Perception of Decoupled Government Payments: Evidence from a National Survey.
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Abstract

Based on results from a national survey, this study examines how farm households say that they used (or would use) government transfers distributed in the form of direct fixed payments. In addition, the study examines what factors best explain farm household decisions regarding how fixed payment proceeds are used.

Keywords: direct payments, decoupled payments

Introduction

Federal government policies to subsidize farmers were initiated in the United States more than sixty years ago during the Great Depression when world agricultural markets had collapsed and farmers were numerous and impoverished. Current government programs continue making various types of income support payments to farmers. The fixed payments or Production Flexibility Contract (PFC) payments introduced with the FAIR Act in 1996 help maintain farm income in a manner that proponents argue does not distort farm-level production decisions and encourage overproduction. They believe that these payments generate only minimal distortions in resource allocation decisions and are thus an efficient way to transfer income to targeted recipients.

However, these "decoupled" payments have been the focus of significant attention during the recent World Trade Organization (WTO) round of negotiations. The debate centered on the extent to which U.S. fixed payments (and similar payments in the European Union) are really decoupled from farm-level production decisions. While the U.S. fixed payment program was designed to be fully compliant with WTO obligations, a WTO panel has issued a mixed verdict in a dispute brought by Brazil challenging several types of U.S. agricultural support measures, including direct payments. Specifically, opponents argue that income support provided to U.S. cotton farmers through direct payments creates incentives to produce more cotton and thus suppresses world cotton prices.

This study, based on data from a national survey of farm households, investigates further how farm households perceive fixed payments and is intended to enrich the existing literature on the efficiency and rationality of fixed payments as a means of income transfer. This is accomplished via two specific objectives. The first is to examine what factors explain differences in how farm households allocate (or would allocate) fixed payments between generalized farm and household categories. The second objective is to examine what factors explain differences in the specific farm (household) uses to which the funds are (or would be) allocated. Better understanding the factors that explain how households choose to allocate fixed payments provides insights into the extent to which these payments can be considered decoupled.

The paper proceeds as follows. The next section reviews recent theoretical and empirical work on the decoupling issue, especially the effect of decoupling on production decisions. In addition, literature that addresses farm household allocation and investment decisions is also reviewed. This is followed by sections that discuss the data and econometric methods, empirical results, and conclusions and implications.

Literature review

The effect of fixed payments on production decisions and market supply has been analyzed using various approaches. Many empirical studies have focused on analysis of the acreage and/or production response to the direct payments made to US wheat, feed grains, cotton, and rice producers under the 1996 FAIR Act (OECD, 2005). These studies are based on the general notion that the impact on production from any type of government financial support for agriculture depends on the exact nature of the program through which the support is being provided as well as on the incentives that the program creates and the behavior of producers in response to those incentives.

Hennessy (1998) developed a neo-classical framework for the analysis of income support policies under uncertainty. Hennessy found that, in general, government payments affect farmers' risk aversion through wealth and/or insurance effects. Fixed payments cause a wealth effect but no insurance effect. A fixed payment affects a farmer's wealth and this change in wealth can affect risk attitudes. If risk aversion is decreasing in wealth, then fixed payment should make farmers more willing to take on risk. For example, they may be more willing to expand production by planting crops on land that would otherwise be viewed as too risky OECD (2001).

Makki, Somwaru, and Vandeveer (2004) reviewed empirical studies of risk aversion among U.S. farmers. They note that, in general, these studies found evidence of risk aversion though the exact magnitude varied widely. With regard to fixed payments, Makki, Somwaru, and Vandeveer (2004) conclude that the resulting effects on production are likely to be small for several reasons. First, payments are, on average, low (less than 3 percent) relative to the net worth of participants. While fixed payments might influence production through "risk effects," changes in risk aversion could also be manifested in many other ways such as changes in input use or mix of outputs. Further, despite the

availability of fixed payments, surveys find that producers still use various tools – such as insurance, hedging, and management strategies – to reduce risk.

Even if producers are not risk-averse, production decisions may be influenced by expectations about the conditions attached to future payments. For example, fixed payments may affect planting decisions if producers have reason to believe that there might be future updating of the area upon which payments are based OECD (2001). In such a case, producers might be reluctant to reallocate acreage from program crops to other crops or to idle marginal land in order to protect their eligibility for future payments. For there to be a link between current payments and these production decisions, producers would have to believe that current program provisions provide a good indicator of future program provisions. Goodwin and Mishra (2006) evaluated the effect of base updating on planting decisions. Their results do not exhibit a statistically significant effect on acreage allocations.

A production decision for a given year may be based on a variety of intertemporal considerations (OECD, 2001; Roe et al., 2004). Production decisions are tied to decisions about investments in productive assets. Capital goods can be used at least partially in future production years. This means that production in a given year is a function of several inputs including the current level of capital, which depends on past investment decisions. The farmer must decide each year how much to produce and invest in the farm, taking into account that any additional capital will affect both current and future production.

If capital markets are perfectly competitive, the production and investment decisions will be independent of consumption decisions. The level of optimal investment will be based on the rate of the return from the farm investment compared to market interest rates. Farmers adjust their consumption and investment decisions across time using capital markets to borrow or lend freely. In this scenario, fixed payments will not affect investment decisions, that is, fixed payments will be decoupled in both a static and a dynamic sense.

However, if capital markets are imperfect, then agricultural subsidy programs will not be decoupled in a dynamic sense, even if they are decoupled in a static sense (OECD, 2001). When producers face capital constraints, the additional income generated from

fixed payments will allow them to invest more in farm operations out of earnings generated by the farm business (OECD, 2005). Based on this theory, Young and Westcott (2000) argue that if farmers have limited liquidity and/or face credit constraints, the cash flow and increased wealth provided by fixed payments may facilitate more production through increases in agricultural investments. Of course, some of the fixed payment may be allocated to consumption, savings, and non-farm investments, but, farm investment may also rise.

Collender and Morehart (2004) examine the extent to which capital market imperfections may affect farm investment and production. They find that imperfections do exist but they do not appear to influence aggregate investment. Though some farmers have limited liquidity or face credit constraints, any increased investment enabled by fixed payments would not have much effect on aggregate production. Further, the effect would likely be transitory. Farmers who cannot afford the investments required to attain and maintain efficiency, will soon be induced by competitive forces to relinquish control of their assets to unconstrained farm owners or managers.

Mishra and Goodwin (2005) estimated acreage response models that incorporate market prices, fixed payments and marketing loan payments. They also attempted to capture the indirect effects of fixed payments on acreage response through farmers' aversion to risk and capital constraints. They estimated their models not only at the farm level but also at the county-level because the farm-level data did not track individual farms over time. Findings based on both the farm-level and county-level data indicated that the effect of direct payments on acreage decisions was very small, though in some cases statistically significant. These results are similar to those obtained from the aggregate model by Burfisher and Hopkins (2003). Mishra and Goodwin (2005) also found that acreage decisions are not affected by changes in wealth, thus implying that any risk preference shifts caused by different levels of wealth do not appear to affect crop acreage. This is in contrast to other findings (e.g., Hennessy, 1998) that suggested important wealth effects on risk preferences and production.

Burfisher and Hopkins (2003) suggest that fixed payments might affect the farm household's labor-leisure choice. Ahearn et al. (2002) analyze the impact of government payments on off-farm labor force participation decisions and hours worked off the farm

by farm operators. Their results indicate that government payments reduce the probability of working off the farm. However, the effect is relatively small. El-Osta, Mishra, and Ahern (2004) found that the impact of direct payments on on-farm work hours was statistically significant but also small in magnitude. Ahearn et al. (1993) determined that an increase in farm households' incomes will cause a rise in consumption and living expenditures. Mishra and Moreheart (2001) investigated factors that affect off-farm investment by farm households. Among other statistically significant variables, household net worth and farm size were positively related to off-farm investment.

Goodwin and Mishra (2006) evaluated farmers' reported allocations of direct payment receipts among farm and non-farm uses. Their results indicate that operators of larger farm are more likely to report significant on-farm usage of the funds received as direct payments. Operators that are highly leveraged are much more likely to allocate funds toward on-farm uses. This is consistent with the argument that direct payments may affect the production of credit-constrained producers. Older farmers and farmers expecting to retire in the near future are much less likely to allocate direct payment receipts to on-farm uses. Wealthy farm operators are more likely to use direct payment receipts for on-farm purposes while highly risk-averse operators are less likely to allocate direct payments to the farm.

Data and Methods

Our analysis is conducted using individual farm data collected under the Agriculture Resource Management Survey (ARMS) project by the National Agricultural Statistics Service (NASS) of the USDA. These data are collected annually by a survey of individual farmers. The ARMS data represent the USDA's primary source of information about U.S. agricultural production conditions, marketing practices, resource use, and the economic well-being of farm households.

We use data collected in the 2003 ARMS survey. This survey included several questions related to how the proceeds from direct payments either were allocated (for those who currently received direct payments) or would be allocated (for those who did not currently receive direct payments). These questions were asked only in the 2003

survey and thus, our analysis has the limitation of looking only at a single-period. The results of preliminary analysis of responses are provided in Table 1.

Table 1. Stated Uses of Fixed Direct (Decoupled) Payments

Use of Payments	Weighted Average	St. Deviation
Entire Sample (n = 5,596)		
Used on Farm	65.11	396.23
Used on Household	34.89	396.23
Used on Farm Operating Costs	32.56	467.09
Used on Farmland Rental and Purchase	9.13	213.25
Used on Farm Capital Expenditures	12.18	273.33
Used to Pay Down Farm Debt	11.24	252.29
Used on Farm Living Expenditures	16.24	281.07
Used to Build Household Cash Reserves	7.12	205.37
Used in Non-farm Assets	7.66	211.99
Used to Pay Down Non-farm Debt	3.87	142.62
Sub-Sample (1) that Received Payments in 2003 (n = 2,017)		
Used on Farm	74.67	382.34
Used on Household	25.33	382.34
Used on Farm Operating Costs	43.31	326.02
Used on Farmland Rental and Purchase	11.35	187.90
Used on Farm Capital Expenditures	6.68	241.45
Used to Pay Down Farm Debt	13.33	163.13
Used on Farm Living Expenditures	15.48	229.03
Used to Build Household Cash Reserves	3.62	189.23
Used in Non-farm Assets	3.96	172.35
Used to Pay Down Non-farm Debt	2.12	121.01
Sub-Sample (2) that Did Not Receive Payments in 2003 (n = 3,579)		
Used on Farm	48.10	481.96
Used on Household	51.90	481.96
Used on Farm Operating Costs	24.16	442.71
Used on Farmland Rental and Purchase	7.87	180.04
Used on Farm Capital Expenditures	14.42	286.67
Used to Pay Down Farm Debt	10.65	290.11
Used on Farm Living Expenditures	21.36	315.67
Used to Build Household Cash Reserves	12.09	284.46
Used in Non-farm Assets	13.57	225.53
Used to Pay Down Non-farm Debt	4.88	153.12

The empirical analysis was estimated in two parts. The first part utilizes multinomial logit procedures and examines factors that explain how households indicated they have (or would) allocate fixed payments between general farm and household uses.

Goodwin and Mishra (2006) conducted a similar empirical analysis; however they only examined the responses of those who actually received direct payments in 2003. Our analysis includes both current recipients and non-recipients. The entire sample of 5,596 observations is divided into two subsamples (recipients and non-recipients) and the model is estimated. The discrete dependent variable is based on results from a question that asks whether the farm would allocate a $10,000 fixed payment to farm uses, household uses, or both farm and household uses. The latter is used as the base case for the multinominal logit model.

In the second part, a censored two-limit tobit model is employed to examine factors that explain allocations across specific farm and household uses. In the survey, respondents could choose from among 5 specific allocations for farm use – farm operating costs (excluding the rental of farmland), farmland rental, farm capital expenditures (excluding the purchase of farmland), farmland purchases, and farm debt payments. Respondents also chose from among 5 specific allocations for household uses - family living expenditures (food, clothing, appliances, medical care, education, vacations, etc.), maintain a cash reserve for the household, non-farm financial assets (e.g. stocks, bonds, or other investments), non-farm real assets (e.g. non-farm real estate or home improvements), and non-farm debt payments. To simplify the analysis we merged the shares allocated to farmland rental and purchase, since both would indicate acreage expansion, and shares allocated to non-farm financial and real assets, which together would represent allocation to all non-farm assets of any kind.

In both parts of the empirical analysis, any farm that is not classified as a family farm was excluded. Family farms would still include those that are classified as commercial, limited-resource, retirement, residential/lifestyle farms. Thus, our sample includes only farms that are closely held or controlled by the farm operator and household. A dummy variable identified where the farm was located within the 9 Economic Research Service (ERS) production regions and a dummy variable for farm typology based on the major commodity produced on the farm measured by value of production.

Other variables included in the empirical analysis are farm size (measured by total value of production), wealth (measured by net worth), financial leverage (measured by

debt-to-asset ratio), rate of return on assets, farm tenure, and marketing strategies. In addition, we included household characteristics such as: household size and age demographics, operator's gender, operator's marital status, operator's age, operator's education level, whether or not the operator intended to retire prior to 2008, whether or not the operator or spouse were employed off the farm, and whether or not the operator or spouse were employed off the farm prior to starting the farm operation.

Respondents were also asked whether they agree or disagree that non-farm investments offer higher returns than farm investments and if non-farm investments reduce the household's overall financial risk. In addition, to measure risk preferences we constructed a proxy variable that is the ratio of total expenditures on insurance over total farm expenses. We hypothesize that more risk averse farms will tend to devote more of their total production expenditures to insurance. Definitions for the variables used in the analysis are presented in table 2.

The ARMS survey applies complex stratified, multi-frame, probability-weighted, and sometimes multiple-phase, sampling methods. These sampling methods lead to complications in estimating the efficiency of summary statistics. When the empirical analysis involves maximum likelihood estimation techniques, the complications occur in estimating the standard errors. To address this problem a delete-a-group jacknife procedure was used (Dubman, 2000). We use the NASS version of the delete-a-group jacknife, where the sample is divided into 15 nearly equal and mutually exclusive parts. Fifteen parameter estimates, called "replicates", are created. One of the 15 parts is eliminated, in turn, for each replicate estimate with replacement. Replicate weights are adjusted in a complex manner to assure the near unbiasedness of the jacknife variance estimator.

Empirical Results

The multinomial logit analysis of payment allocation was based upon 5,596 farms across the U.S. The model was additionally run separately on the two subsamples – those who received direct payments in 2003 (a sample of 2,017 farms), and those who did not receive direct payments in 2003 but answered a question regarding a hypothetical $10,000 direct payment (a sample of 3,579 farms).

Table.2 Description of the explanatory variables

Variable	Description
Farm Characteristics:	
FARMSIZE	total value of production in thousands U.S. dollars
WEALTH	net worth in thousands U.S. dollars
DEBTASSET	debt-to-asset ratio
RROA	rate of return on assets (from farming)
INS	proxy variable, constructed as the ratio of total expenditures on insurance over total farm expenses
Farm Tenure (base=full tenant)	
FOWNER	=1 if full owner, 0 otherwise
POWNER	=1 is partial owner, 0 otherwise
Farm Type based on major commodity produced (base=OLIVE, other livestock)	
CG	=1 if cash grains (including wheat, corn, soybean, grain sorghum, and rice), 0 otherwise
OFC	=1 if other field crops (tobacco, cotton, peanut), 0 otherwise
HVC	=1 if high-value crops (fruits, tree nuts, vegetables, nursery and greenhouses), 0 otherwise
BEEF	=1 if beef cattle, 0 otherwise
POULT	=1 if poultry, 0 otherwise
DAIRY	=1 if dairy, 0 otherwise
Marketing Strategy	
PRODUCT	=1 if sold through forward contracts, 0 otherwise
CONTRACT	=1 if sold through futures or options contracts, 0 otherwise
MARKET	=1 if cold for cash, 0 otherwise
Farm Operator/Spouse Characteristics	
HH_SIZE	number of persons in the household
HH_SIZE18	number of persons who are 18 or younger
HH_SIZE65	number of persons who are 65 or older
OP_GEN	operator's gender, =1 if male, 0 otherwise
OP_AGE	operator's age
RETIRE	retirement plans, =1 if operator plans to retire during the next 5 years, 0 otherwise
OP_OFF	=1 if operator is off-farm employed, 0 otherwise
SP_OFF	=1 if spouse is off-farm employed, 0 otherwise
OP_LSTR	operator's livelihood strategy, =1 if operator worked at any off-farm job prior to becoming a farm operator, 0 otherwise
SP_LSTR	spouse's livelihood strategy, =1 if spouse worked at any off-farm job before farming, 0 otherwise
EDUC	operator's education level, =10 if some high school or less, 12 if completed high school, 14 if some college, 16 if completed college, 18 if graduate school
MARRIED	operator's marital status, =1 if married, 0 otherwise
NFRET	=1 if strongly agree or agree that non-farm investments offer a higher return than farm investments, 0 otherwise
NFRISK	=1 if strongly agree or agree that non-farm investments reduce my family's overall financial risk, 0 otherwise
ERS Regions (Mississippi Portal region is used as a base)	
HEART	=1 if the farm is located in the Heartland region, 0 otherwise
NORTHC	=1 if the farm is located in the Northern Crescent region, 0 otherwise
NORTHGP	=1 if the farm is located in the Northern Great Plains region, 0 otherwise
PGATE	=1 if the farm is located in the Prairie Gateway region, 0 otherwise
EUPLAND	=1 if the farm is located in the Eastern Upland region, 0 otherwise
SSBOARD	=1 if the farm is located in the Southern Seaboard region, 0 otherwise
FRIM	=1 if the farm is located in the Fruitful Rim region, 0 otherwise
BASINR	=1 if the farm is located in the Basin and Range region, 0 otherwise

The first objective was to examine what factors explain differences in how farm households indicate that they have (or would) allocate fixed payments between generalized farm and household categories. Results of this analysis are shown in table 3. A second objective was to examine what factors explain differences in the specific farm or household uses to which fixed payments have (or would be) allocated. Selected results from these models are shown in tables 4 and 5.

For the entire sample and sub-sample 2, larger farms are more likely to allocate direct payments towards household uses than to farm uses, though the likelihood estimates are very small. The impact of wealth is more ambiguous. For the entire sample, wealthier households are more likely to allocate direct payments to farm uses and less likely to allocate them to household uses. For sub-sample 2, wealthier households are more likely to allocate direct payments to either farm uses or household uses rather than to both farm and household uses (the base case), however again the likelihood estimates are small. Financial leverage plays a significant role in explaining the preference of households to allocate direct payments to on-farm uses. For the entire sample, and sub-sample 2, households with higher rates of return on farm assets are more likely to allocate the fixed payment to farm uses. The risk aversion proxy was not significant for any of the samples. For the entire sample and sub-sample 2, if the farm operator is either a full or partial owner for the farm, he/she is less likely to invest direct payment proceeds only to farm uses.

For the entire sample, farms that specialize in cash grain production are more likely to allocate the fixed payment toward farm uses than farms specializing in other livestock (the base case). For the entire sample and sub-sample 1, farms that specialize in other field crops (OFC) like tobacco, cotton, and peanuts are less likely to allocate the fixed payment solely to farm uses than to both farm and household uses (the base case).

For the entire sample, larger farm households are less likely to invest fixed payment proceeds solely to the farm. For the entire sample and sub-sample 1, households with more children under age 18 are less likely to allocate fixed payment proceeds solely for household uses. The opposite is true for sub-sample 2. For the entire sample and sub-sample 2, the more persons in the household who are age 65 or older prefer, the more likely that the household will allocate the fixed payment to both farm and household uses

rather than solely to the farm or solely to the household. For the entire sample and sub-sample 1, male farm operators are less likely to allocate fixed payments solely to household uses. For the entire sample and sub-sample 2, older operators are less likely to allocate fixed payments solely to the farm. Also, those who intend to retire prior to 2008 are less likely to allocate fixed payments solely to the farm and more likely to allocate the payments solely to the household. For the entire sample and sub-sample 2, married operators are more likely to allocate fixed payments solely to household uses. Surprisingly, for the entire sample and sub-sample 2, those who believe that non-farm investments offer higher returns than farm investments are actually less likely to allocate the fixed payment solely to household uses. For the entire sample and sub-sample 1, those who believe that non-farm investments reduce household financial risk are less likely to invest direct payment proceeds solely in farm uses.

In the tobit analysis the same model was run for each specific allocation individually and therefore, we have 8 two-limit tobit models. Few of the farm characteristics were significant in explaining which farmers would use payments to cover farm operating costs. For the entire sample, cash grain farmers are more likely to allocate the fixed payment for farm operating costs. Highly educated and married operators are less likely to use payments on farm operating costs.

Full and partial owners are less likely to allocate fixed payments to land purchases are rental. Large households, older operators and those who planned to retire prior to 2008 are also less likely to use fixed payments to either purchase or rent additional land.

For the entire sample, highly-leveraged farm households are less likely to spend fixed payments on farm capital expenditures. Older and more highly educated operators are more likely to allocate fixed payments to farm capital expenditures but those who intend to retire soon are less likely.

For the entire sample and sub-sample 2, operators who have higher insurance expenses relative to total expenses and those who are employed off-the farm are less likely to use fixed payments to decrease farm debt. Full and partial owners are generally more likely to use fixed payments to decrease farm debt. For the entire sample, larger households are more likely to use fixed payments to pay down farm debt.

Table 3. Selected Parameter Estimates of Multinomial Logit Model: Determinants of Farm vs Household Allocation of Fixed Payments

	Entire sample		Subsample 1		Subsample 2	
	Farm	HH	Farm	HH	Farm	HH
Intercept	–0.0146 (0.8269)	–0.6439 (0.9566)	–0.5083 (1.7515)	–0.31 (4.1937)	0.6818 (0.9673)	–0.1791 (0.9834)
Farm Size	0.0000002 (0.0000003)	0.0000009*** (0.0000002)	0.0000006 (0.0000006)	0.0000001 (0.000002)	0.0000001 (0.0000004)	0.0000008*** (0.0000002)
Net Worth	0.0000003*** (0.00000009)	–0.0000009*** (0.0000006)	0.00000004 (0.0000001)	–0.00000009 (0.0000007)	0.0000003*** (0.0000001)	0.0000009*** (0.0000003)
Debt-to-Asset Ratio	1.6533*** (0.3898)	–1.8313** (0.7874)	2.0862*** (0.862)	–3.0633 (4.0438)	1.569*** (0.406)	–1.6501** (0.8349)
RROA	0.00324* (0.0021)	0.00037 (0.0061)	0.00028 (0.0054)	–0.0016 (0.0142)	0.0036*** (0.001)	0.0021 (0.0073)
Insurance expenses	–0.3988 (0.7183)	1.1774 (1.6811)	–1.6147 (3.5039)	–4.6302 (7.5234)	–0.2464 (0.9799)	1.5692 (1.6598)
Full Owner	–0.8092** (0.3723)	0.2799 (0.6564)	0.0978 (0.628)	0.6319 (1.7735)	–1.1296*** (0.4295)	–0.1528 (0.7328)
Partial Owner	–0.5646* (0.4049)	–0.4715 (0.6261)	0.4584 (0.482)	0.5807 (1.458)	–1.0142** (0.4952)	–0.9176 (0.7464)
Cash Grain	0.6627*** (0.178)	–0.0768 (0.496)	–0.499 (0.639)	–0.272 (1.926)	0.0614 (0.648)	–0.183 (0.836)
Other Field Crops	–0.2084* (0.2144)	0.4291 (0.2853)	–0.9114* (0.6675)	–0.567 (1.7384)	–0.2629 (0.267)	0.3682 (0.297)
Household Size	–0.102* (0.073)	0.0689 (0.055)	–0.1268 (0.1447)	0.1401 (0.419)	–0.0713 (0.0789)	0.0637 (0.0501)
Household Size (18 and younger)	–0.0217 (0.1021)	–0.4107** (0.2153)	0.1262 (0.227)	–1.142* (0.817)	–0.1195 (0.1241)	0.377** (0.224)
Household Size (65 or older)	–0.548*** (0.215)	–1.341*** (0.403)	0.8852 (2.088)	–0.4443 (12.502)	–0.8378*** (0.3057)	–1.4389*** (0.4069)
Operator's Gender	–0.0425 (0.2169)	–0.6327** (0.3235)	0.8524 (0.775)	–2.768*** (1.049)	–0.1895 (0.2102)	–0.4502 (0.3542)
Operator's Age	–0.0066* (0.0044)	–0.0051 (0.0107)	–0.011 (0.012)	–0.003 (0.0460	–0.0085** (0.0059)	–0.0059 (0.011)
Retirement Plans	–0.317*** (0.128)	0.4927*** (0.228)	0.3015 (0.419)	0.2629 (1.173)	–0.5643*** (0.1933)	0.4955** (0.214)
Operator's Marital Status	0.2042 (0.238)	0.5656*** (0.208)	–0.024 (0.405)	0.3531 (1.258)	0.2074 (0.269)	0.5989*** (0.2243)
NFRET	–0.086 (0.158)	–0.349* (0.231)	0.3175 (0.3302)	–0.4853 (0.78340	–0.161 (0.2220	–0.4339* (0.2848)
NRISK	–0.3894** (0.2079)	–0.2664* (0.1742)	–0.0789 (0.3299)	–0.3255 (0.715)	–0.3637** (0.2121)	0.0693 (0.261)

Note: standard errors in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

Table 4. Selected Parameter Estimates of Two-Limit Tobit Model: Determinants of Specific Farm Uses of Fixed Payments

	Entire Sample	Subsample 1	Subsample 2		Entire Sample	Subsample 1	Subsample 2
			Farm Operating Costs				
Intercept	94.034	0.20611	121.567	Operator's	–5.7462**	–2.5849	–7.2328**
	(80.41)	(93.885)	(102.775)	Education Level	(3.245)	(3.2161)	(4.0346)
Farm Size	0.0026	0.0013	0.00162	Operator's	–44.844***	–2.2464	–52.904***
	(0.0035)	(0.0065)	(0.0051)	Marital Status	(15.403)	(15.684)	(20.574)
Cash Grain	78.338***	52.4163	–1.47515	σ	157.095	109.892	165.295
	(21.87)	(73.946)	(35.862)	Sample Size	5177	1847	3330
			Land Purchases and Rental				
Intercept	–20.736	100.597*	–44.5004	Operator's Age	–1.4646**	–0.7512	–1.6657*
	(95.527)	(65.734)	(134.985)		(0.7888)	(0.6154)	(1.2065)
Full Owner	–83.903***	–64.076***	–91.271***	Retirement Plans	–23.429*	35.2732	–57.118**
	(22.475)	(22.817)	(38.646)		(17.917)	(27.125)	(27.335)
Partial Owner	–41.449**	–29.079***	–44.47	Southern Seaboard	–40.277**	28.5796	–59.049***
	(19.208)	(10.259)	(37.6))		(18.971)	(48.998)	(22.8)
Household Size	–5.9618*	–4.7799*	–6.5734	σ	152.211	76.2312	174.311
	(3.9788)	(3.7217)	(5.217)	Sample Size	5168	1840	3328
			Farm Capital Expenditures				
Intercept	–331.92***	–359.39	–355.47	Operator's Age	1.06551**	0.57596**	1.35065**
	(51.764)	(120.59)	(69.537)		(0.5704)	(0.8187)	(0.6616)
Debt-to-Asset Ratio	–139.16***	–42.993	–166.69	Retirement Plans	–36.893**	–7.3981	–40.687**
	(37.366)	(38.478)	(48.101)		(16.816)	(22.68)	(21.284)
Other Field Crops	–22.763	50.5122*	–27.059*	Operator's	11.3902***	8.70869**	11.5792***
	(27.271)	(33.64)	(29.064)	Education Level	(4.038)	(4.0102)	(4.8079)
Operator's Gender	–11.7334	81.4452*	–16.681	σ	157.802	96.8364	165.194
	(22.4209)	(53.519)	(27.032)	Sample Size	5172	1842	3330
			Paying Farm Debt				
Intercept	–267.49***	–200.73	–344.16***	Household Size	13.423***	2.4069	15.7101
	(66.456)	(71.212)	(90.378)		(3.851)	(4.197)	(4.2512)
Insurance Expenses	–165.91*	35.3106	–225.18***	Operator's Age	–0.577	–0.771	–0.4025
	(107.65)	(353.07)	(111.99)		(0.415)	(0.413)	(0.5413)
Full Owner	53.668**	3.37444	88.8307*	Operator's Off-Farm	35.784**	–2.278	54.3982***
	(23.09)	(18.392)	(57.728)	Employment	(20.36)	(14.65)	(18.537)
Partial Owner	91.024***	40.752***	125.344**	σ	141.176	101.152	152.429
	(28.98)	(15.54)	(67.321)	Sample Size	5177	1846	3331

Note: standard errors in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

Results for selected household uses are shown in table 5. For the entire sample, full owners and operators who believe that non-farm investments offer higher returns than on-farm investments are more likely to use fixed payments for family living expenses. Among those who already receive fixed payments (sub-sample 1) larger households are more likely to use fixed payments for family living expenses. For the entire sample and sub-sample 2, operators who worked off the farm prior to beginning their farming operations are less likely to use fixed payments for family living expenses.

Highly-leveraged farm households are less likely to use fixed payments to increase cash reserves. Operators who believe that non-farm investments reduce household financial risk are more likely to use fixed payments to build cash reserves. For the entire sample and sub-sample 2, larger households, male farm operators and those who intend to retire soon are more likely to use fixed payments to build cash reserves. For the entire sample, more educated farmers are less likely to use fixed payments to build cash reserves.

For the entire sample and sub-sample 2, farmers who intend to retire soon and those who worked off the farm prior to beginning their farm operation are more likely to invest fixed payment proceeds in non-farm assets. For sub-sample 1, full owners are less likely to use fixed payments to invest in non-farm assets while those who are employed off the farm and those who believe that non-farm investments reduce household financial risk are more likely to invest fixed payment proceeds in non-farm assets. For sub-sample 2, partial owners are more likely to use fixed payments to purchase non-farm assets.

For the entire sample and sub-sample 2, larger households, households with more children under age 18, and households where the farm operator also works off the farm are more likely to use fixed payments to pay off non-farm debt. Operators who believe that non-farm assets offer higher returns than farm assets are less likely to use fixed payments to pay off non-farm debt. For sub-sample 1, households with higher insurance expenses relative to total farm operating expenses and those with more individuals age 65 or older are less likely to use fixed payments to pay off non-farm debt.

Table 5. Selected Parameter Estimates of Two-Limit Tobit Model: Determinants of Specific Household Uses of Fixed Payments

	Entire Sample	Subsample 1	Subsample 2		Entire Sample	Subsample 1	Subsample 2
			Family Living Expenses				
Intercept	117.709**	137.061	110.189	Operator's	–25.785*	–42.164	–25.671*
	(61.247)	(211.62)	(68.264)	Livelihood Strategy	(15.676)	(40.903)	(17.534)
Full Owner	40.3221*	6.74285	45.9023	NFRET	20.1206*	7.70571	26.0827
	(24.987)	(39.172)	(29.295)		(15.216)	(45.155)	(16.641)
Household Size	1.97152	35.2691**	–2.4853	σ	148.806	210.801	139.669
	(4.8771)	(16.101)	(5.5676)	Sample Size	5230	1871	3359
			Cash Reserve				
Intercept	–76.513**	–85.769	–80.574*	Retirement Plans	41.3809***	0.04711	49.723***
	(39.881)	(110.88)	(49.149)		(8.8635)	(19.584)	(9.071)
Debt-to-Asset Ratio	–96.807***	–205.51***	–84.754***	Operator's	–2.5174*	1.2295	–1.913
	(23.789)	(62.803)	(24.761)	Education Level	(1.9127)	(3.241)	(2.202)
Household Size	4.96569**	–5.5929	5.25541*	NFRISK	35.7389***	28.297*	34.716***
	(2.6024)	(11.979)	(2.4891)		(6.8827)	(19.44)	(6.832)
Operator's Gender	25.6081**	3.95139	28.7017**	σ	110.135	94.1277	109.622
	(14.228)	(44.389)	(13.528)	Sample Size	5227	1871	3356
			Non-Farm Assets				
Intercept	–308.69***	–112.08	348.955***	Operator's Off-farm	–4.8883	27.1084*	–10.302
	(95.191)	(166.72)	(97.926)	Employment	(15.701)	(19.619)	(18.382)
Full Owner	20.2432	–67.659*	44.3359	Operator's	35.4195*	–31.368	45.707**
	(28.477)	(42.994)	(37.262)	Livelihood Strategy	(22.718)	(29.42)	(25.06)
Partial Owner	32.9772	–30.573	61.5276**	NFRISK	0.03496	57.1783**	–7.9451
	(27.908)	(41.302)	(35.262)		(25.519)	(29.888)	(26.594)
Retirement Plans	27.0222*	–25.445	36.4387**	σ	171.759	126.253	171.781
	(19.271)	(35.074)	(20.807)	Sample Size	5227	1871	3356
			Paying Non-Farm Debt				
Intercept	–356.47**	–504.29	–383.23***	Household Size	47.892	–563.34***	52.8774
	(153.17)	(510.21)	(113.68)	(65 and older)	(42.892)	(164.88)	(42.174)
Insurance Expenses	–120.41	–228.49*	–111.07	Operator's Off-farm	65.718***	–11.342	78.6019***
	(135.75)	(175.01)	(142.41)	Employment	(24.71)	(27.844)	(30.166)
Household Size	11.6209**	6.19065	10.1781*	NFRET	–50.64**	7.1184	–61.478***
	(5.8183)	(9.4124)	(6.7222)		(26.52)	(29.73)	(31.754)
Household Size	23.2643**	6.3452	28.4406**	σ	162.465	109.564	163.886
(18 and younger)	(11.016)	(19.75)	(12.726)	Sample Size	5231	1871	3360

Note: standard errors in parentheses; ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

Discussion and conclusions

The objective of our analysis was to determine how farm households use (or would use) fixed payments and to determine factors that explain such behavior. Unlike Goodwin and Mishra (2006), we used data for both current fixed payment recipients and non-recipients and estimated the allocation of payments to specific uses.

Based on the data available from the 2003 ARMS survey significant empirical results were obtained that can be utilized to consider the extent to which U.S. fixed direct payments may cause distortions in production. Critics argue that these payments can alter production decisions because payments increase farm operators' income, and the expectation of fixed, future payments increases their wealth. Previous research concluded that though fixed payments can provide an incentive to increase farm production, they likely have minimal links to farm production levels.

Fixed payment recipients can allocate the funds received over a wide selection of alternatives. Our empirical results generally support previous empirical findings that fixed payments are unlikely to have a significantly increase production through income or wealth effects. We analyzed various factors that explain household decisions regarding whether to allocate direct payments to generalized farm or household uses. We also analyzed various factors that explain household decisions to allocate direct payments to specific farm and household uses.

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