14	28.54
(Std. Err.)	(0.236)	(0.110)	(0.129)	(0.240)
Obs.	2,652	11,404	8,809	2,687
95-100% (Sales > $228,940)				
Years	25.20	27.75	28.10	28.64
(Std. Err.)	(0.319)	(0.147)	(0.197)	(0.430)
Obs.	1,507	6,508	3,838	924

Figure 1. Kaplan-Meier Estimated Survival Functions for Farms in the Upper and Lower Government Payments as a Share of Sales Quartiles

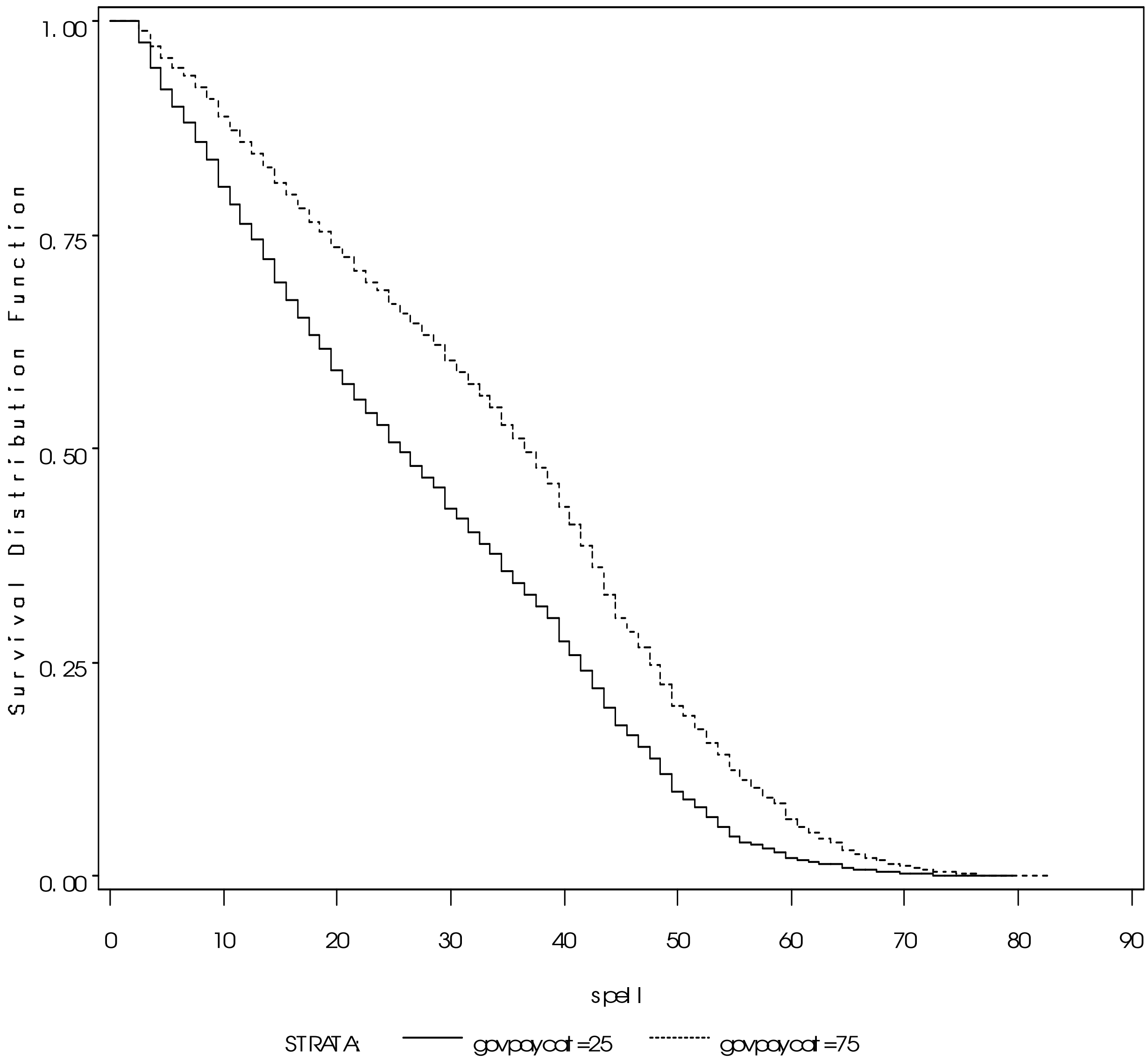

Table 3. Cox Proportional Hazard Model Estimates of Farm Business Duration under Various Specifications

	(1)		(2)		(3)		(4)	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Log Sales	-0.065	0.003	-0.089	0.003	-0.096	0.003	-0.062	0.006
SIC 111 (Wheat)	-0.255	0.013	-0.259	0.013	-0.211	0.016	-0.210	0.027
SIC 112 (Rice)	0.144	0.023	0.128	0.023	0.013	0.025	-0.012	0.033
SIC 115 (Corn)	-0.182	0.011	-0.175	0.011	-0.145	0.015	-0.184	0.021
SIC 116 (Soybean)	-0.199	0.011	-0.188	0.012	-0.155	0.015	-0.187	0.022
SIC 119 (Cash Grain)	-0.360	0.011	-0.346	0.011	-0.314	0.014	-0.306	0.020
Operator’s Age <30	-0.766	0.014	-0.665	0.014	-0.660	0.014	-0.655	0.014
Operator’s Age 30-34	-0.803	0.014	-0.710	0.014	-0.706	0.014	-0.696	0.014
Operator’s Age 35-39	-0.772	0.013	-0.691	0.014	-0.689	0.014	-0.677	0.014
Operator’s Age 40-44	-0.725	0.013	-0.652	0.013	-0.649	0.013	-0.637	0.013
Operator’s Age 45-49	-0.699	0.013	-0.634	0.013	-0.633	0.013	-0.622	0.013
Operator’s Age 50-54	-0.622	0.012	-0.567	0.013	-0.568	0.013	-0.557	0.013
Operator’s Age 55-59	-0.392	0.011	-0.347	0.011	-0.347	0.011	-0.340	0.011
Operator’s Age 60-64	-0.183	0.010	-0.147	0.011	-0.145	0.011	-0.141	0.011
Operator’s Age 65-69	-0.192	0.011	-0.170	0.011	-0.168	0.011	-0.168	0.011
Sex = Male	-		-0.255	0.014	-0.256	0.014	-0.258	0.014
Race = White	-		-0.139	0.026	-0.076	0.027	-0.083	0.027
Organiz. = Family Owned	-		-0.389	0.007	-0.386	0.007	-0.390	0.007
Main Occupation = Farmer	-		0.011	0.007	0.002	0.007	0.006	0.007
Sales Quartile 0-25	-		-		-		0.153	0.038
Sales Quartile 25-50	-		-		-		0.118	0.031
Sales Quartile 50-75	-		-		-		0.091	0.027
State Fixed Effects	-		-		yes		yes	
Sales Quartile*SIC	-		-		-		yes	
Log Govt. Payments	-0.043	0.001	-0.041	0.001	-0.043	0.001	-0.043	0.001
Log-likelihood	-1619480		-1617837		-1617220		-1617073	
Chi-Sq (P-value)	21148.19	(<.0001)	24434.52	(<.0001)	25668.18	(<.0001)	25961.8	(<.0001)
Obs.	255,477		255,477		255,477		255,477	

Note: Chi-Sq is the statistic associated with the test of the global null hypothesis that β =0.

Table 4. Cox Proportional Hazard Model Estimates of Farm Business Duration by Farm Size Quantile

	Total Sales Quantile											
	0-25%		25-50%		50-75%		75-100%		90-100%		95-100%	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Log Sales	-0.088	0.008	-0.086	0.016	-0.101	0.020	-0.060	0.012	-0.017	0.023	0.039	0.033
SIC 111 (Wheat)	-0.169	0.034	-0.257	0.034	-0.207	0.036	-0.203	0.033	-0.188	0.052	-0.117	0.072
SIC 112 (Rice)	-0.036	0.087	-0.018	0.068	0.084	0.048	0.028	0.035	-0.009	0.050	0.045	0.066
SIC 115 (Corn)	-0.164	0.033	-0.129	0.033	-0.106	0.033	-0.074	0.027	-0.096	0.039	-0.117	0.053
SIC 116 (Soybean)	-0.160	0.033	-0.129	0.032	-0.160	0.032	-0.135	0.027	-0.134	0.040	-0.115	0.054
SIC 119 (Cash Grain)	-0.322	0.033	-0.330	0.032	-0.305	0.032	-0.227	0.025	-0.203	0.035	-0.190	0.046
Operator’s Age <30	-0.450	0.024	-0.689	0.026	-0.799	0.033	-0.688	0.042	-0.648	0.072	-0.614	0.098
Operator’s Age 30-34	-0.495	0.025	-0.650	0.026	-0.852	0.032	-0.777	0.040	-0.716	0.067	-0.650	0.089
Operator’s Age 35-39	-0.485	0.024	-0.604	0.026	-0.796	0.031	-0.821	0.039	-0.774	0.065	-0.735	0.085
Operator’s Age 40-44	-0.469	0.022	-0.574	0.025	-0.742	0.031	-0.814	0.039	-0.809	0.065	-0.786	0.085
Operator’s Age 45-49	-0.455	0.022	-0.587	0.025	-0.756	0.031	-0.762	0.038	-0.710	0.063	-0.675	0.083
Operator’s Age 50-54	-0.412	0.021	-0.560	0.024	-0.684	0.029	-0.657	0.037	-0.607	0.062	-0.579	0.081
Operator’s Age 55-59	-0.342	0.020	-0.402	0.021	-0.374	0.026	-0.317	0.036	-0.290	0.060	-0.296	0.079
Operator’s Age 60-64	-0.258	0.019	-0.209	0.019	-0.103	0.024	-0.043	0.035	-0.025	0.059	-0.060	0.078
Operator’s Age 65-69	-0.185	0.018	-0.181	0.019	-0.180	0.026	-0.170	0.038	-0.110	0.064	-0.096	0.084
Sex = Male	-0.207	0.020	-0.283	0.025	-0.369	0.034	-0.365	0.044	-0.362	0.074	-0.272	0.108
Race = White	-0.104	0.035	-0.086	0.059	-0.155	0.078	-0.166	0.095	0.041	0.164	0.004	0.212
Organiz. = Family Owned	-0.300	0.015	-0.344	0.014	-0.393	0.015	-0.433	0.013	-0.418	0.020	-0.383	0.027
Main Occupation = Farmer	0.125	0.011	0.069	0.011	-0.066	0.015	-0.279	0.026	-0.361	0.049	-0.332	0.071
State Fixed Effects	yes		yes		yes		yes		yes		yes	
Log Govt. Payments	-0.023	0.001	-0.044	0.002	-0.064	0.002	-0.091	0.002	-0.092	0.004	-0.088	0.005
Log-likelihood	-425240		-372311		-323560		-280805		-100232		-47093	
Chi-Sq (P-value)	3028.5	(<.0001)	4415.0	(<.0001)	5241.0	(<.0001)	5527.2	(<.0001)	2395.7	(<.0001)	1258.7	(<.0001)
Obs.	63,868		63,869		63,870		63,870		25,552		12,777	

Note: Chi-Sq is the statistic associated with the test of the global null hypothesis that β =0.

Table 5. The Effect of a 50% Reduction in Government Payments on the Duration of Farm Businesses.

Sales Quartiles	Estimated Life of Farm Business (Years)					
	Farms Receiving Payments			All Farms		
	Base	50% of Base	% Change	Base	50% of Base	% Change
0-25%	7.98 (0.022)	7.88 (0.022)	-1.2	7.41 (0.020)	7.37 (0.020)	-0.6
25-50%	9.79 (0.028)	9.53 (0.027)	-2.7	9.14 (0.027)	8.94 (0.026)	-2.2
50-75%	12.30 (0.046)	11.76 (0.045)	-4.3	11.73 (0.037)	11.27 (0.044)	-4.0
75-100%	15.09 (0.048)	14.23 (0.045)	-5.7	14.66 (0.046)	13.84 (0.045)	-5.6