Farm Level Incidence of the U.S. Farm Policy Proposal to the WTO

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The United States Department of Agriculture (USDA) Commodity Credit Corporation (CCC) spent an estimated $20.1 billion towards agricultural support programs in 2005 (USDA, CCC, 2006), which represents approximately 7.4% of the $270 billion value of agricultural production in that same year (USDA, ERS, 2005). This system of cash payments serves as both an income enhancement regardless of commodity prices and a safety net for farmers when prices are below specified levels. Therefore, when commodity prices are low, government payments can represent a significant portion of a farm's gross cash income, minimizing their exposure to downside financial risks. A reduction in these payments may affect the incomes, wealth, and financial risks for producers of different size, leverage position, and other characteristics differently. Thus, potential changes to farm policy may affect farm structure and it is important to recognize the implications of policy alternatives for different types of farms.

The Farm Security and Rural Investment Act, passed by the United States Congress in 2002, governs current farm subsidy programs. The three primary types of subsidies as part of the FSRI include the following: direct payments, countercyclical payments, and loan deficiency payments. Direct payments (DPs) are fixed and decoupled from production decisions. They are paid using base acres and program yields and are determined from historical records and a fixed government payment rate. Thus, DPs are calculated irrespective of present year planted acreage, yield, and price.

Countercyclical payments (CCPs) are based on historical production records, making individual farmer production decisions in the present year unrelated to CCP amounts. However, unlike DPs, CCPs are calculated from current marketing year average (MYA) prices. Therefore, US farmer production decisions in aggregate can affect MYA prices which can affect subsidy levels. Under present legislation, CCPs are issued at a set maximum rate whenever commodity prices fall below a national loan rate. As MYA prices rise above that loan rate, CCP rates linearly decline until they diminish to zero. Therefore, since CCPs are linked inversely to MYA prices, these payments act as a safety net when prices are low.

Loan deficiency payments (LDPs) are government issued loans utilizing farmers' crop as collateral against the loan (ERS, 2006). If the government-specified posted county price (PCP) drops below the national loan rate, farmers are required to pay the loan back at the PCP, effectively setting a price floor at the national loan rate. If the PCP is above the national loan rate, no subsidies exist. Loans are issued based on present year planted acres and yields and are linked with current production decisions. Farmers can also receive these payments regardless of whether loans were taken out or not. Thus, government subsidies can have larger impacts than DPs and CCPs on current production decisions.

Aggregate US commodity subsidy payments—including DPs, CCPs, and LDPs—are restricted by the 149-country World Trade Organization (WTO), of which the US is a member. The WTO oversees international trade policies between countries while "ensuring that trade flows as smoothly, predictably and freely as possible." (WTO, 2006). The implementation of this goal includes restricting trade-distorting domestic policies, which directly relate subsidy levels to volumes of production (UIUC, Farmdoc, 2006).

The WTO monitors domestic support by categorizing specific subsidy programs into one of the following colored boxes based upon their level of trade distortion: green, blue, or amber. Green box programs are not trade distorting and are not directly linked to current production levels. The WTO has no limit restrictions on total green box programs payments (WTO, 2006). Blue box programs are more trade distorting than green box programs and are directly linked to current production levels. However, production limits are built into the design of blue box programs (WTO, 2006). Amber box programs are the most trade distorting and are directly linked to current production. The WTO presently places limits on amber box policies (WTO, 2006).

The current Doha round of WTO negotiations calls for the reduction of trade-distorting policies in the US to promote compliance with WTO guidelines. Under current assumptions, green box payments include DPs and will not be directly limited or reduced through this round (FAPRI, CARD, 2005, p.4). However, reductions in blue box programs, which include CCPs, and amber box

programs, which include LDPs, must occur in order to make aggregate measures of support (AMS) compliant with WTO agreements (Hart and Beghin, 2004, p.10). With the 2002 US Farm Security and Rural Investment Act expiring in 2007, a reduction in national loan rates and target prices appears likely in the upcoming Farm Bill to ensure WTO compliance.

If a reduction in loan rates and target prices is realized in the next farm bill, the effects could be highly uneven on different US farms, as the current agricultural subsidies are asymmetrically distributed between varying farm sizes. For example, in 2004, approximately 40% of farms received government payments. The average subsidy amount awarded to recipient farmers was approximately $12,000, which represents 5% of the gross cash income for the respective farm. However, despite only representing 10% of the total number of farms in the U.S., over 50% of all government payments in 2004 were received by large commercial farms (as defined by the Economic Research Service) (USDA, ERS, 2006). On average, recipient commercial farms garnered approximately $37,000 of subsidies per farm, which represents approximately 6% of their gross cash income. The average payment awarded to a recipient rural residence farm was approximately $3,700, representing 16% of their gross cash income (USDA, ERS, 2006). Thus, despite large commercial farms receiving a greater proportion of government subsidies, their dependence upon farm subsidies is substantially less than smaller, rural residence farms.

Reductions in government payments could also have varying impacts on income and wealth levels depending on a farm's land tenure system. Research by Kirwan (2003), Goodwin, et al. (2003), and Lence and Mishra (2003) shows empirical evidence that government payments are often capitalized into higher land values and cash rents. Thus, a decrease in government subsidies would be partially offset by a reduction in per acre cash rents for farms renting a high percentage of farmland. Additionally, a reduction in government subsidies could equate to a loss of farmland value and owner's equity for farms that own a high percentage of their land. The impact on producers could be highly variable considering approximately 60% of the farmland in the US is rented (USDA, ERS, 2003).

A decrease in downside price protection by a reduction in subsidy payments could equate to greater financial stress and a higher probability of loan defaults by highly-leveraged producers. For example, while having a high owned-to-operated ratio means that a farm leases a low percentage of their land, a high owned-to-operated ratio does not mean that "owned" land is free-and-clear of debt obligations. The average debt-to-asset ratio of all farms in the US in 2004 was 13.8% (ERS, AO, 2006). However, according to the 2004 Agricultural Resource Management Survey (ARMS), only 35% of US farms were carrying this entire debt load. This implies that there is substantial variation in the debt obligations across US farms. In times of low commodity prices, government subsidy payments may represent a large safety net for highly-leveraged producers when attempting to service those debt obligations.

The overall problem is a reduction in government payments causes the risk of serious negative impacts on annual farm income, total equity, and debt repayment capacity. The objective of this research is to determine the financial impacts of reduced government payments on farms. The research will consider the affect a reduction of government payments has on farms that differ in typology, land tenure system, and capital structure. A quantification of these effects could assist farmers and inform policymakers with preparing for potential financial and sociological disasters arising from reductions in payments.

Methodology

A stochastic simulation model is used to carry out the objective of this research. The model will captures a distribution of 1,000 possible outcomes of yield and price for corn, soybeans, and wheat each year over a 10-year horizon. These observations are subsequently input into a farm accounting model that will track net farm income, and other key ratios such as return on equity, debt-to-asset ratio, and debt coverage ratio. The mean and volatility of these simulations will be analyzed, providing particular insight when prices drop to low levels and high subsidy payments act as a safety net. Reductions in subsidy payments follow an analysis conducted by the Food and Agricultural

Policy Research Institute (FAPRI) in order to meet WTO commitments. This involves a linear reduction in target prices and loan rates over a 5-year period from 2008 to 2012.

Farm balance sheets, cash flow statements, and income statements are calibrated from the 2003 Agricultural Resource Management Survey (ARMS) to reflect typical Indiana, Illinois, and Ohio corn, soybean, and wheat farms. Three separate typologies, or categorizations of farm types, are analyzed: farm operator with spouse working off farm, traditional, and commercial. High and low debt scenarios and high and low land ownership scenarios will be analyzed with each of the 3 typologies. Thus, there are 12 farm types analyzed in total.

Revenues on the income statement incorporate simulated cash receipts, commodity payments, and crop insurance indemnity payments as well as non-simulated, scenario-specific other farm and non-farm income. Operating expense estimates for each scenario are adjusted annually for inflation by baseline projections from FAPRI. Fixed expenses including interest and depreciation are calculated using beginning asset and debt values. Beginning cash rent costs for land are changed on a year-over-year basis by a proportion of the percentage change in expected year-over-year returns to land.

Net farm income is combined with taxes, debt service, and operator withdrawals to determine cash flow impacts for the farm. Taxes are assumed to be for a sole proprietor farming operation and federal taxes are filed as "Head of Household". State taxes follow Indiana tax law. Debt service is determined based on each farms starting debt position and amortization schedule. Operator withdrawals are also accounted for in the statement of cash flows. Langemeier and Patrick (1990) and Mishra and Morehart (1998) conducted analyses on the marginal propensity to consume (MPC) for farmers. Langemeier and Patrick found MPC rates of approximately 0.14 for Illinois farmers and Mishra and Morehart found MPC rates of approximately 0.19 for farmers. A simple average of the two was used to calculate the marginal propensity to consume. Langemeier and Patrick also found cases where household consumption exceeded disposable household income. For cases such as this a minimum withdrawal must be implemented for family subsistence. The ARMS

data provides survey results for the category "Principal operator household income minimum deemed necessary." This value is used as the minimum household income necessary. Using any off-farm income to offset the minimum household income, "minimum operator withdrawals" are calculated as "Principal operator household income minimum deemed necessary" minus off-farm income. Therefore, operator withdrawals are calculated as the greater of "minimum operator withdrawals" or the MPC multiplied by net farm income. Finally, cash available after taxes, debt servicing, and operator withdrawals is added to the assets on the balance sheet. Any cash shortfalls are remedied by short-term borrowing.

Balance sheets for each farm type incorporate beginning asset, debt, and owner equity values. These values are updated using the simulated income statement and other cash flow information, including operator withdrawals and farm asset growth through equity and debt financing. Year-over-year change in land values incorporate the change due to non-agricultural factors as well as capitalized increases (or decreases) attributed to agricultural returns per acre.

Yield and price data from 1975 to 2004 gathered from the National Agricultural Statistics Service (NASS) will be used to simulate yields and prices. Yields are modeled as a linear time trend. Local prices are modeled as an autoregressive moving average (ARMA) process where yields are also included as a dependant variable. Mean price levels are adjusted to the FAPRI baseline projection levels, making use of a more refined deterministic projection while allowing for the simulation of stochastic variability estimated through error structures from times series models of the historical data. To capture the farm-level yield variability, Carroll County, Indiana yields are simulated as a function of Indiana state yields. Correlation in error terms across commodities is maintained and stochastic error processes are developed from the estimated time series models.

This simulation model simulates a set of 1,000 yield and price realizations each year for 10 years into the future for corn, soybeans, and wheat. These yield and price realizations are then used in financial statements to analyze net income, total equity, and debt repayment capacity. Financial statements are calibrated to reflect characteristics of a corn, soybean and wheat farm in the eastern

Corn Belt, encompassing Illinois, Indiana, and Ohio using the 2003 Agricultural Resource Management Survey (ARMS). All three states were chosen to provide sufficient sample size. These financial statements are used to analyze the long-term effects of reductions in government subsidies.

Reductions in Subsidy Payments

Subsidy reduction scenarios have been taken from recommendations by FAPRI. According to FAPRI stochastic simulation results, the proposed changes bring US aggregate measures of support into compliance with FAPRI guidelines in no less than 95 percent of occurrences. These reductions consist of 7 percent reductions in target prices and 11 percent reductions in loan rates to be implemented from 2007 to 2011. There are no changes to direct payment rates. The proposed loan rates and target prices can be found in table 1.

Performance Measures

Several performance measures will be used to analyze each of the 11 scenarios. The scenarios will be analyzed for the long-term effects of reductions in government subsidies. This will include a comparison of the key measures before and after the policy reductions in 2012. The key comparisons will be drawn between before and after results in one year as opposed to the changes over time in one policy scenario.

The key metrics to be compared are net farm income, total equity, and term debt coverage ratio. Net farm income provides a measure of how reductions in subsidy payments affect the annual income stream. Total equity allows for analysis of farm wealth, and term debt coverage ratio will indicate if a certain group of farms is more susceptible to default after reductions in subsidies.

Data

The data used to populate these financial statements comes from the 2003 Agricultural Resource Management Survey (ARMS), the USDA's "primary source of information about the current status and trends in the financial condition, production practices, and resource use of America's farmers" (ERS, 2006). These surveys are conducted annually in the US and co-sponsored by the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS).

ARMS summary statistics are made available to the public through the USDA website. Due to the level of specificity, the data contained in this research were obtained with special permission from the ERS.

Summary statistics from the 12 scenarios (including the omitted scenario) and the pooled data are contained in table 2. Briggeman (2006) developed a set of US farm typology cluster groups. The seven categories he developed were: single income ruralpolitan, double income ruralpolitan, dual career operator and spouse, active seniors, farm operator with spouse working off-farm, traditional, and commercial. The last three typologies were chosen in order to isolate the largest three groups by asset size and less dependence on off-farm income. In addition to grouping farms by typology, they were also divided into high and low debt groups and high and low owned-to-operated land ratio groups. The break between high and low debt groups was set with the debt-to-asset ratio at 0.08, the median of all 454 observations. The break between high and low owned-to-operated land ratio groups was set at 0.5.

The Stochastic Processes

To simulate prices and yields, stochastic processes are estimated based on the residuals from estimated time series yield and price models. A multivariate empirical distribution for the stochastic component of each variable is constructed using the residuals from the deterministic model following the method outlined by Richardson, Klose, and Gray (2000).

The final simulated price and yield estimates are contained in Table 4. The mean, standard deviation, 5th percentile, and 95th percentile have been reported for the yield data. Since 2005 was the first simulated year in the model and 2005 yields are already known, they were taken as given in the model. In 2006 the average eastern Corn Belt corn yield is 153.5 bushels/acre with a standard deviation of 23.9 bushels/acre. The mean yield and the standard deviation gradually rise over the simulation period of the model. The mean soybean and wheat yields in 2006 are 46.7 and 67.7 bushels/acre, respectively. These mean values as well as standard deviations rise over the simulation period.

In addition to the mean, standard deviation, 5th percentile, and 95th percentile reported for crop prices, the probability of the MYA price being below the effective target price and the probability of the average annual PCP being below the loan rate are listed. This gives an indicator of the probability of receiving CCPs and LDPs. While the probability of the MYA corn price being below the effective target price in 2006 is 78.9 percent, it diminishes to 36.2 percent in 2012, the final year of payment reductions. As well, the probability of the average PCP being below the loan rate in 2006 is 65.7 percent but only 19.3 percent in 2012. The trend of the declining probabilities over time for corn is also present in soybeans and wheat. This implies that as prices increase, farmers are likely receiving less money in subsidies. The results of the stochastic accounting simulation model are discussed next.

Results

Net farm income (NFI), total equity, and term debt coverage ratio (TDCR) are tracked as the key output variables. The proposed policy alternative, defined by the Food and Agricultural Policy Research Institute, entails a reduction in target prices and loan rates from 2007 to 2011. The key output variables are analyzed both with and without the proposed change in policy. The results are reported for 2012, the first year after the subsidy reductions are fully implemented. This provides a snapshot of the farm's well financial performance in the long run after the reductions have been absorbed. Each output variable is monitored for the median, standard deviation, and 5th percentile. Specific analysis will focus on the median, standard deviation and 5th percentile levels. In addition, the probability that the TDCR is less than one is also reported. The results are summarized in Tables 5 through 7.

Net Farm Income

For each of the three typologies, farms with a low owned-to-operated ratio (i.e. low ownership) have the highest median NFI in the base case indicating the large size of these operations. The lowest NFI group is low debt/high ownership farms. The policy change results in Median NFI level decreases of between 5.6 and 8.2 percent for each of the 11 scenarios.

Additionally, the standard deviation of NFI increases between 5.3 and 6.3 percent for each of these scenarios. The range in the reduction in the 5th percentile of NFI after 2012 is from 8.6 percent to 17.7 percent. The largest percent reduction occurs in traditional farms with low debt/high ownership where a 17.7 percent decrease is from $18,577 to $15,283. The largest absolute decrease occurs in commercial high debt/low ownership farms and is from $72,556 to $60,966, a 16 percent reduction. It is of note that the previous two categories, traditional and commercial high debt/low ownership farms, are the two largest categories by acres farmed. The high debt/low ownership category for farm operator with spouse working off-farm is the largest absolute reduction in the 5th percentile for its typology at $7,216, which represents a 13.2 percent reduction. The other category across typologies that see large percentage decreases in NFI is low debt/high ownership. This category for farm operator with spouse working off-farm and traditional farm types has reductions by 17.4 percent. However these are the smallest two scenarios out of the 11 by acres farmed and thus their absolute reductions are much smaller.

The farm types that have the biggest decrease in downside NFI protection from subsidy reductions are farms in the low debt/high ownership and high debt/low ownership categories. However the largest absolute reductions occur in the latter high debt/low ownership category, which corresponds to being the largest farms. The reductions in median NFI levels coupled with similar percentage increases in standard deviations are indicative of the downside protection afforded by current farm policy levels. Lowering the subsidy levels for LDP's and CCP's reduces the skewness in the distribution of NFI for all of the farms resulting in a drop in median values and an increase in variability. Without simulating the stochastic nature of prices and yields, the impacts of changes in the farm policy instruments on farm level financial performance would be understated.

Wealth Effects

In general, the total wealth of each farm scenario is more closely linked to the owned-to-operated ratio than to acres operated. For example, of traditional farms, although low debt/high ownership is the smallest by acres operated, it is the largest by net worth. Therefore, one would

expect that reductions in subsidies that cause decreases to land values would cause the largest decrease in wealth for farms with high ownership.

After full implementation of subsidy reductions the median expected wealth levels for each scenario decrease between 0.3 and 1.5 percent and the 5th percentile levels decrease between 0.3 and 1.4 percent due to subsidy reductions. Interestingly, the reductions in wealth due to the policy change are more severe for the low ownership farms than the high ownership farms. The standard deviation of the wealth level increases between 6.9 and 9.5 percent, and the standard deviation of wealth increases by a greater percentage for farms with high ownership compared to farms with low ownership. In every case the percentage reduction in 5th percentile wealth levels is larger for low ownership farms compared to high ownership farms.

Despite having lower equity levels in every case, low ownership farms operate more acres and have higher NFI levels than there high ownership counterparts. In the current structure of the simulation model, any cash earnings net of all financial obligations are retained in the business. Therefore, years with high NFI will result in higher equity levels. Because low ownership farms have higher levels of NFI, reductions in subsidies will reduce their NFI and thus reduce their increases in wealth over time. This implies that reduced NFI due to lower CCP and LDP subsidies has a greater affect on wealth in the long run than decreases in land values.

Term Debt Repayment Capacity Effects

When the TDCR drops below one, a farm's cash available for debt service is below their debt servicing obligations and they may have a difficult time paying this long-term debt. By tracking the probability that the TDCR is below one, it provides insight into the number of farms that have a higher probability of defaulting on loans.

In each scenario, low debt farms have sufficiently high TDCRs so that any reduction in subsidies still maintains that there is zero percent probability that the TDCR of these farms' will drop below one. While there are small reductions in the TDCR for median and 95th percentile levels for low debt farms, each of the reductions does not diminish the TDCR below two in any scenario.

Therefore, it is concluded that for low debt farms, reduced subsidies do not increase the probability of facing difficulties in servicing term debts.

For all three typologies, high debt/high ownership farms have the lowest median TDCR and the highest probability that the TDCR will fall below one. The median TDCR for high debt/high ownership farm operator with spouse working off-farm goes from 1.09 to 1.07 after subsidy reductions and the probability that the TDCR falls below one goes from 26 to 30 percent, an increase by 4 percentage points. For the commercial farm typology this probability increases from 12.0 to 16 percent. There is no change in the probability of a TDCR below 1 for the traditional farm due to a shift in the farms cash flows away from servicing operating debt to servicing term debt when government subsidies decline. With rising projected mean commodity prices between 2007 and 2012 the probability of TDCR's below 1 are significantly lower in 2012, however the subsidy reductions still cause the median TDCR to decrease for high debt/high ownership farms.

For farms with low debt, their short-term and long-term ability to service debts is sufficiently high that a reduction in subsidy payments causes no impact on their continued ability to service those debts. For farms with high debt/low ownership, with rising simulated mean commodity payments, their ability to service debts in the long run is strong and unabated by a reduction in subsidy payments. Finally, high debt/high ownership farms currently represent the highest risk of failure to service term debts, and reductions in commodity payments slightly increase the risk of failing to service those debts.

Conclusions

The results of the analysis show that the impact of the U.S. proposal to the WTO has an expected negative impact on farm level financial performance for traditional corn/soybean farms in the Midwest. However, the expected increase in commodity prices projected by FAPRI as a result of the policy changes lessens the impact that would otherwise occur. The main objective of this study was to examine how the policy change might impact farms with different size and ownership

structures. The ARMS data was used to define "typical" farms in the Midwest with different mixes of owned versus rented land, asset levels, debt positions, and labor allocations.

The policy change has the most substantial impact on NFI due to the reduction in the safety net provided by CCP's and LDP's. In absolute terms, the biggest downside impact occurs for the larger farms with high debt and low ownership. On a percentage basis the bigger impact is for low debt/high ownership traditional farms. The low debt/high ownership farms have absorptive capacity in their financial performance to weather the policy shock due to their low debt positions. But, larger farms associated with high debt/low ownership positions are vulnerable to the reduction in the safety net and will have increased difficulty repaying debts.

One original hypothesis of this work was that high ownership farms would suffer more from reductions in equity valuation associated with reductions in land values due to changes in policy. However, the fact that land values are only partially determined by farm income lessens the impact on farm level wealth due to the policy change. In addition, the fact that reductions in downside risk protection in policy instruments does not translate to the same magnitude of reduction in the expected value of farm income; particularly when commodity prices are increasing; the impact of the policy change would be more heavily felt in cash flows than in equity values. Thus, high ownership farms, in this analysis, due not face a bigger impact in financial performance compared to their low ownership counterparts.

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Table 1. Changes in Farm Policy Instruments

Corn	**Current**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Loan Rate	1.95	1.95	1.91	1.86	1.82	1.78	1.74	1.74	1.74	1.74
Target Price	2.63	2.63	2.59	2.56	2.52	2.48	2.45	2.45	2.45	2.45
Direct Payment	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28

Soybeans	**Current**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Loan Rate	5.00	5.00	4.89	4.78	4.67	4.56	4.45	4.45	4.45	4.45
Target Price	5.80	5.80	5.72	5.64	5.56	5.48	5.39	5.39	5.39	5.39
Direct Payment	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44

Wheat	**Current**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Loan Rate	2.75	2.75	2.69	2.63	2.57	2.51	2.45	2.45	2.45	2.45
Target Price	3.92	3.92	3.87	3.81	3.76	3.70	3.65	3.65	3.65	3.65
Direct Payment	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52

Table 2. Characteristics of Farm Typologies Used in the Analysis

Farm Operator with Spouse Working Off-farm -- low debt / high ownership	
Debt/Asset Ratio	0.02
Owned/Operated Ratio	0.85
Acres	353
Observations	16
Off-farm Income	53,916
Gross Cash Income	91,718
Variable Cash Expenses	52,255
Fixed Cash Expenses	14,720
Net Cash Farm Income	24,744
Net Farm Income	36,204
Total Assets	853,794
Current Assets	82,144
Non-current assets	771,649
Total Liabilities	11,938
Current Liabilities	3,995
Non-current Liabilities	5,031
Farm Equity	841,856

Farm Operator with Spouse Working Off-farm – low debt / low ownership	
Debt/Asset Ratio	0.03
Owned/Operated Ratio	0.18
Acres	873
Observations	53
Off-farm Income	48,456
Gross Cash Income	243,034
Variable Cash Expenses	107,521
Fixed Cash Expenses	41,343
Net Cash Farm Income	94,170
Net Farm Income	81,405
Total Assets	948,147
Current Assets	172,218
Non-current assets	775,930
Total Liabilities	30,111
Current Liabilities	5,283
Non-current Liabilities	13,886
Farm Equity	918,036

Farm Operator with Spouse Working Off-farm – high debt / high ownership	
Debt/Asset Ratio	0.19
Owned/Operated Ratio	0.81
Acres	770
Observations	14
Off-farm Income	68,594
Gross Cash Income	288,158
Variable Cash Expenses	133,367
Fixed Cash Expenses	81,931
Net Cash Farm Income	72,861
Net Farm Income	4,342
Total Assets	2,164,550
Current Assets	239,977
Non-current assets	1,924,572
Total Liabilities	510,906
Current Liabilities	31,362
Non-current Liabilities	415,684
Farm Equity	1,653,643

Farm Operator with Spouse Working Off-farm – high debt / low ownership	
Debt/Asset Ratio	0.26
Owned/Operated Ratio	0.15
Acres	1,101
Observations	90
Off-farm Income	49,901
Gross Cash Income	313,119
Variable Cash Expenses	142,676
Fixed Cash Expenses	92,288
Net Cash Farm Income	78,155
Net Farm Income	80,225
Total Assets	1,086,862
Current Assets	186,743
Non-current assets	900,119
Total Liabilities	259,951
Current Liabilities	55,227
Non-current Liabilities	156,923
Farm Equity	826,911

Table 2. (Continued)

Commercial Farms – low debt / high ownership	
Debt/Asset Ratio	0.02
Owned/Operated Ratio	0.93
Acres	644
Observations	6
Off-farm Income	25,259
Gross Cash Income	137,750
Variable Cash Expenses	121,790
Fixed Cash Expenses	28,530
Net Cash Farm Income	(12,570)
Net Farm Income	65,926
Total Assets	1,431,786
Current Assets	223,423
Non-current assets	1,208,363
Total Liabilities	41,283
Current Liabilities	4,131
Non-current Liabilities	29,041
Farm Equity	1,390,503

Commercial Farms – low debt / low ownership	
Debt/Asset Ratio	0.04
Owned/Operated Ratio	0.16
Acres	1,110
Observations	26
Off-farm Income	12,967
Gross Cash Income	332,583
Variable Cash Expenses	137,327
Fixed Cash Expenses	73,686
Net Cash Farm Income	121,569
Net Farm Income	79,485
Total Assets	1,143,778
Current Assets	218,320
Non-current assets	925,457
Total Liabilities	50,308
Current Liabilities	6,817
Non-current Liabilities	25,318
Farm Equity	1,093,470

Commercial Farms – high debt / high ownership	
Debt/Asset Ratio	0.24
Owned/Operated Ratio	0.84
Acres	865
Observations	14
Off-farm Income	60,411
Gross Cash Income	264,097
Variable Cash Expenses	123,833
Fixed Cash Expenses	66,956
Net Cash Farm Income	73,308
Net Farm Income	47,844
Total Assets	2,453,146
Current Assets	109,133
Non-current assets	2,344,013
Total Liabilities	557,560
Current Liabilities	37,026
Non-current Liabilities	446,262
Farm Equity	1,895,587

Commercial Farms – high debt / low ownership	
Debt/Asset Ratio	0.25
Owned/Operated Ratio	0.16
Acres	1,553
Observations	52
Off-farm Income	36,867
Gross Cash Income	465,186
Variable Cash Expenses	234,180
Fixed Cash Expenses	135,475
Net Cash Farm Income	95,531
Net Farm Income	74,406
Total Assets	1,605,811
Current Assets	282,431
Non-current assets	1,323,380
Total Liabilities	341,190
Current Liabilities	61,078
Non-current Liabilities	215,565
Farm Equity	1,264,621

Table 2. (Continued)

Traditional Farms – low debt / high ownership	
Debt/Asset Ratio	0.01
Owned/Operated Ratio	0.78
Acres	489
Observations	45
Off-farm Income	25,857
Gross Cash Income	123,392
Variable Cash Expenses	68,070
Fixed Cash Expenses	23,771
Net Cash Farm Income	31,551
Net Farm Income	9,825
Total Assets	2,155,903
Current Assets	147,968
Non-current assets	2,007,935
Total Liabilities	25,624
Current Liabilities	5,078
Non-current Liabilities	14,759
Farm Equity	2,130,279

Traditional Farms – low debt / low ownership	
Debt/Asset Ratio	0.03
Owned/Operated Ratio	0.24
Acres	1,161
Observations	41
Off-farm Income	30,577
Gross Cash Income	341,326
Variable Cash Expenses	146,774
Fixed Cash Expenses	68,658
Net Cash Farm Income	125,894
Net Farm Income	111,256
Total Assets	1,796,396
Current Assets	273,326
Non-current assets	1,523,069
Total Liabilities	53,161
Current Liabilities	22,600
Non-current Liabilities	13,738
Farm Equity	1,743,234

Traditional Farms – high debt / high ownership	
Debt/Asset Ratio	0.20
Owned/Operated Ratio	0.80
Acres	769
Observations	28
Off-farm Income	35,642
Gross Cash Income	235,914
Variable Cash Expenses	107,797
Fixed Cash Expenses	59,250
Net Cash Farm Income	68,867
Net Farm Income	51,854
Total Assets	1,910,824
Current Assets	188,895
Non-current assets	1,721,929
Total Liabilities	386,714
Current Liabilities	53,832
Non-current Liabilities	282,042
Farm Equity	1,524,110

Traditional Farms – high debt / low ownership	
Debt/Asset Ratio	0.20
Owned/Operated Ratio	0.26
Acres	1,195
Observations	69
Off-farm Income	19,742
Gross Cash Income	332,334
Variable Cash Expenses	149,187
Fixed Cash Expenses	106,848
Net Cash Farm Income	76,299
Net Farm Income	89,398
Total Assets	1,592,819
Current Assets	212,411
Non-current assets	1,380,408
Total Liabilities	318,232
Current Liabilities	40,199
Non-current Liabilities	225,420
Farm Equity	1,274,587

Table 3. Simulation results for Yields

Corn

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	146.0	153.5	155.2	157.0	158.7	160.5	162.3	164.1	165.8	167.6
St. Dev.		23.9	24.2	24.3	24.3	24.6	25.1	25.6	25.3	25.7
5th Percentile		104.3	106.6	106.3	107.7	109.5	109.4	112.0	113.6	114.7
95th Percentile		186.9	190.8	193.5	193.1	198.0	198.1	200.7	202.2	203.0

Soybeans

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	47.1	46.7	47.2	47.7	48.1	48.6	49.1	49.6	50.1	50.6
St. Dev.		5.8	5.8	5.9	5.9	6.0	5.9	6.0	6.0	6.1
5th Percentile		36.2	36.5	36.8	37.6	38.4	38.7	38.8	39.8	39.6
95th Percentile		55.4	55.6	56.5	56.8	58.0	57.9	58.9	59.1	59.6

Wheat

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	67.8	67.7	68.7	69.7	70.7	71.6	72.6	73.6	74.6	75.5
St. Dev.		10.8	11.0	11.3	11.4	11.3	11.4	11.6	11.8	11.9
5th Percentile		48.0	48.3	49.7	50.7	50.8	52.1	52.0	52.9	52.7
95th Percentile		84.2	85.7	87.0	88.6	89.2	90.6	91.5	92.6	93.8

Table 4. Simulation Results for Prices

Corn

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	1.80	2.12	2.24	2.34	2.43	2.48	2.50	2.51	2.52	2.53
St. Dev.		0.34	0.35	0.35	0.36	0.36	0.37	0.36	0.37	0.36
5th Percentile		1.62	1.71	1.82	1.87	1.94	1.97	1.96	2.00	1.99
95th Percentile		2.75	2.86	2.93	3.06	3.10	3.21	3.16	3.21	3.19
Prob. MYA < 2.35	100.0%	78.9%	67.1%	55.8%	44.9%	37.0%	36.8%	36.2%	34.2%	32.9%
Avg. PCP	1.54	1.86	1.98	2.08	2.17	2.22	2.24	2.25	2.26	2.27
Prob. Avg. PCP < 1.95	100.0%	65.7%	50.1%	35.5%	27.5%	21.7%	19.8%	19.3%	19.5%	17.4%

Soybeans

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	5.50	5.05	5.33	5.53	5.56	5.60	5.66	5.67	5.66	5.64
St. Dev.		0.86	0.84	0.83	0.83	0.82	0.84	0.82	0.84	0.81
5th Percentile		3.79	4.07	4.23	4.35	4.34	4.44	4.38	4.44	4.42
95th Percentile		6.53	6.81	7.01	7.04	7.06	7.18	7.11	7.10	7.02
Prob. MYA < 5.36	0.0%	63.5%	53.6%	43.7%	44.2%	40.6%	39.8%	36.6%	38.6%	39.5%
Avg. PCP	5.16	4.71	4.99	5.19	5.22	5.26	5.32	5.33	5.32	5.30
Prob. Avg. PCP < 5.00	0.0%	63.0%	52.5%	42.5%	43.3%	40.0%	39.1%	35.7%	37.8%	38.6%

Wheat

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean	3.15	3.11	3.20	3.26	3.36	3.41	3.47	3.50	3.53	3.56
St. Dev.		0.39	0.46	0.45	0.51	0.52	0.52	0.53	0.53	0.53
5th Percentile		2.40	2.43	2.50	2.55	2.52	2.63	2.68	2.68	2.71
95th Percentile		3.73	3.92	3.97	4.22	4.29	4.37	4.36	4.46	4.48
Prob. MYA < 3.40	100.0%	76.7%	63.8%	62.4%	54.2%	48.6%	45.4%	44.7%	40.6%	39.7%
Avg. PCP	2.99	49.11	49.60	50.07	50.57	1.54	1.86	1.98	2.08	2.17
Prob. Avg. PCP < 2.75	0.0%	28.6%	29.9%	23.5%	20.2%	17.3%	16.6%	14.7%	12.7%	11.1%

Table 5. Impact of Alternative Farm Policy on the Farm Operator with Spouse Working Off The Farm Household Type

	Low Debt/Low Ownership			Low Debt/High Ownership			High Debt/Low Ownership			High Debt/High Ownership		
	Base	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**
Farm Income												
Median	107,834	101,775	-5.62%	27,903	25,773	-7.63%	106,520	98,774	-7.27%	75,959	70,781	-6.82%
Standard Deviation	27,020	28,564	5.71%	9,826	10,392	5.76%	33,979	35,829	5.44%	22,656	23,890	5.45%
5th Percentile	66,926	60,895	-9.01%	13,181	10,885	-17.42%	54,600	47,383	-13.22%	41,477	36,521	-11.95%
Wealth												
Median	1,415,397	1,400,797	-1.03%	1,036,976	1,030,655	-0.61%	1,304,490	1,285,967	-1.42%	2,270,096	2,258,861	-0.49%
Standard Deviation	50,562	54,379	7.55%	23,420	25,649	9.52%	62,583	66,911	6.92%	60,743	65,767	8.27%
5th Percentile	1,339,275	1,321,564	-1.32%	1,001,547	992,530	-0.90%	1,212,112	1,191,306	-1.72%	2,188,340	2,165,964	-1.02%
Repayment Capacity												
Median	3.65	3.54	-3.01%	4.40	4.21	-4.32%	5.22	4.98	-4.60%	1.09	1.07	-1.83%
Standard Deviation	0.47	0.49	4.26%	0.71	0.76	7.04%	0.99	1.02	3.03%	0.16	0.15	-6.25%
5th Percentile	2.95	2.84	-3.73%	3.30	3.11	-5.76%	3.79	3.58	-5.54%	0.82	0.84	2.44%
Probability of < 1	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	30%	4%

Table 6. Impact of Alternative Farm Policy on the Traditional Farm Household Type

	Low Debt/Low Ownership			Low Debt/High Ownership			High Debt/Low Ownership			High Debt/High Ownership		
	Base	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**
Farm Income												
Median	110,100	103,919	-5.61%	38,943	35,822	-8.01%	105,107	97,117	-7.60%	105,655	99,613	-5.72%
Standard Deviation	27,113	28,685	5.80%	13,719	14,508	5.75%	35,874	37,843	5.49%	24,832	26,321	6.00%
5th Percentile	69,528	63,300	-8.96%	18,577	15,283	-17.73%	51,452	43,337	-15.77%	67,651	61,836	-8.60%
Wealth												
Median	1,404,473	1,390,398	-1.00%	2,558,805	2,550,238	-0.33%	1,770,835	1,754,029	-0.95%	2,544,471	2,529,935	-0.57%
Standard Deviation	49,383	52,928	7.18%	34,386	37,703	9.65%	66,982	71,740	7.10%	53,015	57,545	8.54%
5th Percentile	1,330,069	1,312,307	-1.34%	2,508,135	2,494,933	-0.53%	1,671,198	1,648,063	-1.38%	2,467,967	2,446,804	-0.86%
Repayment Capacity												
Median	3.59	3.47	-3.34%	2.94	2.98	1.36%	1.89	1.80	-4.76%	1.17	1.16	-0.85%
Standard Deviation	0.55	0.56	1.82%	0.39	0.41	5.13%	0.35	0.36	2.86%	0.23	0.21	-8.70%
5th Percentile	2.33	2.22	-4.72%	2.33	2.22	-4.72%	1.40	1.33	-5.00%	0.79	0.82	3.80%
Probability of < 1	0%	0%	0%	0%	0%	0%	0%	0%	0%	22%	22%	0%

Table 7. Impact of Alternative Farm Policy on the Commercial Farm Household Type

	Low Debt/Low Ownership			High Debt/Low Ownership			High Debt/High Ownership		
	Base	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**	**Base**	**Alternative**	**% Change**
Farm Income									
Median	130,879	123,210	-5.86%	144,093	133,440	-7.39%	104,364	98,232	-5.88%
Standard Deviation	34,506	36,677	6.29%	47,623	50,191	5.39%	24,781	26,254	5.94%
5th Percentile	77,286	68,463	-11.42%	72,556	60,966	-15.97%	66,404	60,661	-8.65%
Wealth									
Median	1,683,440	1,663,628	-1.18%	1,972,081	1,943,986	-1.42%	2,633,671	2,619,686	-0.53%
Standard Deviation	71,310	76,974	7.94%	95,390	102,174	7.11%	66,858	72,849	8.96%
5th Percentile	1,574,283	1,546,814	-1.74%	1,827,251	1,795,393	-1.74%	2,543,311	2,515,019	-1.11%
Repayment Capacity									
Median	4.10	3.96	-3.41%	4.68	4.46	-4.70%	1.22	1.19	-2.46%
Standard Deviation	0.67	0.69	2.99%	0.97	1.01	4.12%	0.20	0.19	-5.00%
5th Percentile	3.14	2.93	-6.69%	3.38	3.15	-6.80%	0.88	0.89	1.14%
Probability of < 1	0%	0%	0%	0%	0%	0%	12%	16%	4%