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The Effects of Direct Payments on Liquidity and Repayment Capacity of Beginning Farmers

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Abstract

Purpose: U.S. decoupled direct payments, paid to farm operators based on historic yields and base acreage under the 2002 Farm Bill, may alter a farmer's access to credit or his ability to meet debt servicing obligations. More specifically, direct payments might improve the farmer's liquidity position or repayment capacity enabling the farmer to obtain more favorable credit terms. In turn, more favorable credit terms might allow a farm to remain in business or expand production, leading to current production distortions. Since direct payments are based on historic production, beginning farmers tend to receive lower levels of direct payments and hence these payments might impact beginning farmers differently than more experienced farmers.

Design/methodology/approach: Given the manner in which direct payments are calculated and administered, it is likely that direct payments affect beginning farmers and more experienced farmers differently; hence we analyze the impacts of direct payments on the current and term debt coverage ratios for these two groups separately. In the analysis, we control for farm financial characteristics, farm operator characteristics, and other factors. Data from the U.S. Department of Agriculture (USDA) Agricultural Resource Management Survey (ARMS) for the years 2005, 2006 and 2007 are used in the weighted regression analysis and jackknifed standard errors are computed.

Findings: We find a positive significant relationship between the level of direct payments (in dollars) and the term debt coverage ratio for experienced farmers, suggesting that direct payments improve repayment capacity. However, this relationship is not significant for beginning farmers. We also find a negative significant relationship between the number of base acres and the current ratio for experienced farmers, while this relationship lacks significance for beginning farmers.

Research limitations/implications: The results indicate that direct payments have the potential to impact a recipient's liquidity position and repayment capacity, particularly for experienced farmers. Consequently, these decoupled payments have the potential to alter a farmer's access to credit and hence alter his current production decisions. Direct payments appear to impact beginning farmers differently than more experienced farmers.

Originality/value: We provide evidence that decoupled direct payments impact a farmer's liquidity and repayment capacity. Furthermore, direct payments impact beginning and experienced farmers differently. This paper also contributes to the growing body of research investigating the mechanisms by which decoupled payments have the potential to distort current production.

Keywords: beginning farmers, creditworthiness, decoupled payments, liquidity, repayment capacity

JEL classification: Q15, Q17, Q18

The Effects of Direct Payments on Liquidity and Repayment Capacity of Beginning Farmers

I. Introduction

Farmers face various challenges in their early years of operation. Not only do they lack the experience of older seasoned farmers, they also frequently lack capital and access to capital. Without established credit histories and extensive assets, beginning farmers, with ten years experience or less, tend to have a difficult time obtaining credit, generating revenue and meeting their debt servicing obligations. Furthermore, given how U.S. government programs are administered, decoupled direct payments and other support policies have the potential to impact beginning farmers differently than farmers that have been in business longer. For example, recent research indicates that agricultural subsidies are capitalized in land values and rental rates (Goodwin, Mishra and Ortalo-Magne 2011). As a result, beginning farmers do not benefit from agricultural subsidies and ultimately face higher entry costs.

In 1996, the United States enacted the Federal Agricultural Improvement and Reform Act (FAIR), introducing Production Flexibility Contracts (PFC). This decoupled payment program was designed to replace the old system of coupled price supports and was to be phased-out prior to the subsequent Farm Bill. The FAIR Act was designed to both combat rising costs associated with maintaining existing coupled price support programs and honor commitments outlined in the Uruguay Round Agreement on Agriculture (AoA), which required World Trade Organization (WTO) member countries to reduce their use of trade-distorting agricultural support. By participating in the PFC program, farm operators received payments based on historic plantings (historic base acres and yields) regardless of their current plantings. Hence, these decoupled payments were not tied to current production, prices or inputs unlike the coupled payments they

replaced. The only restrictions placed on program participants to remain eligible for the PFC payments were that the land tied to the base acres must be kept in good agricultural use and the land could not be used in the production of specialty crops such as fruits and vegetables or forestry.

The 2002 Farm Bill contained provisions for a new decoupled support system for farm operators. Under the 2002 Farm Bill direct payment program, operators received payments based on historic base acres and yields similar to PFC payments. The 2002 Farm Bill also allowed farmland owners to update base acreage and yields upon which their benefits were calculated. The Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) continued the decoupled direct payment program. This latest Farm Bill also gave farmers the ability to adjust base acreage to allow for the addition of newly covered commodities.

In general, there are only two ways for a farmer to obtain direct payments. The first is for the farmer to have been producing during the historic base period and hence be eligible for direct payments. The second is to operate land with associated payment rights. By law, farm operators receive the direct payments, while the landowner merely owns the rights to the decoupled payments.

Beginning farmers tend to have fewer base acres and therefore tend to receive less government support in the form of direct payments than more experienced farmers. However, updating policies in both the 2002 and 2008 Farm Bills allowed farm operators to obtain additional base acreage and/or higher historic yields increasing their direct payment levels. Nevertheless, direct payments are likely to impact beginning farmers differently than farmers that have been in business longer.

Although when they were first introduced decoupled payments were thought to have

minimal impacts on current production because they do not alter conditions for profit maximization or the marginal production decisions, recent research suggests that decoupled direct payments have the potential to indirectly impact current production decisions. Specifically, decoupled direct payments have the potential to impact a farmer's risk attitudes through wealth and insurance effects (Hennessy 1998). Decoupled payments also impact production by influencing the optimal allocation of inputs (Ahearn, El-Osta and Dewbre 2006). Furthermore, decoupled payments may deter some farmers from exiting the industry (Chau and de Gorter 2005; de Gorter, Just and Kropp 2008). This research contributes to the growing body of literature pertaining to the impact of direct payments on current production decisions and the literature pertaining to the financial performance of beginning farmers by examining the impact of direct payments on access to credit by investigating the effects of direct payments on liquidity and repayment capacity for experienced and beginning farmers. If direct payments significantly impact a farm operator's ability to service debt and access capital, then these payments might enable some farms to remain operational and avoid shutting down. Furthermore, improved access to capital has the potential to cause some farms to expand production, especially if the farm is credit constrained. Ultimately, improved access to capital could lead to current aggregate production distortions.

Using U.S. Department of Agriculture (USDA) Agricultural Resource Management Survey (ARMS) data we find a positive significant relationship between the level of direct payments (in dollars) and the term debt coverage ratio for experienced farmers, suggesting that direct payments improve repayment capacity. We also find a negative significant relationship between the number of base acres and the current ratio for experienced farmers. These relationships lack significance for beginning farmers. Although, one might expect a positive

relationship between the level of direct payments (or the number of base acres) and the current ratio if direct payments improve a farmer's liquidity, one possible justification for the observed relationship is that experienced farmers might be willing to be less liquid if they know they will receive direct payments. Perhaps, this is because direct payments alter farmers' risk preferences making them less risk-averse. However, the relationship between direct payments and the current ratio lacks significance when direct payments are used in the analysis.

The remainder of this paper is organized as follows. The next section reviews the sources of potential production distortions resulting from decoupled payments. The third section discusses how direct payments have the ability to impact liquidity and repayment capacity. The fourth section offers empirical evidence of the relationships between direct payments and the term debt coverage and current ratios using farm-level U.S. data. The final section discusses the implications of the results.

II. Potential Production Impacts of Decoupled Payments

The early literature pertaining to decoupled payments concluded that these payments do not distort production decisions in the current period. The logic is that since farmers receive the market price for the last unit they produce, the marginal production decision is not altered (Alston and Hurd 1990; Blandford, de Gorter, and Harvey 1989; Borges and Thurman 1994; Rucker, Thurman, and Sumner 1995; and Sumner and Wolf 1996). However, recent research has offered several mechanisms through which decoupled payments have the potential to distort production in the current period.

First, Hennessy (1998) suggests that these payments may alter a farmer's attitude toward risk due to wealth and insurance effects generated by the decoupled payments. He shows that decoupled payments can lead to increases in production if the farmer is risk-averse and the

farmer's preferences can be characterized by a decreasing absolute risk aversion (DARA) utility function.

Furthermore, the uncertainty of future government payments and the expectations of those payments may indirectly affect current production. This is especially true if updating is allowed as it was in the 2002 and 2008 Farm Bills. Goodwin and Mishra (2006), assuming that farmers maximize their expected utility of wealth, show that uncertainty regarding future decoupled payments affects the optimal allocation of acreage amongst planted crops. Furthermore, Bhaskar and Beghin (2010) show that if a farmer believes that he might be allowed to update his base acreage or yields in the future, then he has the incentive to increase his plantings and yields by applying more fertilizer in the current period.

In addition, there is evidence that agricultural decoupled subsidies may deter some farms from exiting the market, leading to inflated aggregate production. Chau and de Gorter (2005) demonstrated that while infra-marginal payments do not affect production discussions on the margin, they have the potential to deter producers from exiting the industry. They argue that since infra-marginal payments allow producers to cover fixed costs, some producers are able to remain in business when they would have exited absent the payment. De Gorter, Just and Kropp (2008) show that it is actually declining average costs driving exit deterrence and cross-subsidization. Therefore, the number of farms in the industry in the presence of decoupled infra-marginal payments exceeds the number of farms in the industry absent the payments and hence ultimately aggregate output levels are higher with these payments. However, the authors assume that farmers must produce in order to receive the infra-marginal payments. Farmers receiving U.S. direct payments are not formally required to produce to receive the payments and hence their findings may not directly apply.

Direct payments are also thought to alter access to capital (Young and Westcott 2000). Unlike other commodity support programs, direct payments provide a known stream of cash inflows independent of market conditions or current plantings. These cash inflows serve as a verifiable signal of an improvement of the farmer's liquidity position and hence might make the recipient more creditworthy (Gonzalez-Vega et al. 2006). In addition, the known cash inflows associated with the direct payments reduce the uncertainty about the future value of pledge collateral, thus increasing the quality of the pledge collateral. Moreover, there is a great deal of debate amongst economists and policymakers regarding the extent to which direct payments are capitalized in land values. If direct payments are indeed capitalized in land values, then the result would be an increase in land prices and higher rental rates. Some research indicates that the share of each dollar of direct payments received by farm operators that is passed through to the landlord in the form of higher rental rates can be as high as 86 percent (Lence and Mishra 2003), while other research shows that only 20-25 percent of decoupled payments are capitalized into land rental values after controlling for land quality (Kirwan 2009). Capitalization of agricultural subsidies into land values can increase the cost of entry to beginning farmers. Furthermore, capitalization is another mechanism by which direct payments can improve the quality of the collateral and hence alter access to capital or reduce the farmer's cost of capital. Kropp and Whitaker (2011) provide empirical evidence that as the proportion of base acres to total acres operated increases farm operators are able to obtain lower interest rates on short-term (maturities of one year or less) operating loans. The authors argue that lower operating costs change the relative prices of inputs and hence have the ability to distort current production.

While several studies have focused on the financial performance of beginning farmers, few have addressed the impacts of direct payments on this group of farmers. For example,

previous studies on beginning farmers have considered various aspects of financial performance, including profitability (return on assets), marginal income and solvency criteria, and net farm income per dollar assets (Adhikari, Mishra, and Chintawar 2009; D'Antoni, Mishra, and Chintawar 2009; Katchova 2010; Mishra, Wilson, and Williams 2007 and 2009). Ahearn and Newton (2009) provide an overview of the current trends and status of beginning farmers and ranchers in the U.S. This study extends previous analyses to examine liquidity and repayment capacity and how they are affected by direct payments, particularly for beginning farmers.

Furthermore, our research, building on Kropp and Whitaker (2011), contributes to the growing body of literature pertaining to decoupled and direct payments. Kropp and Whitaker provide evidence of an inverse relationship between the proportion of base acres (a proxy for the level of direct payments that controls for farm size) and interest rates on short-term operating loans; however the authors do not investigate what factors are driving these results. Thus, begging the question: Do direct payments improve liquidity, the quality of collateral and/or repayment capacity? We focus on the effects of direct payments on farm operator's liquidity and ability to meet debt servicing obligations. Specifically, we are interested in determining if direct payments impact beginning farmers differently than more experienced farmers with regard to repayment capacity and liquidity.

III. Effects of Direct Payments on Liquidity and Repayment Capacity

Direct payments rates are specified in the farm bill and therefore provide a known stream of cash flows for the duration of the farm bill. This stream of cash flows has the potential to increase the borrower's liquidity and improve repayment capacity. Liquidity refers to the farmer's ability to generate sufficient cash to meet his/her financial obligations as they become due, while repayment capacity assesses the ability of the farmer to service debt. Both liquidity

and repayment capacity are of great concern to potential creditors and are frequently evaluated when lenders attempt to determine creditworthiness. Thus, an improvement in a borrower's liquidity position or repayment capacity could increase the borrower's access to capital or enable the borrower to obtain more favorable terms on a loan.

The current ratio is one measure of liquidity that is regularly analyzed by lenders. It is calculated as total current assets divided by current liabilities. Current assets include cash and near cash or cash equivalents, while current liabilities are debt obligations with less than one year to maturity including the current portion of longer term debt.

Several measures can be used to analyze repayment capacity. We focus on the term debt coverage ratio. This measure specifically assesses the ability of a farm to meet its term debt obligations. The term debt coverage ratio is calculated as the net farm income plus depreciation and interest divided by the interest and principal on term debt.

Both the current ratio and term debt coverage ratio depend on many factors. These measures will generally vary by sector. High fixed cost sectors will tend to have higher amounts of long-term debt and hence we might observe lower term debt coverage ratios in these industries. Moreover, sectors that experience more price and revenue volatility may have higher amounts of cash on hand to account for these variations and hence have higher current ratios. Furthermore, these measures will also depend on the operator's level of risk aversion. Managers or operators that are more risk-averse will strive for both higher current ratios and term debt coverage ratios than managers who are less risk-averse. In addition, these measures might also depend on a manager's ability. More effective managers might be better at setting target levels for their current and term debt coverage ratios and may be better at actually hitting their targets. Frequently, the ability to set and achieve targets comes with experience. Thus, farmers that have

been in the industry for awhile and have sufficient experience might aim for lower current and term debt coverage ratios since their experience will likely make them more confident, decreasing the need for a cushion against possible unforeseen events. Alternatively, more experienced farmers might have less debt and hence be able to maintain higher current and term debt coverage ratios.

Direct payments might also impact either a farm's actual current and term debt coverage ratios or the desired target level of these ratios. First consider the current ratio. It has been hypothesized that direct payments improve a borrower's liquidity. If this is in fact true, then we would expect farms receiving more direct payments to have higher current ratios all else being equal. Now consider the term debt coverage ratio. If direct payments improve the quality of collateral, then we might find that farms with more direct payments take on more long-term debt and have a lower term debt coverage ratio. However, receiving direct payments also increases a farmer's income, which implies the farmer would have a higher term debt coverage ratio. Thus, the overall effect is uncertain and is an empirical question. In addition, given that the farm operator knows that he will be receiving a known risk-free direct payment, he might be more comfortable having less cash on hand and hence desire a lower current ratio and/or lower term debt coverage ratio thus providing another mechanism through which direct payments might influence a farmer's level of risk aversion. Since beginning farmers tend to have fewer base acres and hence receive lower direct payments, direct payments might influence this set of farmers differently than more experienced farmers. In the following section, we analyze the impact of direct payments on the current ratio and the term debt coverage ratio while controlling for farm financials and farm and farmer characteristics.

IV. Empirical Evidence

In this section, we investigate the impacts of decoupled direct payments on the current ratio and term debt coverage ratio. Given the manner in which direct payments are calculated and administered, it is likely that the effects of direct payments are different for beginning farmers and more experienced farmers, hence we also analyze the impacts of direct payments on the current and term debt coverage ratios for these two groups separately.

Data and Variables

Data are taken from the Agricultural Resource Management Survey (ARMS) conducted each year by the U.S. Department of Agriculture's National Agricultural Statistics Service (USDA-NASS). This stratified survey samples a cross section of farms, gathering information on farm production practices and farm and operator characteristics. The survey also reports farm financial information that may be used to determine creditworthiness, such as farm and nonfarm assets, debts, and revenues. Data used in the analysis are for the years 2005, 2006, and 2007, because farmers were asked to report the number of base acres operated in these years.

ARMS data is collected from a stratified sample, and each observation in the sample is given a weight reflecting the probability of being selected. The weights are determined by USDA-NASS and are adjusted to ensure key variables in the sample data are representative of U.S. agriculture. All results are obtained using the appropriate weights and standard errors are calculated using a jackknife procedure. The jackknife procedure involves splitting the data into 15 subsamples and repeating the estimation with each subsample omitted as recommended by the USDA's Economic Research Service (Dubman 2000).

In the analysis, we estimate the impact of the level of U.S. direct payments (in dollars)

on the term debt coverage ratio and current ratio, while controlling for other factors. In addition, we use the number of base acres operated as a proxy for the level of direct payments following Kropp and Whitaker (2011). While Kropp and Whitaker (2011) investigate the proportion of base acres to total acres operated, we use the number of base acres because of the number of base acres is more precisely related to the level of direct payments than the proportion of base acres. Direct payments are calculated based on historic base acres and yields of program crops (i.e. corn, wheat, barley, rice, oats, peanuts, soybeans, sorghum, and cotton). The level of direct payments and the number of base acres are reported by farmers on the survey. The current and term debt coverage ratios are calculated by the USDA's Economic Research Service using farm financial information provided by the respondent. The current ratio is calculated as current assets (crop inventory, livestock inventory, purchased inputs, prepaid insurance, inputs for crops planted but not harvested, and other current assets) divided by current liabilities (accrued interest, current portion of term debt, accounts payable, and short term debt of one year or less). The term debt coverage ratio is calculated as the cash net income available for loan repayment (net farm income including depreciation and interest) divided by the debt repayment (interest plus principal on capital debt).

Tables 1, 2 and 3 provide descriptive statistics of the key variables for all farmers (both experienced and beginning), experienced farmers and beginning farmers, respectively. According to the USDA's definition, beginning farmers are considered as those with 10 years of experience or less, while we consider experienced farmers to be those with more than 10 years of experience. As shown in tables 1-3, experienced farmers tend to have higher term debt coverage and current ratios than beginning farmers.[1] Beginning farmers tend to be more leveraged as seen by the higher debt-to-asset ratio for beginning farmers. In addition, experienced farmers tend to

operate more acres and have a higher number of base acres and hence receive more direct payments. Furthermore, on average, experienced farmers are more profitable (i.e. have higher return on asset ratios and higher gross sales revenues) than beginning farmers. Experienced farmers also tend to be older. Given these differences between experienced and beginning farmers, it is likely that direct payments impact the two groups differently. Hence, we analyze the relationships between the term debt coverage and current ratios and the number of base acres for all farm and then for the two groups separately.

We limited our analysis to farms having debt.[2] More specifically, we limit the analysis to farmers reporting current liabilities and term debt (48% of all beginning farmers and 43% of all experienced farmers in the sample). Since the current ratio is calculated by dividing current assets by current liabilities, this ratio is undefined for farmers without current liabilities. Furthermore, several farmers had very high current ratios due to their low levels of current liabilities, thus leading to the extremely high means for this variable reported in tables 1-3. Given the presence of these outliers, we eliminate farms with current ratios below the 5th percentile and above the 95th percentile from the analysis.

Similarly, the term debt coverage ratio is undefined for farmers without term debt, and hence we limit our analysis of the impact of direct payments (the number of base acres) on the term debt coverage ratio to farmers reporting term debt. Again, due to the presence of outliers we eliminate farms with term debt coverage ratios below the 5th percentile and above the 95th percentile from the analysis. Because of undefined ratios for farms that do not have current liabilities or term debt, our sample includes only farms reporting positive current liabilities and positive term debt.[3]

In addition, direct payments may impact family operated farms differently than farms that are operated by a hired manager. Therefore, we limit the analysis to family operated farms.

As discussed in the previous section, many factors in addition to direct payments can impact the term debt coverage and the current ratios. Therefore, we control for these factors in our analysis. Other government payments such as conservation payments, disaster assistance, market loss assistance and counter-cyclical payments all have the potential to impact the term debt coverage and the current ratios. Therefore, we include other government payments (exclusive of crop insurance indemnity payments) in the analysis. Off-farm income provides another source of stable income that may reduce income variability and impact the ratios of interest and thus it is included in the analysis. Since farms that own more land tend to have more long-term debt, we include a measure of land tenancy, tenure, constructed as the number of acres rented to the number of acres operated. Return on farm assets (ROA) serves as a measure of the farm's profitability and is calculated as the net farm income adjusted for management, operator and unpaid labor charges divided by total farm assets. Since ROA includes the charges for management and labor, we expect to see low values for this ratio. We also include gross sales revenue as another measure of profitability and as a measure of farm size. The farm debt-to-asset ratio is included to control for the capital structure of the farm, which is often important to lenders and is analyzed when determining creditworthiness. A dummy variable indicating whether the farm is a hobby farm (representing rural residence and limited resource farms) is also included. To control for the types of commodities produced on the farm we construct a dummy variable, primarily program crops, which takes the value of one if 50 percent or more of the value of farm production is attributed to program crops and zero otherwise. Two farmer characteristics are also included: age and a dummy variable that takes the value of one if the

farm operator is a college graduate and zero otherwise. We also include regional dummy variables for the Atlantic, South, West and Plains regions that take the value of one if a farm is located in that region and zero otherwise. The Midwest region variable is not included in the analysis and hence this region serves as the baseline for comparison. The Midwest was chosen as the baseline for comparison because of the high concentration of base acres in this region. Dummy variables for the years 2005 and 2006 are also included in the analysis. The year 2007 is omitted as it serves as the comparison group.

Regression Results

Using weighted ordinary least squares, we analyze the effects of the level of U.S. direct payments on the term debt coverage ratio and current ratio. We also analyze the effects of the number of base acres operated on these two ratios. Standard errors are computed using a jackknife procedure.

As shown in table 4, there is a positive and significant relationship between the term debt coverage ratio and the dollar value of U.S. direct payments. The relationship holds for all farmers and experienced farmers. This indicates that farms with a higher value of direct payments tend to have higher term debt coverage ratios and hence might be more likely to meet their long-term financial obligations. The results suggest that U.S. decoupled direct payments improve the repayment capacity of experienced farmers and thus have the potential to improve the recipient's creditworthiness. We find similar results when the number of base acres operated is used in the analysis as a proxy for the direct payments, as shown in table 5. However, the impact of base acres on the term debt coverage ratio is not significant for either experienced or beginning farmers.

The effects of the other variables included in the analysis of the term debt coverage ratios, when significant, take their expected signs. Farms reporting higher off-farm income tend to have lower term debt coverage ratios. Larger or more profitable farms, as measured by gross sales revenue and return on assets, tend to have higher term debt coverage ratios, while farms with relatively more debt, as measured by the debt-to-asset ratio, have lower term debt coverage ratios. When all farmers are analyzed together we find farmers that are primarily growing program crops tend to have higher term debt coverage ratios; however the effect of this variable is not significant in the regressions analyzing beginning farmers separately. When the variable primarily growing program crops is replaced with dummy variables for livestock production based on the farm type, the coefficient estimates of the other variables are similar.[4, 5] We report the result using the primarily growing program crops variable because of its simplicity. Hobby farms tend to have lower term debt coverage ratios. Farmers from the South region tend to have lower term debt coverage ratios than farmers from the Midwest region. Experienced farmers from the Plains and West regions tend to have lower term debt coverage ratios than experienced farmers from the Midwest region.

Table 6 shows that the effect of dollar value of direct payments on the current ratio is not significant for any of the three groups. As shown in table 7, when the number of base acres is used as proxy for the level of direct payments there is a negative significant relationship between the number of base acres operated and the current ratio for all farmers and experienced farmers. This suggests that experienced farmers having more base acres are less liquid. One might expect a positive relationship between the dollar value of direct payments and the current ratio if direct payments improve a farmer's liquidity. However, it is possible that direct payments, through either wealth or insurance effects, alter the farmer's risk preferences and hence a farmer

receiving these risk-free payments sets a lower target current ratio, particularly because farmers tend to have rather higher-than-expected current ratios. Regardless of the mechanism driving the relationship, it appears that number of base acres impact experienced and beginning farmers differently with regard their liquidity position as measured by the current ratio.

We also find that beginning farmers that are more leveraged tend to have lower current ratios as well. Furthermore, farms that are organized as sole proprietorships tend to have lower current ratios. Beginning farmers operating hobby farms tend to have lower current ratios than beginning farmers who are undertaking farming as their primary occupation. Farms organized as sole proprietorships tend to be less liquid than farms with other organizational structures. Most of the variables do not significantly influence the current ratios for experienced farmers, perhaps indicating a greater homogeneity among farmers in the experienced farmer group.

V. Conclusions

When first introduced, decoupled payments were thought to have minimal impacts on current production. However, several mechanisms have been identified in the literature through which decoupled payments have the ability to distort production. Our research contributes to the growing body of literature regarding decoupled direct payments and access to credit. We focus on the effects of direct payments on farm operator's liquidity and ability to meet debt servicing obligations. Since direct payments are calculated based on historical production, typically beginning farmers tend to receive less direct payments than their more experienced counterparts. Thus, we were specifically interested in determining if direct payments impact beginning farmers differently than more experienced farmers with regard to repayment capacity and liquidity.

We find a positive significant relationship between direct payments and the term debt coverage ratio for experienced farmers. These results suggest that direct payments improve the

repayment capacity of experienced farmers. If direct payments significantly improve a farm operator's repayment capacity and ability to service debt, then direct payments might enable some farms to remain operational and avoid shutting down. Furthermore, if direct payments significantly improve a farm operator's repayment capacity and hence make the farmer more creditworthy, this improved access to capital has the potential to cause some farms to expand production, especially if the farm is credit constrained. Thus, direct payments have the potential to distort current production if they improve access to capital or keep farms from defaulting and going out of business. Given that the relationship between direct payments and the term debt coverage ratio holds only for experienced farmers, this suggest that experienced farmers benefit more from direct payment policies than beginning farmers.

We also find that experienced farmers with a higher number of base acres (a proxy for the level of direct payments) tend to have lower current ratios. The relationship between the number of base acres and the current ratio lacks significance for beginning farmers, suggesting that direct payments impact beginning and experienced farmers differently. If direct payments improve a farmer's liquidity, one might expect a positive relationship between the number of base acres and the current ratio. However, this relationship lacked significance for any of the three groups, suggesting that the impact of direct payments on liquidity is relatively small.

Collectively, our results indicate that direct payments may have the potential to impact a recipient's liquidity position and repayment capacity. Consequently, these decoupled payments have the potential to alter a farmer's access to credit and hence alter his current production decision. Furthermore, direct payments appear to impact beginning farmers differently than more experienced farmers. More specifically, this research suggests that the direct payment program is biased against beginning farmers. In recent years, several farm programs have focused on

supporting beginning farmers. These programs range from technical assistance programs to subsidized credit programs. This research provides justification for the continuation of farm programs targeted to support beginning farmers in future U.S. agricultural policies.

Footnotes

[1] The USDA calculates the mean current ratio for all farms as the sum of current assets across all farms divided by the sum of current liabilities across all farms. Hence, figures reported by the USDA differ from the figures presented here.

[2] Most farmers have at least some debt: 98.6% of experienced farmers carry debt, with the mean debt of $70,466 and median debt of only $1,000; and 98.2% of beginning farmers carry debt with mean debt of $64,496 and median debt of only $1,250. Therefore, while most all farmers have some debt, most of them are not very indebted.

[3] We eliminate observations with current ratios or term debt coverage ratios of above 95th percentiles and below 5th percentiles. The 95th percentile for the current ratio is 198.8 and for the term debt coverage ratio it is 19.3. These values are fairly high in magnitude when compared to mean and median values of the ratios. The results remain qualitatively similar when we eliminate outliers above 95th percentile but retain outliers below the 5th percentile.

[4] These regression results are available from the authors upon request.

[5] The farm type is defined as 1 out of 18 possible categories of commodities which represents the largest portion of gross farm income.

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Table 1. Descriptive statistics for all farmers (beginning and experienced).

Variable	Number of Observations	Mean	Standard Error	25th Percentile	50th Percentile	75th Percentile
Term debt coverage ratio	7246	2.50025	0.065686	0.264293	1.27563	3.45959
Current ratio	7246	3.57164	0.152475	0.246615	1.06199	3.12688
Direct payments (US $)	7246	3778.08	198.7461	0	0	1977.8
Base acres	7246	225.663	11.11955	0	0	157
Other government payments (US $)	7246	5813.45	304.0443	0	0	3238
Tenure	7246	0.76495	0.022929	0.397163	0.94118	1
Off farm income	7246	67337.5	1694.938	23250	51500	90000
Gross sales revenue	7246	182383	6827.192	4168	25578	164059
Return on assets	7246	-2.21214	0.150474	-5.527148	-1.60472	1.525
Farm debt-to-asset ratio	7246	0.2477	0.007068	0.077903	0.18099	0.33409
Hobby farm	7246	0.53815	0.013284	0	1	1
Sole proprietorship	7246	0.90542	0.009518	1	1	1
Primarily program crops	7246	0.21814	0.007625	0	0	0
Operator's age	7246	51.7424	0.377863	44	52	59
College graduate	7246	0.26744	0.013622	0	0	1

Note: Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007.

Table 2. Descriptive statistics for experienced farmers.

Variable	Number of Observations	Mean	Standard Error	25th Percentile	50th Percentile	75th Percentile
Term debt coverage ratio	6074	2.8748	0.085172	0.41866	1.58887	4.07487
Current ratio	6074	4.23505	0.187189	0.358165	1.38082	3.67983
Direct payments (US $)	6074	4685.03	283.872	0	0	4000
Base acres	6074	280.564	14.53154	0	0	254
Other government payments (US $)	6074	7136.98	381.505	0	160	5379
Tenure	6074	0.73401	0.029828	0.347826	0.8	1
Off farm income	6074	63007.9	2049.74	21000	45750	83000
Gross sales revenue	6074	213834	9298.625	7526	44401	203378
Return on assets	6074	-1.70335	0.266007	-4.931997	-1.41068	1.71312
Farm debt-to-asset ratio	6074	0.21399	0.005607	0.067477	0.15281	0.28111
Hobby farm	6074	0.47766	0.017115	0	0	1
Sole proprietorship	6074	0.89363	0.01007	1	1	1
Primarily program crops	6074	0.26001	0.008007	0	0	1
Operator's age	6074	54.1098	0.331817	47	53	61
College graduate	6074	0.23372	0.01374	0	0	0

Note: Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007.

Table 3. Descriptive statistics for beginning farmers.

Variable	Number of Observations	Mean	Standard Error	25th Percentile	50th Percentile	75th Percentile
Term debt coverage ratio	1172	1.40861	0.06099	0.02622	0.55361	1.74689
Current ratio	1172	1.63812	0.1261	0.09036	0.36924	1.39786
Direct payments (US $)	1172	1134.75	98.2669	0	0	0
Base acres	1172	65.6552	6.89079	0	0	0
Other government payments (US $)	1172	1956.03	256.341	0	0	447
Tenure	1172	0.85513	0.03108	0.72727	1	1
Off farm income	1172	79956.1	4222.19	37500	70000	109500
Gross sales revenue	1172	90719.5	6685.47	1754	4918	29530
Return on assets	1172	-3.69501	0.53797	-7.74693	-2.44158	0.90204
Farm debt-to-asset ratio	1172	0.34594	0.02172	0.1231	0.27972	0.46696
Hobby farm	1172	0.71447	0.01408	0	1	1
Sole proprietorship	1172	0.9398	0.01658	1	1	1
Primarily program crops	1172	0.09611	0.0203	0	0	0
Operator's age	1172	44.8427	0.84436	37	45	52
College graduate	1172	0.36569	0.0356	0	0	1

Note: Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture’s National Agricultural Statistics Service for the years 2005 through 2007.

Table 4. The impact of the level of U.S. direct payments on the term debt coverage ratio.

Variable	All	Experienced	Beginning
Intercept	4.725384 ***	4.964444 ***	4.313160 ***
	(0.62969)	(0.64785)	(1.32647)
Direct payments	0.000021 **	0.000018 **	0.000059
	(0.00001)	(0.00001)	(0.00004)
Other government payments	-0.000003	-0.000003	-0.000006
	(2.61E-06)	(2.45E-06)	(0.00002)
Tenure	-0.147374	-0.126099	-0.318990
	(0.18516)	(0.22710)	(0.48873)
Off-farm income	-0.000003 ***	-0.000003 ***	-0.000003 **
	(7.14E-07)	(8.77E-07)	(1.17E-06)
Gross sales revenue	3.07E-07 ***	3.17E-07 ***	1.61E-07
	(8.09E-08)	(8.40E-08)	(1.71E-07)
Return on assets	0.098302 ***	0.101824 ***	0.104868 ***
	(0.00827)	(0.01065)	(0.01553)
Farm debt-to-asset ratio	-3.539410 ***	-3.865188 ***	-1.974202 ***
	(0.37244)	(0.35201)	(0.39765)
Hobby farm	-0.974095 ***	-0.864119 ***	-1.184500 ***
	(0.12132)	(0.13536)	(0.27246)
Sole proprietorship	-0.201433	-0.132146	-0.290372
	(0.29990)	(0.36841)	(0.57706)
Primarily program crops	0.691863 ***	0.646514 ***	0.331338
	(0.15073)	(0.17034)	(0.42555)
Operator's age	-0.005151	-0.006791	-0.012880
	(0.00735)	(0.00939)	(0.01493)
College graduate	0.059915	-0.054357	0.367055
	(0.17289)	(0.22047)	(0.23551)
South	-0.837954 ***	-0.976359 **	-0.482193 *
	(0.32189)	(0.41517)	(0.29083)
Plains	-0.343467 **	-0.569348 ***	0.345302
	(0.15238)	(0.19470)	(0.31619)
West	-0.416221 **	-0.613442 ***	0.144572
	(0.18090)	(0.22224)	(0.32576)
Atlantic	0.266266	0.203805	0.431677
	(0.25554)	(0.33051)	(0.39488)
2005	0.256606	0.351652	0.035927
	(0.21852)	(0.22910)	(0.32444)
2006	-0.112380	-0.107723	-0.098160
	(0.19989)	(0.26138)	(0.24410)
Number of observations	7246	6074	1172
Adjusted R-squared	0.2759	0.2401	0.3936

Note: Asterisk (*), double asterisk (**), and triple asterisk (***) denote 10, 5, and 1 percent significance levels, respectively. Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007. Coefficient estimates and standard errors are calculated using weighted ordinary least squares and a jackknife procedure. Standard errors are in parentheses.

Table 5. The impact of the number of base acres on the term debt coverage ratio.

Variable	All	Experienced	Beginning
Intercept	4.731296 ***	4.958630 ***	4.363157 ***
	(0.62980)	(0.65478)	(1.30887)
Base acres	0.000234 *	0.000228	0.000508
	(0.00014)	(0.00015)	(0.00040)
Other government payments	-0.000001	-0.000002	-8.68E-08
	(2.47E-06)	(2.59E-06)	(0.00002)
Tenure	-0.150674	-0.128318	-0.344542
	(0.19345)	(0.23575)	(0.50417)
Off-farm income	-0.000003 ***	-0.000003 ***	-0.000003 **
	(7.22E-07)	(8.81E-07)	(1.14E-06)
Gross sales revenue	3.19E-07 ***	3.25E-07 ***	1.91E-07
	(8.37E-08)	(8.59E-08)	(1.90E-07)
Return on assets	0.098725 ***	0.102197 ***	0.106235 ***
	(0.00846)	(0.01059)	(0.01526)
Farm debt-to-asset ratio	-3.538044 ***	-3.866019 ***	-1.937804 ***
	(0.38859)	(0.35513)	(0.44742)
Hobby farm	-0.983960 ***	-0.872120 ***	-1.208927 ***
	(0.11906)	(0.13686)	(0.25878)
Sole proprietorship	-0.203899	-0.129245	-0.338656
	(0.29347)	(0.36379)	(0.57818)
Primarily program crops	0.736202 ***	0.675179 ***	0.522607
	(0.16218)	(0.19246)	(0.42784)
Operator's age	-0.004974	-0.006532	-0.012353
	(0.00733)	(0.00927)	(0.01521)
College graduate	0.062700	-0.051535	0.375056
	(0.17219)	(0.21794)	(0.23461)
South	-0.830690 **	-0.968092 **	-0.466680
	(0.32349)	(0.41612)	(0.28761)
Plains	-0.348567 **	-0.581919 ***	0.381681
	(0.15713)	(0.20172)	(0.31984)
West	-0.430712 **	-0.632545 ***	0.152996
	(0.18102)	(0.22768)	(0.32528)
Atlantic	0.255658	0.191714	0.432628
	(0.25187)	(0.32790)	(0.39995)
2005	0.256118	0.353038	0.030023
	(0.22035)	(0.23256)	(0.32323)
2006	-0.116029	-0.110602	-0.108107
	(0.20102)	(0.26177)	(0.24334)
Number of observations	7246	6074	1172
Adjusted R-squared	0.2745	0.2389	0.3886

Note: Asterisk (*), double asterisk (**), and triple asterisk (***) denote 10, 5, and 1 percent significance levels, respectively. Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007. Coefficient estimates and standard errors are calculated using weighted ordinary least squares and a jackknife procedure. Standard errors are in parentheses.

Table 6. The impact of the level of U.S. direct payments on the current ratio.

Variable	All	Experienced	Beginning
Intercept	4.520798 ***	5.318936 **	4.717906 ***
	(1.69662)	(2.45394)	(0.94240)
Direct payments	-0.000017	-0.000020	-0.000005
	(0.00001)	(0.00001)	(0.00003)
Other government payments	-0.000010	-0.000011	0.000003
	(0.00001)	(0.00001)	(0.00003)
Tenure	-0.201884	-0.191090	-0.183541
	(0.25691)	(0.29402)	(0.13284)
Off-farm income	-0.000001	-0.000001	1.54E-07
	(2.65E-06)	(3.18E-06)	(1.85E-06)
Gross sales revenue	-2.95E-07	-3.39E-07	-3.04E-07
	(3.27E-07)	(4.36E-07)	(2.18E-07)
Return on assets	0.071624	0.093158	0.008894
	(0.05011)	(0.06836)	(0.00841)
Farm debt-to-asset ratio	-4.609993 *	-5.271023	-3.351831 ***
	(2.68382)	(4.24004)	(0.67157)
Hobby farm	-1.266278 ***	-0.913004	-1.322856 ***
	(0.41740)	(0.65753)	(0.45947)
Sole proprietorship	-1.573422 **	-1.444186 **	-1.773564 ***
	(0.62157)	(0.65284)	(0.40749)
Primarily program crops	0.743151 *	0.495521	0.657215
	(0.38598)	(0.51472)	(0.54991)
Operator's age	0.045223	0.034988	0.003058
	(0.02751)	(0.04259)	(0.01645)
College graduate	-0.193355	0.064028	0.080639
	(0.40570)	(0.52428)	(0.45579)
South	0.699608 **	0.673672	0.760236
	(0.97386)	(1.37692)	(0.69785)
Plains	0.779993 **	1.019811	0.240904
	(0.70520)	(1.01873)	(0.39338)
West	0.895351	0.925254	0.631112
	(0.58987)	(0.67814)	(0.49578)
Atlantic	0.661668	0.303494	1.654663 **
	(0.56969)	(0.74504)	(0.76922)
2005	-0.408099	-0.599097	0.143983
	(0.50958)	(0.66522)	(0.44180)
2006	0.165370	0.229939	0.280133
	(0.61725)	(0.73984)	(0.60718)
Number of observations	7246	6074	1172
Adjusted R-squared	0.0436	0.0362	0.0334

Note: Asterisk (*), double asterisk (**), and triple asterisk (***) denote 10, 5, and 1 percent significance levels, respectively. Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007. Coefficient estimates and standard errors are calculated using weighted ordinary least squares and a jackknife procedure. Standard errors are in parentheses.

Table 7. The impact of the number of base acres on the current ratio.

Variable	All	Experienced	Beginning
Intercept	4.596932 ***	5.457132 **	4.725350 ***
	(1.69620)	(2.45422)	(0.92797)
Base acres	-0.000491 *	-0.000598 **	-0.000569
	(0.00025)	(0.00030)	(0.00067)
Other government payments	-0.000008	-0.000009	0.000011
	(0.00001)	(0.00001)	(0.00003)
Tenure	-0.207152	-0.196630	-0.200943
	(0.26631)	(0.31229)	(0.15142)
Off-farm income	-0.000001	-0.000001	1.26E-07
	(2.66E-06)	(3.19E-06)	(1.86E-06)
Gross sales revenue	-2.65E-07	-3.00E-07	-2.82E-07
	(3.20E-07)	(4.29E-07)	(2.08E-07)
Return on assets	0.071813	0.093556	0.009067
	(0.04978)	(0.06787)	(0.00821)
Farm debt-to-asset ratio	-4.620936 *	-5.290073	-3.339588 ***
	(2.67411)	(4.22041)	(0.67018)
Hobby farm	-1.300831 ***	-0.956508	-1.357565 ***
	(0.42464)	(0.66229)	(0.47132)
Sole proprietorship	-1.611941 **	-1.498174 **	-1.780709 ***
	(0.63178)	(0.66475)	(0.41501)
Primarily program crops	0.844694 **	0.627151	0.779401
	(0.40996)	(0.53518)	(0.50918)
Operator's age	0.044992	0.033999	0.003421
	(0.02748)	(0.04259)	(0.01652)
College graduate	-0.190259	0.067868	0.101693
	(0.40734)	(0.52778)	(0.45352)
South	0.684263	0.654330	0.755983
	(0.97915)	(1.38304)	(0.69880)
Plains	0.838181	1.105718	0.285290
	(0.70529)	(1.02490)	(0.39493)
West	0.925842	0.973035	0.639467
	(0.58792)	(0.67587)	(0.49282)
Atlantic	0.666621	0.312527	1.659146 **
	(0.57190)	(0.74777)	(0.77164)
2005	-0.425024	-0.625722	0.151301
	(0.50625)	(0.66114)	(0.44297)
2006	0.166677	0.233179	0.282727
	(0.61453)	(0.73499)	(0.60861)
Number of observations	7246	0.2389	0.3886
Adjusted R-squared	0.0439	0.0366	0.0337

Note: Asterisk (*), double asterisk (**), and triple asterisk (***) denote 10, 5, and 1 percent significance levels, respectively. Data are taken from the Agricultural Resource Management Survey (ARMS) administered by the U.S. Department of Agriculture's National Agricultural Statistics Service for the years 2005 through 2007. Coefficient estimates and standard errors are calculated using weighted ordinary least squares and a jackknife procedure. Standard errors are in parentheses.