An Analysis of a Market-Driven Inventory System (MDIS)

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Executive Summary

A new Farm Bill is due and the challenges are many. The budget is lean and likely to get leaner. While some believe that agriculture will remain in a prosperous place in the years ahead, history screams otherwise. Today's crop prices are likely the calm before the sound and fury of the next disastrous price storm.

Over the last dozen years, low-price and high-price extremes revealed shortcomings of the current commodity program. Under the current program, when supply outruns demand, crop prices drop precipitously resulting in very high farm program expenditures. Livestock producers and other grain demanders become the real beneficiaries, while farmers in other countries accuse us of dumping.

At the other extreme, when demand outruns supply, prices spike and crop net returns to often vastly exceed total production costs. The pendulum shift in feed prices causes wrenching dislocations in the livestock industry and raises the consumer prices of food staples, disproportionately affecting the most vulnerable worldwide.

The current type of commodity program is not capable of dampening extreme price and market-receipt variability. Furthermore, this and the other shortcomings would persist—if not become worse—if the current legislation is replaced with any of moment's most-talked about commodity program alternatives, most of which have revenue insurance as their central feature.

The question that this study asks is: Is it possible to design an commodity program that moderates price extremes, reduces economic dislocation and associated economic inefficiencies, cuts government expenditures by well over half, increases the value of crop exports and does not reduce average agricultural net income over the study period? The answer is yes.

The program described and analyzed here is called Market-Driven Inventory System (MDIS). Its central feature is a farmer-owned inventory system that—while it stays out of the way of market forces under normal conditions—moderates prices at the extremes. The intent of MDIS is that reserve activity would only be activated when crop prices become so low or so high that the prices clearly are not providing normally profitable agricultural firms with reasonable investment and production signals. By working with the market, MDIS would ensure that farmers receive their income from the market not from government payments.

This analysis of MDIS has two parts. The first (Phase I) is a rerun of history from 1998 to 2010 with one change: the commodity programs during that period are replaced with MDIS. The second (Phase II) uses the U.S. Department of Agriculture Ten-Year Baseline released in February 2012 as the starting point for the analysis. Since ten-year-ahead baseline projections lack real world variability, we imposed on the baseline a pattern of shocks that roughly mimic the variability experienced by crop agriculture in the 1998 to 2010 historical period. Obviously, this is only one of literally thousands of possible future paths that agriculture could experience, but it provides a concrete situation that is easy to relate to.

The POLYSYS simulation model is the analytical model used in this analysis. POLYSYS simulates changes in policy instrument levels and/or economic situations as variation away from a baseline situation. In this analysis, historical data become the baseline for Phase I and the USDA baseline was used for Phase II. The crop allocation decisions are made with linear programming models using county-level data as a proxy for farm-level decisions. The crop prices and demands as well all livestock variables are estimated at the national level. National estimates of revenues, costs and net returns are also estimated.

Historical Analysis (Phase I)

In this portion of the analysis, the actual historical supply, demand and price numbers are compared with what those numbers are estimated to have been had MDIS been in effect. With MDIS in operation, markets work uninterrupted until prices are estimated to fall below a recourse loan rate or, if MDIS inventory is available, prices exceed 160 percent of the loan rate.

In the former case, the model estimates the amount of grain that farmers would need to put under recourse loan with the Farm Service Agency to raise the market price to or above the loan rate. (The loan rate is the "price" that FSA uses to value the grain used as collateral for the loan.) If a market price is estimated to exceed 160 percent of the loan rate, the model checks to see if there is an inventory stock in the MDIS farmer-owned inventory. If MDIS inventory is available, the model computes the quantity needed to lower price to about 160 percent of the loan rate and puts that amount of stock onto the market.

For the historical analysis, the beginning corn loan rate is computed as half way between the variable cost of producing a bushel corn and the corresponding total production cost. In 1998 that number is computed to be $2.27 per bushel of corn. The 1998 loan rates for other crops are computed to be in the same proportion to corn loan rates as those legislated in the 1996 farm bill, except for grain sorghum for which the loan rate is raised to be equal that of corn and for soybeans for which the loan rate is raised to $6.32. The loan rates of all crops are adjusted for 1999 through 2010 using the prices paid by farmers chemical input index. The maximum quantities of grain allowed in the MDIS inventory are specified (3 billion bushels of corn, 800 million bushel of wheat, 400 million bushels of soybeans). Farmers with MDIS recourse loans are paid 40 cents/bushel/year to store the grain and are required to keep the grain in condition.

The rules are that the grain under MIDS must stay in inventory, that is, cannot be redeemed by paying off the loan and marketed until the price goes above the release price of 160 percent of the loan rate and notification is specifically received. With MDIS in effect, all government payment programs, except MDIS inventory storage payments, are eliminated for corn, grain sorghum, oats, barley, wheat, and soybeans. A whole-farm set-aside would be available for use at the secretary's discretion if MDIS inventory maximums are reached and prices fell below loan rates. Rice and cotton are not included in MDIS and remained eligible for current program payments.

So what would have occurred if MDIS had replaced current programs from 1998 to 2010:

- During 1998 to 2010 actual crop government payments totaled $152 billion; had MDIS been in effect the estimate is $56 billion, a savings of nearly two-thirds.
- With MDIS in effect, annual net farm income was, on average, higher in the early part of the period (1998-2005) and lower in the latter part of the period (2006-2010) but for the full 13 years the MDIS net farm income averaged only slightly lower ($51.1 billion vs. $52.1 billion)
- Crop prices were significantly higher under MDIS in the early part of the period and for the full 1998 to 2010 period prices were higher by a quarter, half dollar, and dollar per bushel for corn, wheat and soybeans respectively compared to actual prices.
- Had MDIS or a similar inventory-based commodity program been in effect from 1998 to 2010 the value of crop exports would have exceeded the actual value of exports during that period. A higher crop price does cause a reduction in the quantity exported but that decline is smaller than the increase in price, as a result the value of

exports increases with price increases and decreases with price declines. (This property does not bode well for the future direction of the change in value of agricultural exports over the next few years if prices decline.)

Future Analysis (Phase II)

The analysis for this portion of the study follows the approach and most of the basic specifications used for Phase I. The loan rates for this analysis (all in $/bu) are: $3.50 for corn, grain sorghum and barley, $2.49 for oats, $5.28 for wheat and $8.97 for soybeans. The loan rates have the same proportion to corn as the loan rates in the 2008 farm legislation. The loan rates are held constant for the full 2012 to 2020 period. The MDIS inventory maximums, storage payment rate and release percentage of loan rates are the same as in historical analysis. The USDA baseline was the beginning point for the analysis but production shocks were used to mimic the variability that crop and livestock agricultures experienced between 1998 and 2010. The result comparisons below are between this shocked baseline assuming continuation of current commodity programs and the MDIS alternative. The MDIS simulation includes those same production shocks.

Results follow the same general pattern observed in the historical analysis:

- Government payments with a continuation of the current program and shocked production total $65 billion over the ten years from 2012 to 2021; with MDIS the estimate is $26 billion, a 60 percent reduction
- Net farm incomes averaged over the ten years are almost identical ($79.2 billion per year under the current program and slightly higher with MDIS at $79.6 billion)
- Because crop prices average higher with MDIS than under the current program, the value of exports over the ten year period is higher with MDIS by $15 billion or $1.5 billion per year on average (more in the first part of the period; less in the latter part of the period).

Conclusions and Policy Implications

- MDIS reduces crop price extremes that otherwise cause severe economic dislocations in the crop and livestock sectors and cause exaggerated market signals that lead to inefficient resource allocations in the short-run and non-optimal investments in the longer-run.
- MDIS provides trade benefits to crop farmers by helping ensure that exportable grain quantities are available in the farmer-owned inventory system when worldwide supplies are short and thus help preserve the U.S. reputation as a dependable supplier in world markets.
- MDIS would discourage or derail “dumping” accusations by competing grain exporters. Also, the value of U.S. grain exports would be larger and agriculture’s trade balance would improve because MDIS actions that raise crop prices when crop supplies are in excess compared to utilization also increase the value of grain exports.
- MDIS would help stabilize grain prices internationally to the benefit of those producers and consumers for which grains are a staple food.
- MDIS could save tens of billions of dollars paid under existing government payment programs and additional tens of billions in “emergency” payments and government

subsidies to revenue insurance programs otherwise needed to offset the almost inevitable periodic severe collapses in grain prices. With MDIS grain farmers receive their income from the market and grain demanders are not subsidized or overcharged.

Introduction

It is widely acknowledged that the 2012 Farm Bill, which is the omnibus, multi-year legislation that guides most federal farm and food policies, will be written with less money than previous farm bills. In the current economic climate and growing budget deficits, agriculture will be called upon to cut the cost of its program in order to help reduce the Federal budget deficit without raising taxes. Given these constraints on federal spending, the 2012 Farm Bill budget faces significant reductions. The goal of the next farm bill, therefore, should be to provide an effective safety net for family farmers, improve the efficiency of farm programs, and reduce overall costs.

Price volatility in commodity markets is costly for the agricultural economy as well as the federal government. Price and income problems have plagued American farmers since shortly after the first European settlers began to export agricultural commodities to Europe. Over time, the causes of extreme price volatility have been identified—the lack of timely market correction on both the supply and the demand side in response to large changes in prices. In recent decades and even in prior centuries, policymakers have tried a variety of approaches to address the lack of relatively sluggish market self-correction when crop prices plummet. Some of these approaches have treated the causes of this dynamic while others have treated the symptoms. The current set of federal policies tends to treat the symptoms of agriculture's chronic price and income problems. After trying both approaches over the last half century, this study shows that addressing the causes is less expensive and less destabilizing to the agricultural and food sector than treating the symptoms.

This study presents a comprehensive policy that stays out of the way of market forces during normal conditions. It is only activated when crop prices become so low or so high that normally profitable agricultural firms are not provided with reasonable investment and production signals.

Phase I of this study shows that if this alternative approach had been in effect over the 1998 to 2010 period, government outlays to farmers would have been cut in half while providing farmers with the same level of total income they received over the period—income received through cash sales and often massive government checks primarily in the form of emergency payments, direct payments, and the marketing loan program. This reduction in government outlays and stabilization of farm income was the result of an alternative policy that would have buffered extremes in crop prices and allowed crop farmers to receive the bulk of their income from the marketplace.

Phase II of the study focuses on the ten years from 2012 to 2021, which is the period that will be used to evaluate the cost of the next farm bill. The Phase II analysis looks at selected combinations of economic situations and policy alternatives, including an economic setting in which prices fall somewhat but remain relatively stable of over time. Other analyses look at economic circumstances that result in low prices similar in magnitude to the 1998 to 2002 period followed in later years by price increases similar to recent years. The policy alternatives analyzed under that economic setting include continuation of the current program as it is, with direct payments eliminated, with updated loan rate levels and finally with the replacement of the current program with the alternative policy approach that moderates price extremes.

Policy Description

So how would one put together a set of commodity programs that could reduce government agricultural payments while maintaining the same level of farm income using 1998 to 2010 as the study period, with its times of extreme low and high crop prices? That is the focal question of Phase I of this study. In Phase II, the study examines the 2012-2021 period that will be used as the baseline period for debating the 2012 Farm Bill. In this phase, the study uses the USDA baseline released in February 2012 with yield shocks imposed on it to replicate the price variation seen in the Phase I period.

The policy approach analyzed is designed so that farmers receive the bulk of their revenue from market receipts. It includes a combination of a farmer-owned-inventory system, increased loan rates, setasides, the elimination of direct payments, and reduced reliance on other government payment instruments. The policy set will be referred to in this report as the Market-Driven Inventory System (MDIS).

The analysis of the policy for Phase I began by setting the 1998 loan rate for corn at the midpoint between the variable cost of production and full cost of production for the 1998 crop, as calculated by the U.S. Department of Agriculture (USDA). All other crop loan rates were pegged to the corn loan rate based on the ratio between corn and the other crops, as found in the 1996 Farm Bill. The two exceptions are grain sorghum, which was increased to the same price as corn, and soybeans, which was raised from where the 1996 loan rate was set to $6.32. Thereafter, all loan rates were raised or lowered based on the change in the rolling three-year average of the chemical input index of prices paid by farmers as calculated by the USDA. For corn, that calculation resulted in a loan rate of $2.27 in 1998, increasing to $2.60 by 2010. These loan rates approximate the historical ratio between the price of corn and the other crops, facilitating the arbitrage of crops to the most profitable mix for each farm, with minimal influence from the loan rate.

When the market price falls below the loan rate, farmers would have the opportunity to place their grain into a farmer-owned inventory. The farmer would be paid $0.40 a bushel/year as a storage payment. The release price was set at 160 percent of the loan rate to allow for a sufficiently wide band within which the market could efficiently allocate resources. Once the price exceeds 160 percent of the loan rate, the crop, at the discretion of the Secretary of Agriculture, could be released into the market until the price falls back below the release price. The size of the farmer-owned-inventory for corn was set at 3 billion bushels, wheat: 800 million bushels, and soybeans: 400 million bushels. With the right balance in the loan rates, an inventory of these three crops would maintain the prices of these three and other crops within their price bands.

In the model, all of the crop allocation decisions were made at the county level as a proxy for farm-level decisions. When the MDIS is full (comparable to 3 billion bushels corn, 800 million bushels of wheat, and 400 million bushels of soybeans), a voluntary, bid-in setaside is triggered in the model if prices drop below the loan rate. The farm-level setaside is based on whole-farm acreage and not allocated crop-by-crop as in the past. Setasides were allocated at the county level in the model with the intent that farmers would have the opportunity to bid acreage into the setaside. Participation in the setaside by any given farmer would not be mandatory, but farmers would have the opportunity to offer a bid on acreage they would be willing to put in the setaside. An alternative to open bidding for setaside participation would be to limit the bidding, that results from a crop hitting its maximum, to land that has been in production of that crop in

two of the last three years. As in the past, farmers would be required to maintain an appropriate cover crop on the land. Farmers would be free to allocate the mix of crops based on the profitability of the crops.

Direct payments would be eliminated, and with the use of MDIS, the marketing loan and countercyclical programs would also be eliminated. Commodity payments would only be paid for quantities actually placed in the MDIS and not for every bushel produced, as in the case of the marketing loan program or a large proportion of the bushels produced for other payment programs. As a result, the level of government payments would be significantly reduced. The simulation model included the following crops in the MDIS program: corn, grain sorghum, oats, barley, wheat and soybeans and kept current programs for rice and cotton.

Program specifications for the Phase II analyses, which cover the 2012 thru 2021 period, closely follow the specifications used in Phase I. Exceptions are noted in the sections of the report that discuss the results of each of the Phase II scenarios.

Phase I Results:

Government Payments and Farm Income, 1998-2010

Throughout the 13-year period from 1998 to 2010, government payments for crops totaled $152.2 billion, or $11.7 billion per year. If MDIS had been used during those years, government payments would have been $56.4 billion over the same period (an average of $4.3 billion annually), less than 40 percent of what the U.S. government actually spent on crop programs in those years. A look at a year-by-year comparison of government payments under the two policy regimens (fig.1) shows large savings in six of the eight years in the period from 1998-2005. Even when prices were high, especially during 2006-2010, the savings are significant—government payments are nearly 50 percent lower under MDIS than under the policies that were in effect at that time.

Total Actual Government Payments vs. Simulated Government Payments Under MDIS Policies for the 8 Program Crops, 1998-2010

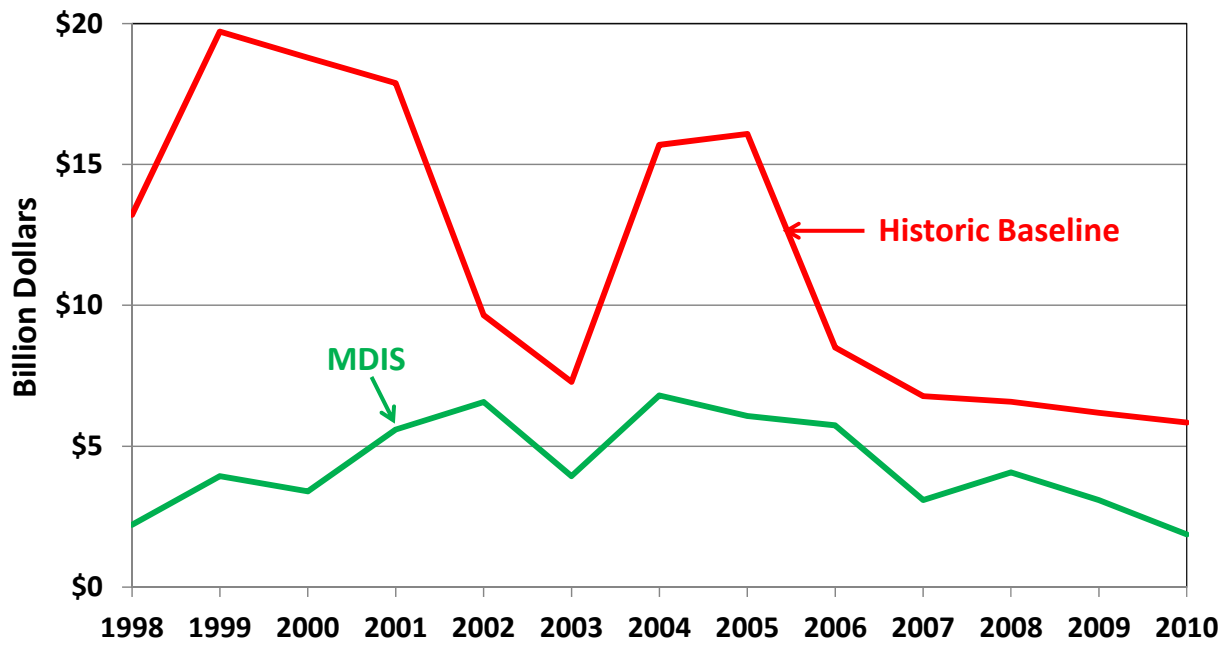

Figure 1. A comparison of actual U.S. Government expenditures for crop programs compared to what the expenditures would have been had MDIS been in effect, 1998-2010. Under MDIS government payments would have been 60 percent less than was actually spent as government payments during that period. MDIS would have saved the federal government over $95 billion.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

In the first four years of the study period, 1998-2001, the value of production of the eight major crops was not sufficient to cover cash expenses (fig. 2). That means that, in aggregate, producers of the major crops used a portion of their government payments just to cover some of their cash expenses. This calculation does not take into account items like returns to investment and management. During that four-year period, cash expenses exceeded the value of production by between $4.2 billion and $8.5 billion. Farmers used between 33 and 45 percent of their government payments to pay some of the cash costs of production. Without the large amount of emergency payments distributed by the U.S. government during those years, the policies of the 1996 Farm Bill, which eliminated much of the farm safety net, could have resulted in a repeat of the farm crisis of the late 1980s.

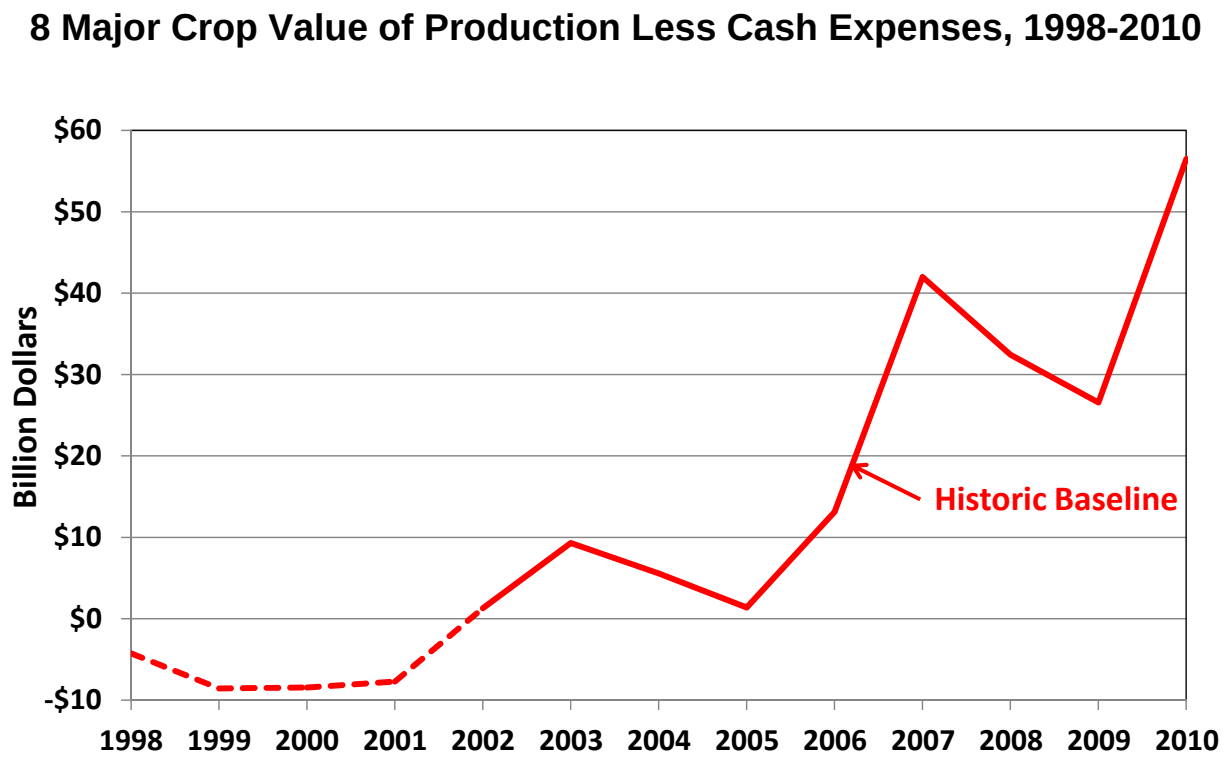

Figure 2. The value of production less cash expenses for the eight major crops (corn, grain sorghum, barley, oats, wheat, soybeans, cotton, and rice), 1998-2010. During the 1998-2001 period farmers used a portion of their government payments just to cover cash expenses. Without the large amount of emergency payments distributed by the U.S. government during those years, the policies of the 1996 Farm Bill could have resulted in a repeat of the farm crisis of the late 1980s.
Source: USDA-ERS.

A Market-Driven Inventory System, in addition to reducing government payments by more than 60 percent when compared to actual government expenditures on farm programs over the 1998-2010 period, would have provided nearly the same amount of net farm income (fig. 3). A system of farmer-owned reserves would have provided more income to farmers than they actually received during times of low prices (1998-2005) and somewhat less income than they actually received in high price periods (2006-2010) but over the whole period Net Farm Income is virtually the same.

Actual Net Farm Income in the Historic Baseline vs. Net Farm Income under MDIS, 1998-2005, 2006-2010, and 1998-2010

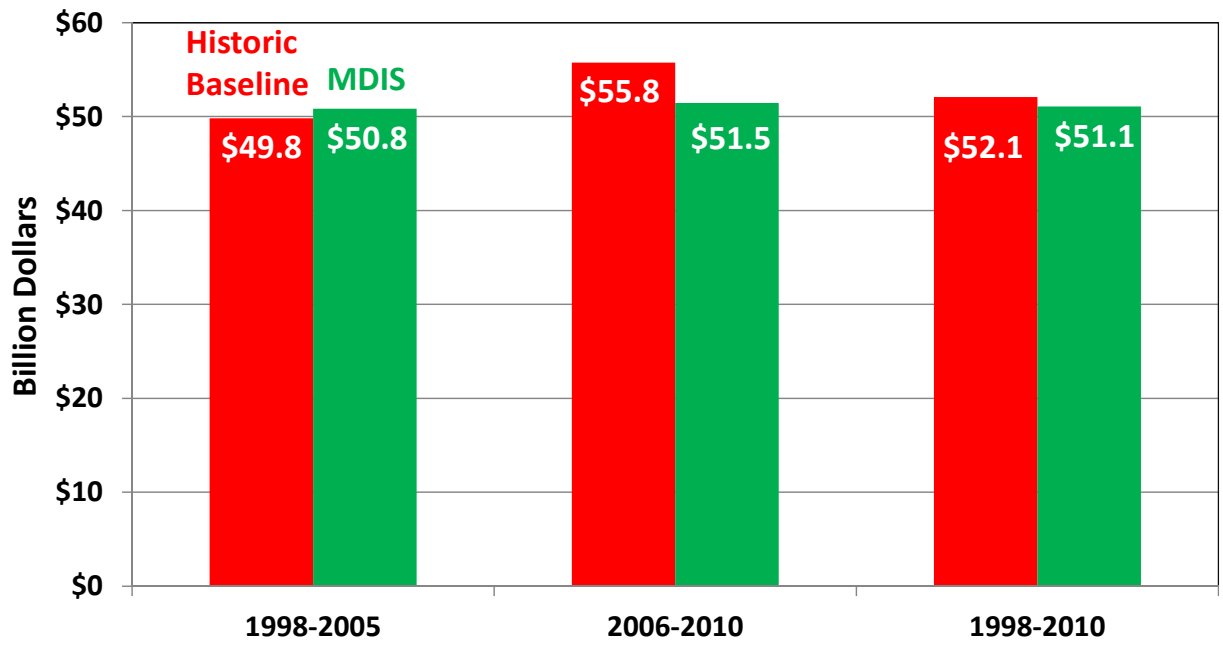

Figure 3. A comparison of actual net farm income to the net farm income generated under a simulation of a Market-Driven Inventory System, 1998-2010. Though government payments were 60 percent lower under MDIS than under the baseline experience in the 1998-2001 period, farmers received the same amount of income under MDIS policies as the result of higher market receipts. In the high price period of 2006-2010, farmers received a slightly lower net farm income under MDIS when compared to baseline conditions, Again government payments were significantly lower even in this period of high prices. For the full 13-year period, net farm income was virtually the same under MDIS conditions even though government payments were 60 percent lower.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

Impact of a Market- Inventory System on the Three Major U.S. Crops, 1998-2010

Corn

Government payments to corn farmers under MDIS are consistently lower than they were under emergency payment responses, Agricultural Market Transition Assistance (AMTA) or direct payments, the Marketing Loan Gain program, and various other policies that were in effect during the 1998-2010 period (fig. 5). Actual government payments for corn during the 13-year period were $56 billion while under a system of farmer-owned reserves the payments would have been $12 billion—less than $1 billion per year. This represents a 78 percent reduction in direct government payments to farmers during this period.

Actual Government Payments for Corn vs. Simulated Government Payments for Corn Under Reserve Policies, 1998-2010

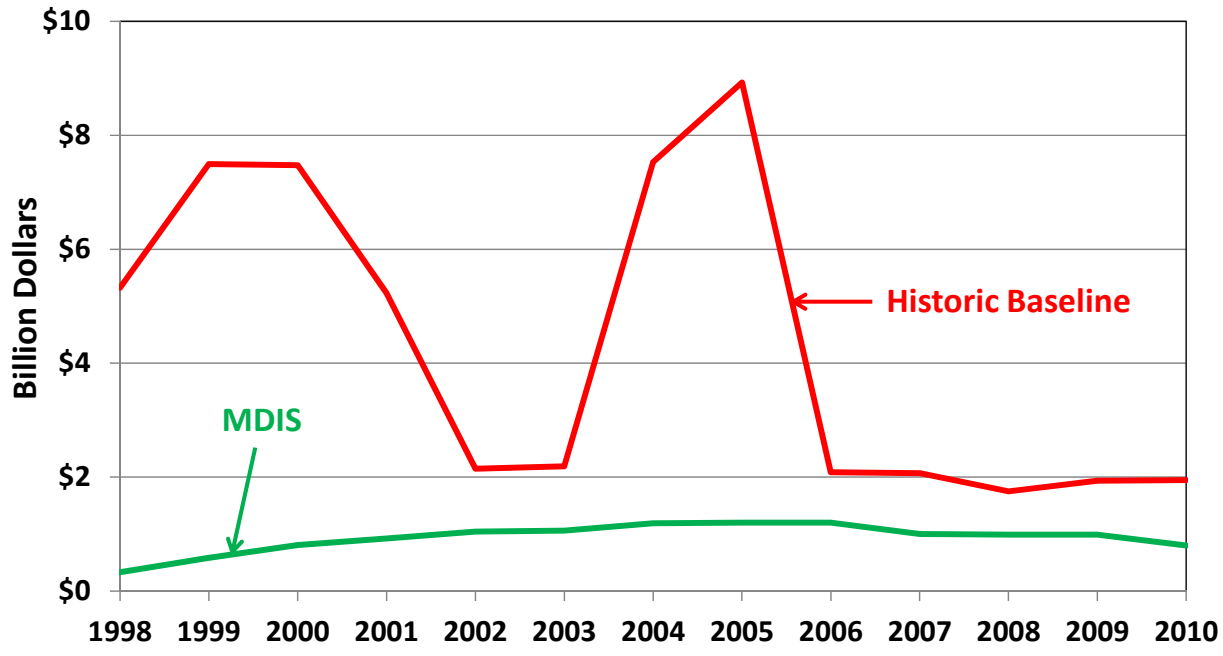

Figure 4. A comparison of actual government payments for corn to government payments generated under a simulation of MDIS policies, 1998-2010. While direct governments payments for corn under MDIS would not exceed $1.4 billion during this period, actual expenditures exceeded $7.4 billion four times over the thirteen years and remained nearly twice the MDIS payments in the high corn price years of 2006-2010.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

An examination of the impact of MDIS on corn prices when compared to the actual prices in the 1998-2005 period—a time when corn prices were well below the cost of production—shows that farmer-owned inventory stocks would have generated 63 cents per bushel more than the baseline policies (fig. 5), increasing farm income while reducing government payments. During the period of generally higher prices, 2006-2010, MDIS generates corn prices that are about 31 cents per bushel lower than the baseline policies. Over the entire period, corn prices are 26 cents a bushel higher under a system of farmer-owned inventory stocks than actually occurred.

If corn prices had been higher during the times of low prices, as they would have been under MDIS, farmers would have received the bulk of their income from the marketplace rather than the government. Those higher prices would also have protected U.S. farmers from accusations of dumping subsidized corn on the world market at prices below the cost of production. The low prices faced by U.S. farmers were felt by corn farmers worldwide.

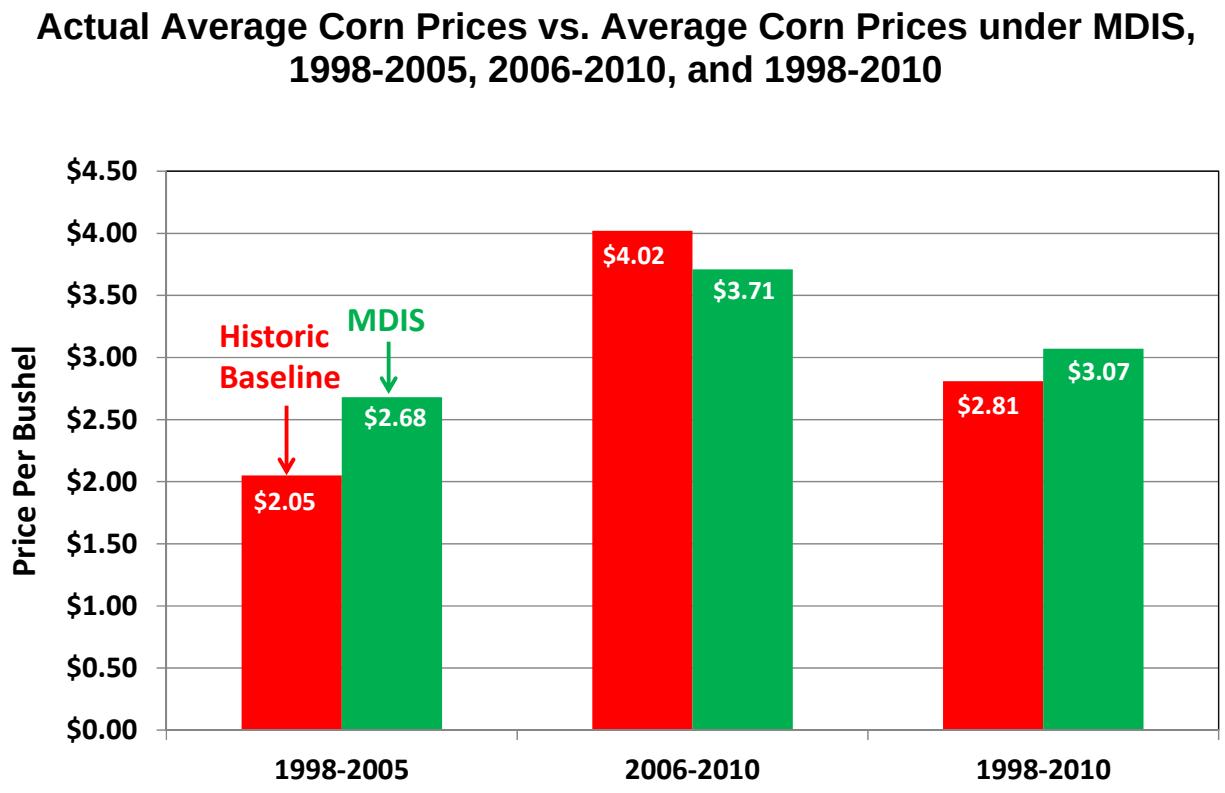

Figure 5. A comparison of actual corn prices to corn prices generated under a simulation of farmer-owned reserves, 1998-2010. If MDIS policies had been in effect during the 1998-2005 period corn prices would have averaged $0.63 per bushel more than the actual average for that period. Corn prices under MDIS would have averaged $0.31 per bushel lower than farmers actually received during the 2006-2010 period of high prices. Over the full 13 year study period, Corn prices would have averaged $0.26 per bushel higher than the price farmers actually received.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

With higher corn prices due to MDIS policies, the overall value of corn production would have been higher between 1998 and 2006 than it was in the baseline, while the value of production is lower between 2007 and 2010 than it was in history (fig. 6). For the entire 13-year period, the value of production under the baseline policies was $413 billion while with MDIS it would have been $446 billion–an average increase of $2.6 billion a year.

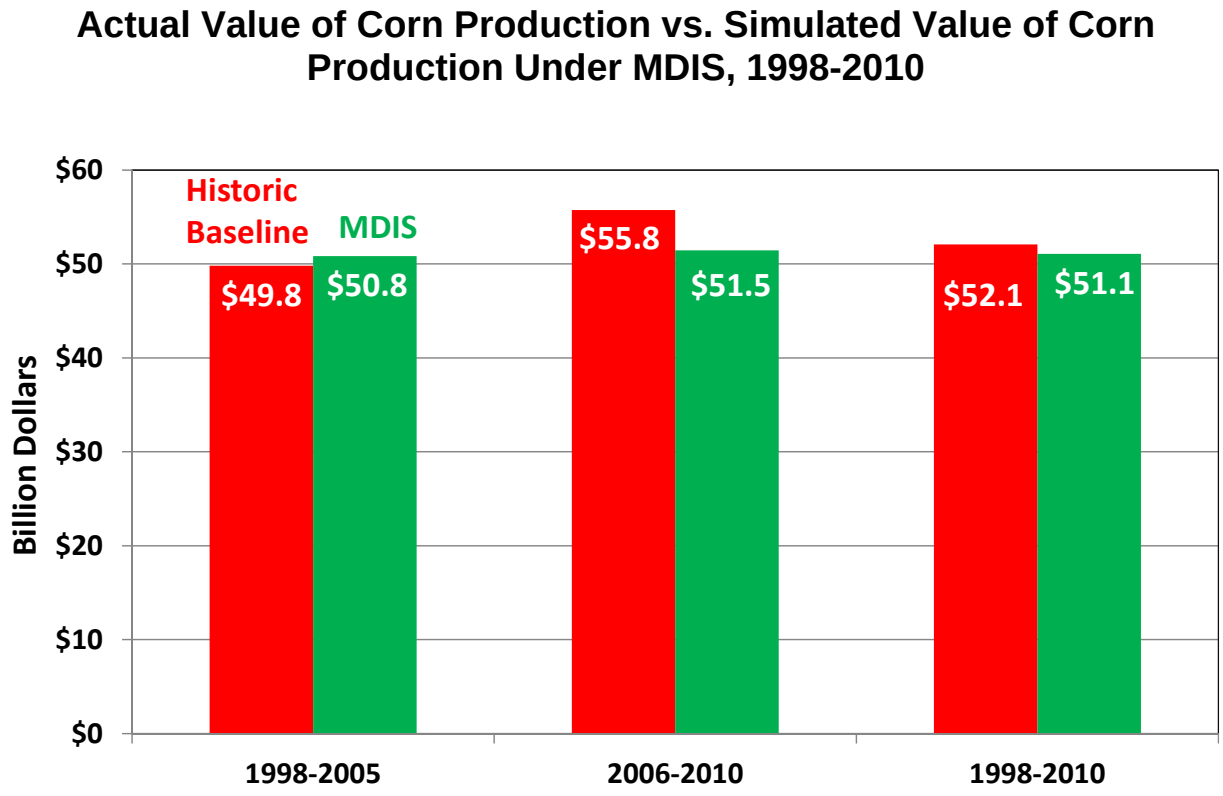

Figure 6. A comparison of the actual value of corn production to the value of corn production generated under a simulation of MDIS policies, 1998-2010. The implementation of MDIS policies during the Phase I study period would have resulted in higher corn prices when corn prices were low and lower during the timeframe when prices were extremely high. With MDIS policies, the value of corn production would have been $33 billion higher over the 13-year study period than the value of production under policies in place during that time period.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

MDIS policies would have provided corn farmers with a slightly higher value of production plus government payments than was produced under baseline policies during the 1998-2005 period (fig. 7). By providing nearly the same value of production plus government payments in years when farmers were receiving prices that were below the cost of production, a Market-Driven Inventory System would have offered corn farmers a significant level of income protection. For the 2006-2010 period, the value of production plus government payments under a system of farmer-owned inventory would have been lower for corn farmers than history. By slightly reducing the level of value of production plus government payments during a period of historic high prices and volatility, farmer-owned inventory stocks would have protected corn farmers from the tendency to capitalize those higher prices into land, thereby raising the cost of production over the longer term and increasing the potential for the collapse of land prices as was seen in the 1980s. The moderated level of the value of production plus government payments in the 2006-2010 period would have also reduced the incentive for farmers worldwide to bring land into production beyond what is sufficient to meet demands of an increasing population and increased industrial use.

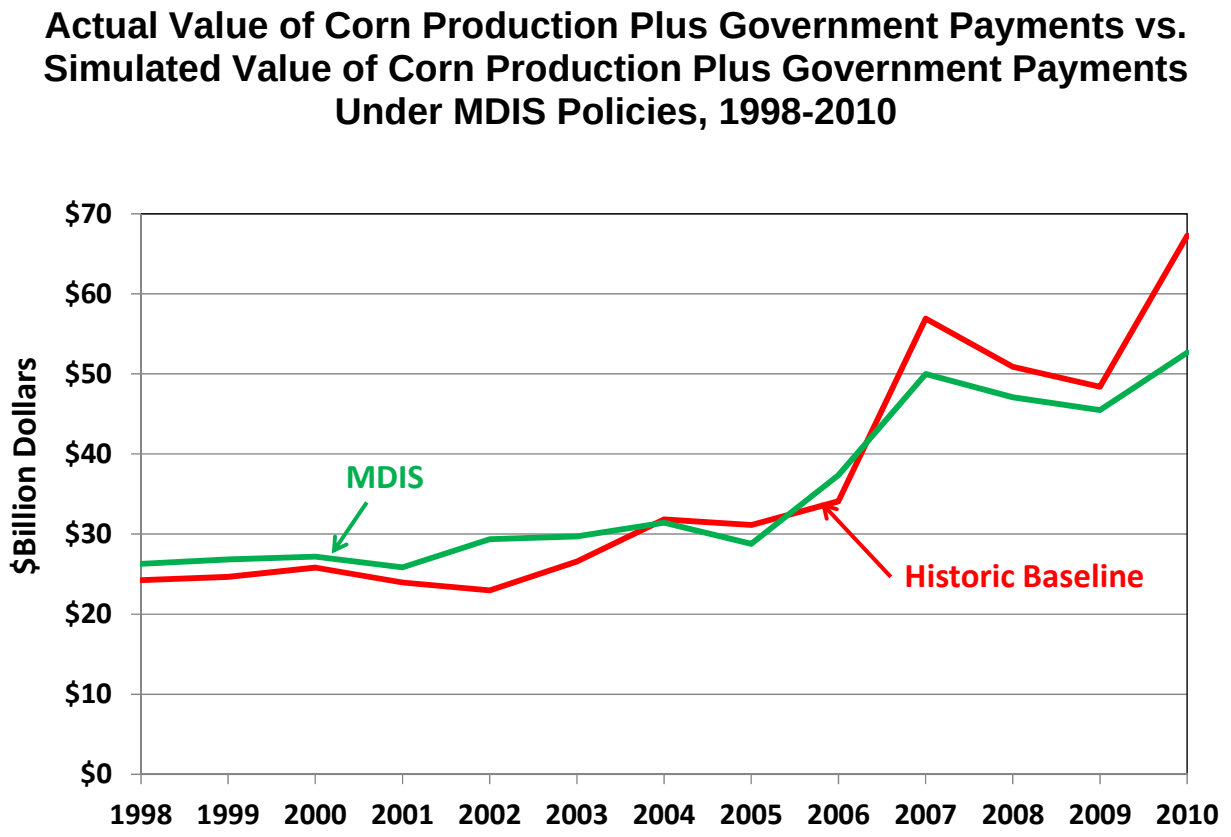

Figure 7. A comparison of the actual value of corn production plus government payments to the value of corn production plus government payments generated under a simulation of MDIS policies, 1998-2010. MDIS policies slightly raised the value of corn production plus government payments during the period of low corn prices while moderating the value of corn production plus government payments when corn prices were very high.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

By increasing prices in the early period of low prices, MDIS policies would have resulted in slightly lower corn exports (fig. 8). Conversely, during the later period of high prices, farmer-owned reserves would have lowered corn prices, resulting in slightly increased corn exports.

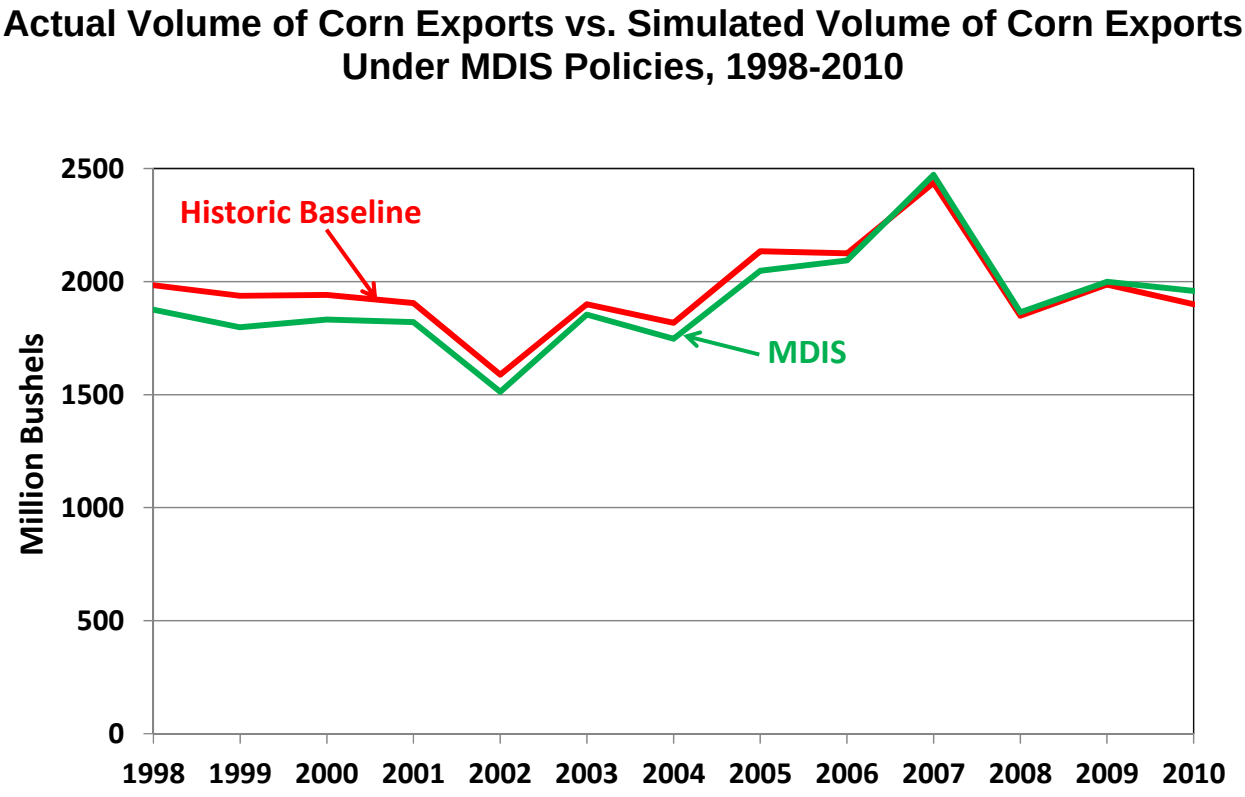

Figure 8. A comparison of the actual quantity of corn exports to the quantity of corn exports under a simulation of farmer-owned reserves. 1998-2010. By increasing corn prices during the period of low prices, MDIS policies resulted in marginally lower export volumes while lowering prices during the period of high prices resulted in slightly increased export volumes.
Source: USDA-ERS baseline and Agricultural Policy Analysis Center POLYSYS simulation.

However, the issue of exports is not simply a matter of quantity. More important is the value that those exports bring to the U.S. economy. During the era of low prices, 1998-2005, MDIS policies would have resulted in a higher value of exports for corn (fig. 9), totaling an additional $8.8 billion over the eight-year period. For the latter period, 2006-2010, the value of exports under a system of farmer-owned reserves would have been lower than historical levels, due mostly to higher actual prices. Over the complete 13-year study period, the value of exports would have been $4.9 billion higher under MDIS policies than under historical conditions for that period. Farmer-owned reserves would have provided additional export income in years when corn farmers needed it the most.

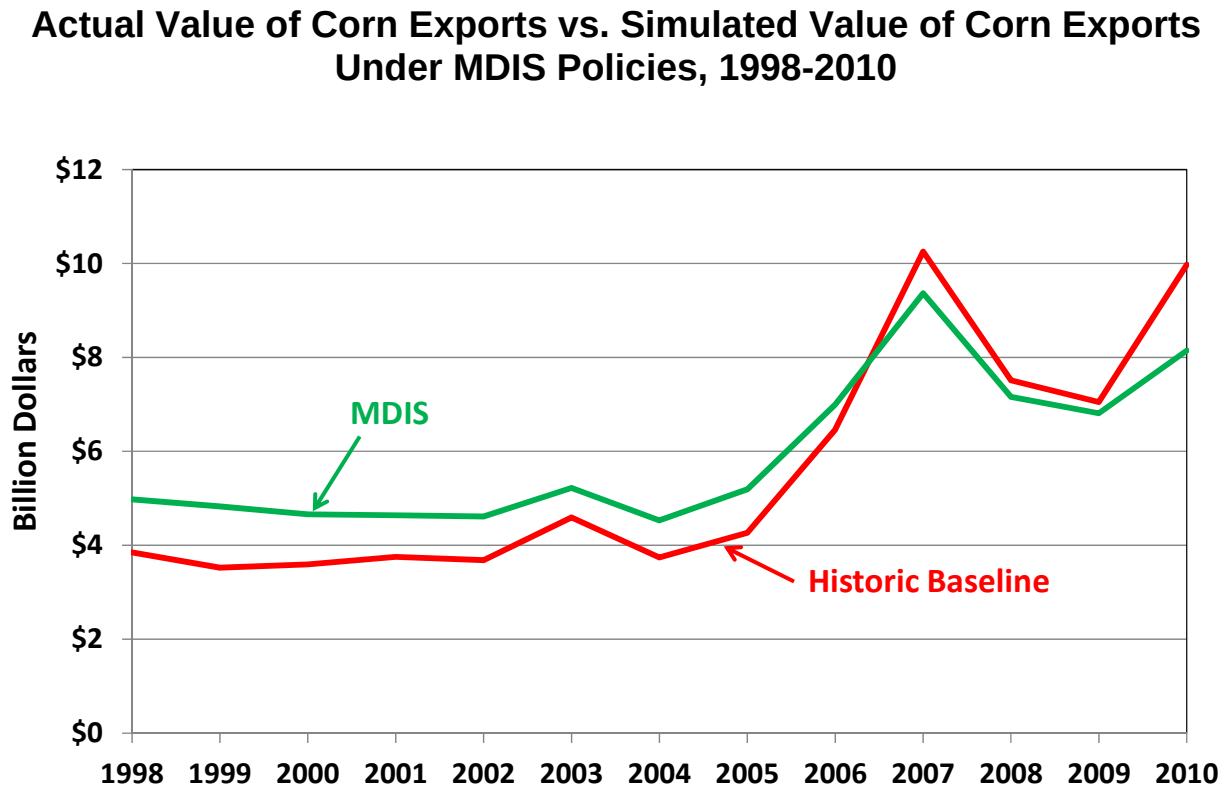

Figure 9. A comparison of the actual value of corn exports to the value of corn exports under a simulation of MDIS policies, 1998-2010. During the full 13-year period, the value of corn exports would have been $4.9 billion higher under MDIS policies that the value of corn exports experienced under policies in place during that period.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

WHEAT

Government payments to wheat farmers under a market-driven inventory system would have been consistently lower than they were during the 1998-2010 period, which consisted of a system of emergency payments, AMTA/direct payments, the Marketing Loan Gain program, and various other policies (fig. 10). Actual government payments for wheat during the 13-year period were $22.9 billion while under MDIS they would have been $2.8 billion, which amounts to less than $214 million per year.

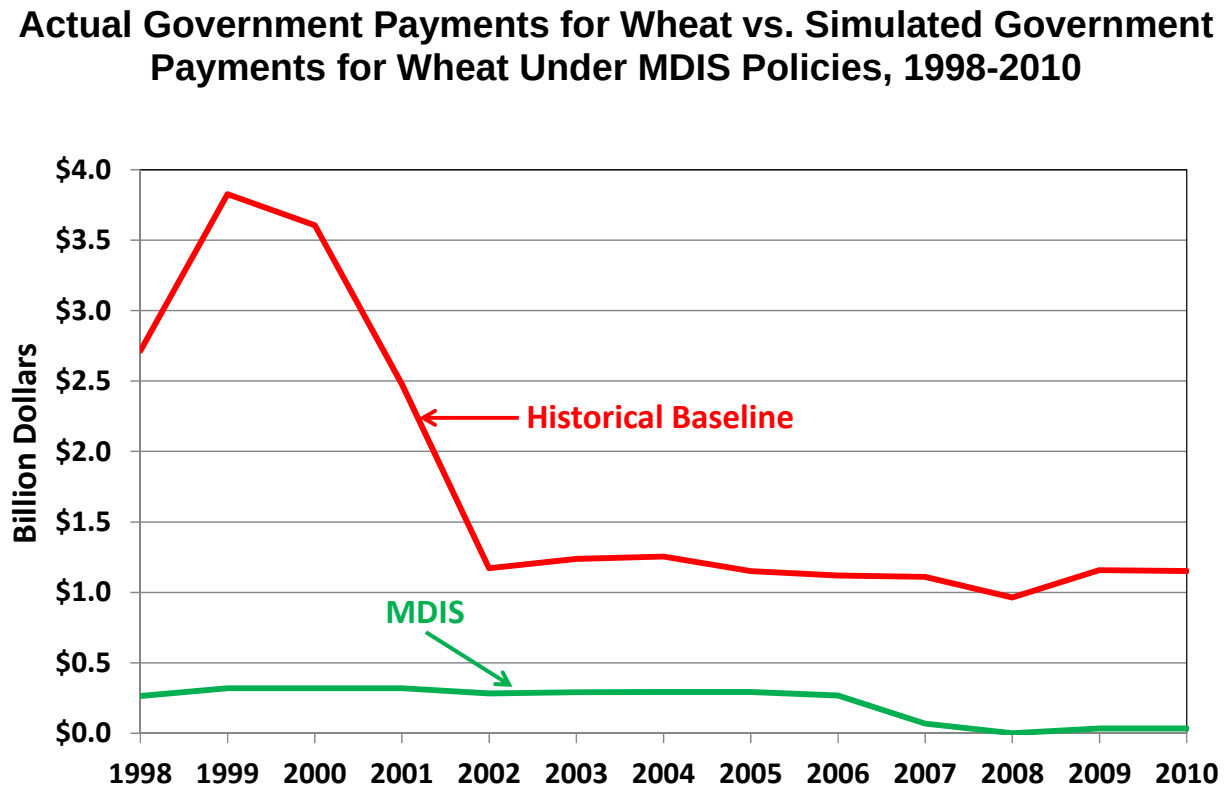

Figure 10. A comparison of actual government payments for wheat to government payments generated under a simulation of MDIS policies, 1998-2010. Government payments would have been significantly higher during the 1998-2001 period, under the policies then in effect, than they would have been under MDIS policies. Over the whole 13-year period direct government payments to farmers were $22.9 billion compared to a simulated $2.8 billion under MDIS policies.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

An examination of the impact of MDIS policies on wheat prices when compared to the actual prices in the 1998-2005 period—a time when wheat prices were well below the cost of production—shows that a system of a farmer-owned inventory would have generated $1.06 per bushel more than the baseline policies (fig. 11). This would have increased cash receipts and reduced government payments. During the period of generally high prices, 2006-2010, MDIS policies would have lowered wheat prices by about an average of 43 cents per bushel. Over the entire 13-year period, wheat prices would have been 48 cents per bushel higher under MDIS than they were in history. Additionally, the higher domestic wheat prices during the 1998-2005 period would have protected U.S. farmers from the accusations of dumping subsidized wheat on the world market at prices below the cost of production. The depressed prices seen by U.S. farmers were experienced by wheat farmers worldwide.

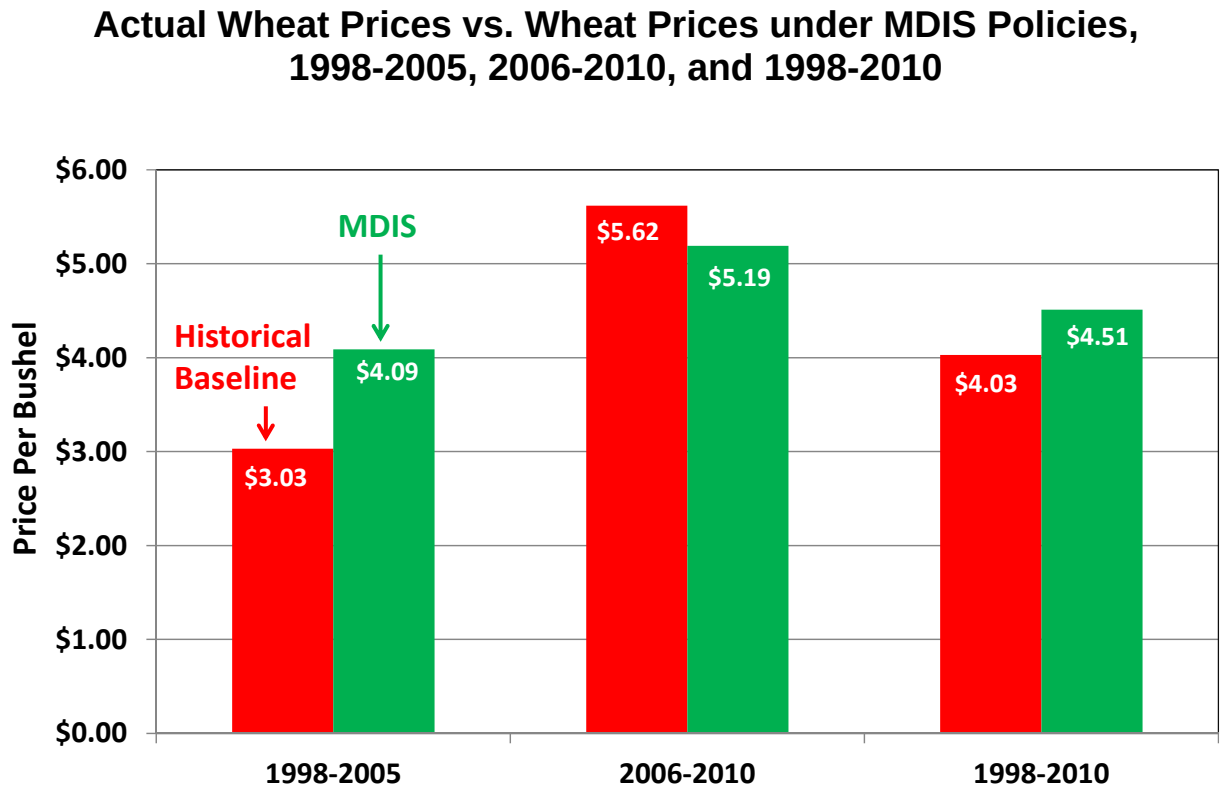

Figure 11. A comparison of actual wheat prices to wheat prices generated under a simulation of MDIS policies, 1998-2010. During the crucial 1998-2005 period wheat prices would have averaged $1.06 per/bu. Higher under MDIS policies than the prices experienced under policies in effect during that period. Even with lower wheat prices under MDIS in the 2006-2010 timeframe, over the 13-year study period wheat prices averaged $0.48/bu higher than under actual conditions.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

An examination of the impact of MDIS policies on the value of wheat production when compared to the actual value of production in the 1998-2005 period shows that an inventory-based policy would have increased the value of production in the early years (fig. 12). This would have increased cash receipts and reduced government payments. During the period of generally high prices, 2006-2010, MDIS policies moderated the value of production.

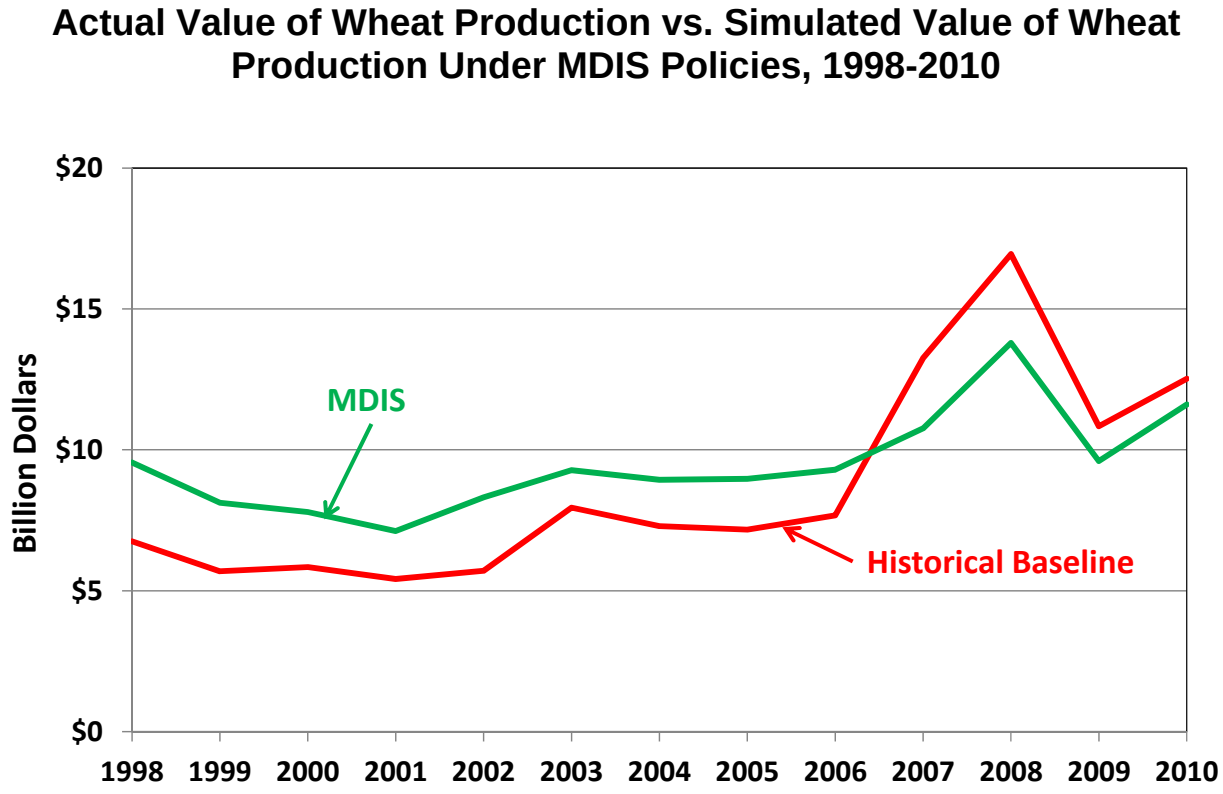

Figure 12. A comparison of the actual value of wheat production to the value of wheat production generated under a simulation of MDIS policies, 1998 to 2010. By increasing the wheat price in the 1998-2006 time frame, MDIS policies increased the value of wheat production when compared to the actual value of production.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

A system of a farmer-owned inventory would have provided wheat farmers with $151 million per year more in the value of production plus government payments than was produced under baseline policies during the 1998-2005 period. For the 2006-2010 period, the combination of the value of production plus government payments would have been lower with farmer-owned reserves for wheat farmers than the level that actually occurred (fig. 13).

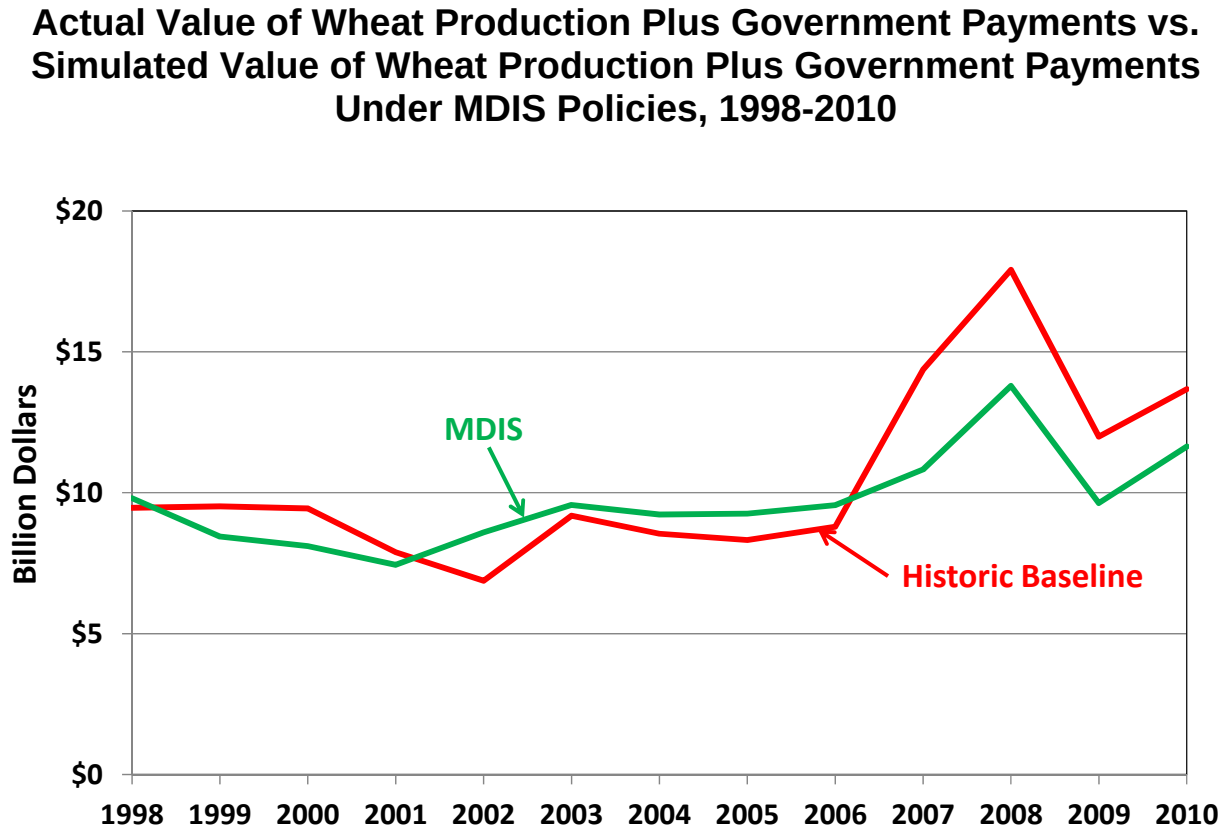

Figure 13. A comparison of the actual value of wheat production plus government payments to the value of wheat production plus government payments generated under a simulation of farmer-owned reserves, 1998-2010.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

MDIS policies would have had an impact upon wheat exports because the system would moderate prices. By increasing prices in the 1998 to 2006 period of low prices, exports of wheat would have been slightly below the historical baseline. Conversely, during the high prices of 2007 to 2010, a farmer-owned inventory would have lowered wheat prices, thereby slightly increasing exports (fig. 14).

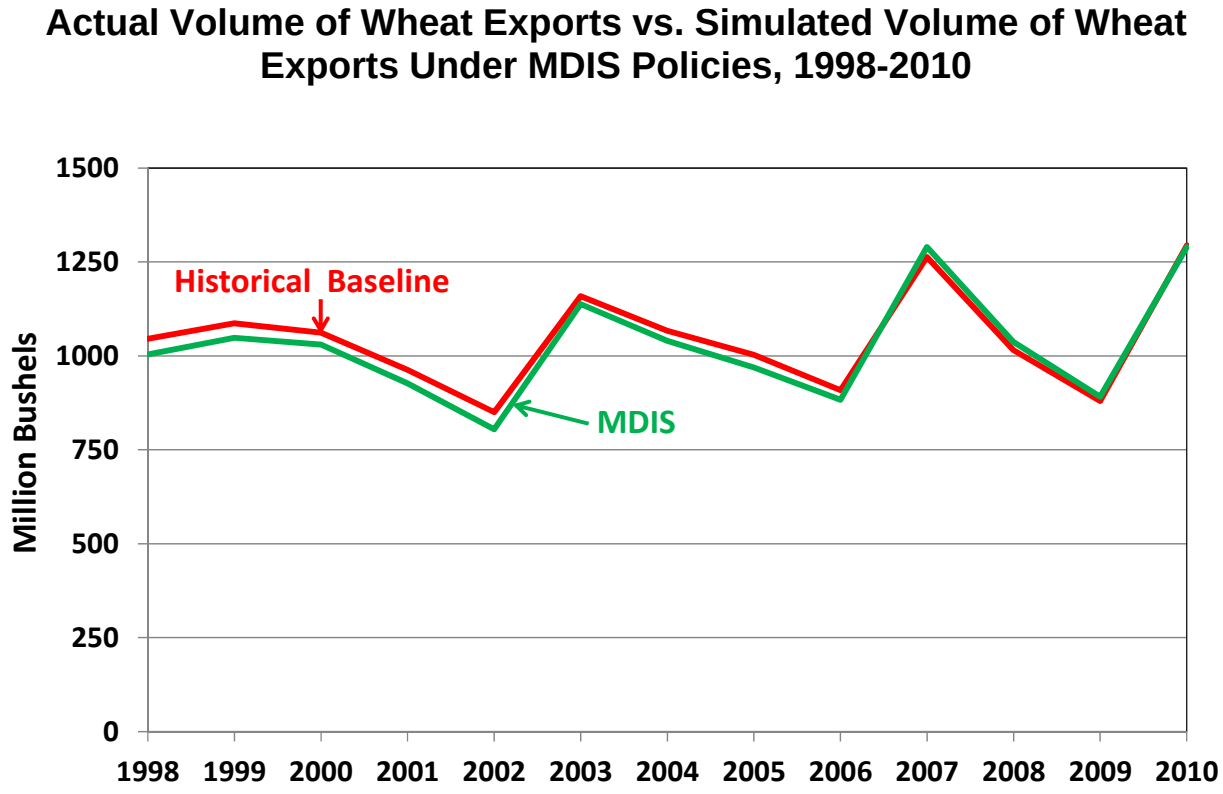

Figure 14. A comparison of the actual quantity of wheat exports to the quantity of wheat exports under a simulation of farmer-owned reserves, 1998 to 2010.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

The issue of exports is not simply a matter of quantity. More important is the value that those exports bring to the U.S. economy. During the era of low prices, 1998-2005, MDIS policies would have resulted in a higher value of exports for wheat (fig. 15), totaling an additional $7.4 billion over the 8-year period. For the latter period, 2006-2010, the value of exports under farmer-owned reserves would have been lower than historical levels, due to price reductions that a market-driven inventory system would have triggered. For the overall 13-year study period, the value of exports would have been $5 billion higher with MDIS policies than under historical conditions for that period. A farmer-owned inventory would have provided extra export income in the years when wheat farmers needed it the most.

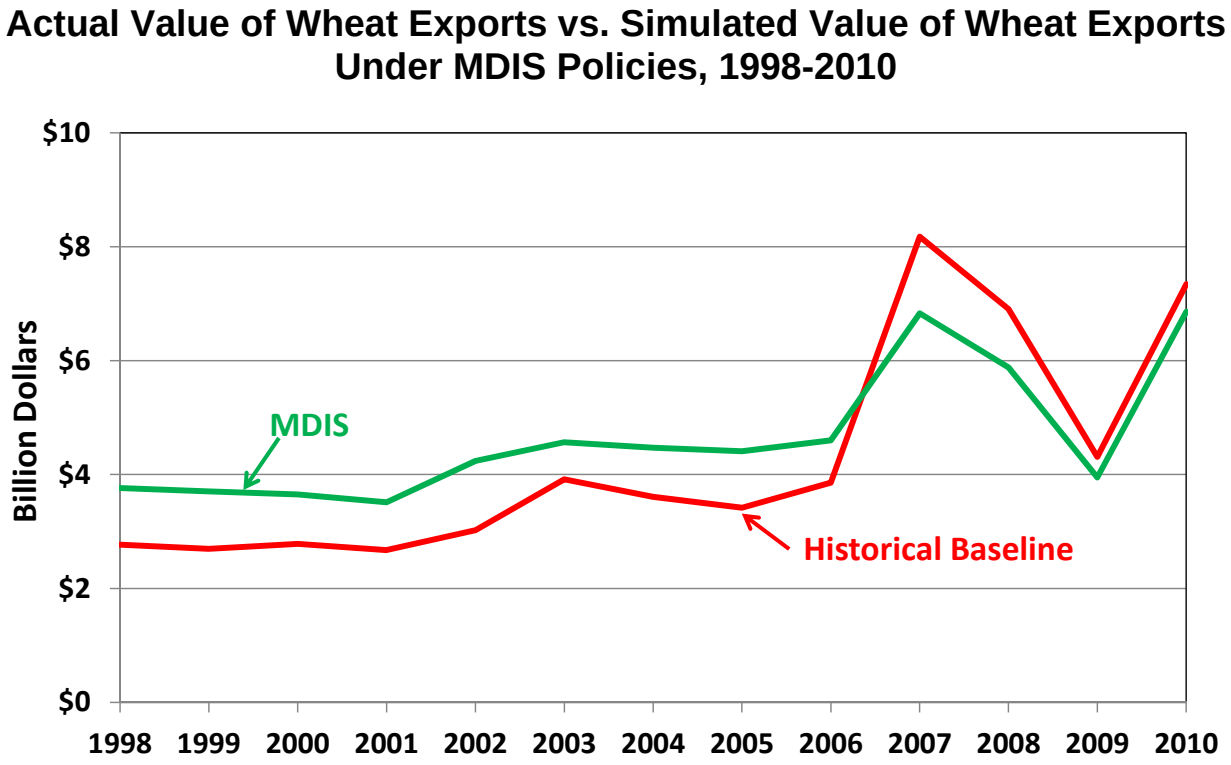

Figure 15. A comparison of the actual value of wheat exports to the value of wheat exports under a simulation of MDIS policies, 1998-2010. A farmer-owned inventory system would have increased the value of wheat exports by $7.4 billion over the 1998-2005 period when compared to policies in effect during that period. For the overall 13-year study period, the value of wheat exports would have been $5 billion higher under MDIS compared to the actual value of wheat exports.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

SOYBEANS

Government payments to soybean farmers under MDIS policies would have been consistently lower than they were under emergency payment responses, Agricultural Market Transition Assistance (AMTA) or direct payments, the Marketing Loan Grain program, and various other policies that were in effect during the 1998-2010 period (fig. 16). Actual government payments for soybean farmers during the 13-year period were $15 billion while under a farmer-owned inventory they would have been $1.4 billion, which amounts to less than $105 million per year.

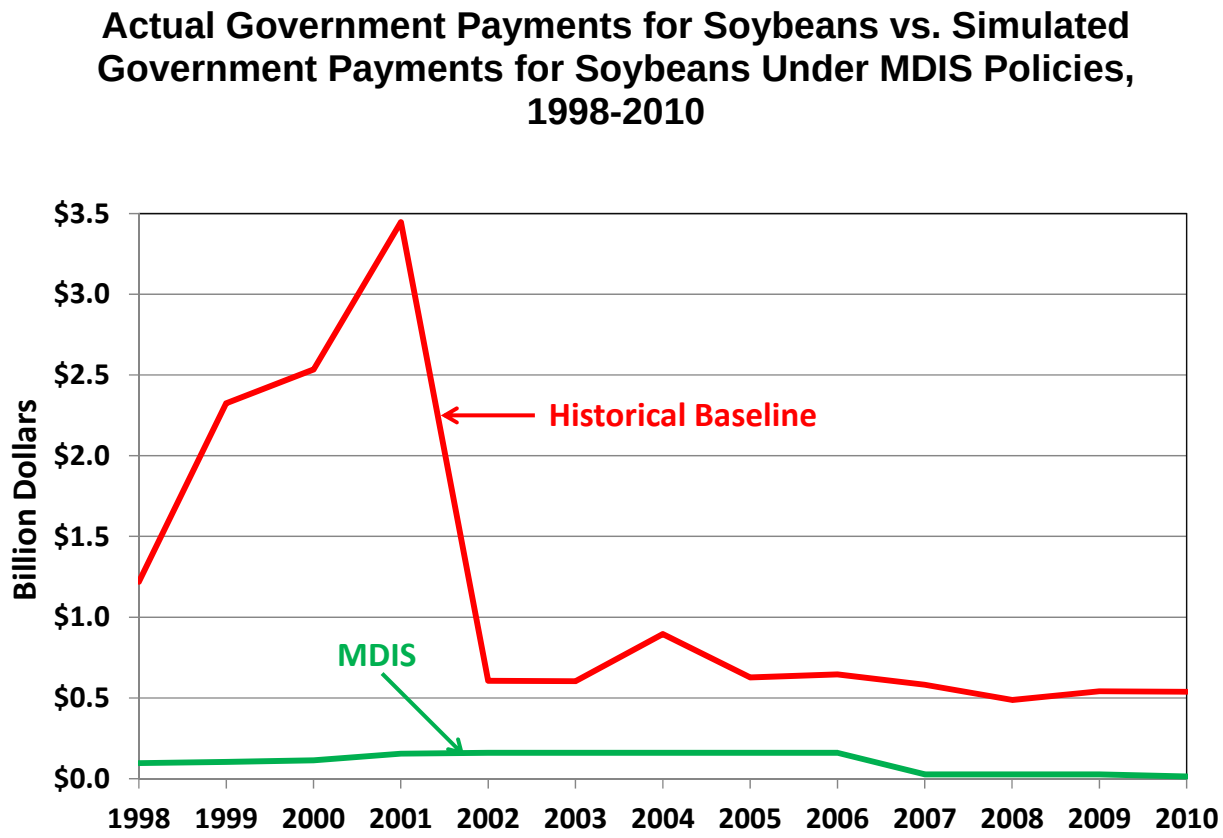

Figure 16. A comparison of actual government payments for soybeans to government payments generated under a simulation of MDIS policies, 1998 to 2010. For the 13-year study period, MDIS policies would have reduced direct government payments for soybeans from $15 billion to $1.4 billion when compared to policies in effect during that period.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

An examination of the impact of a farmer-owned inventory on soybean prices when compared to the actual prices in the 1998-2005 period—a time when soybean prices were low but more profitable than other crops—shows that MDIS policies would have generated $1.95 per bushel more than the actual policies (fig. 17). This would have increased cash receipts and reduced government payments. During the period of generally high prices, 2006-2010, a market-driven inventory would have slightly lowered soybean prices by about 28 cents per bushel. Over the entire study period, soybean prices would have averaged $1.09 per bushel more under MDIS policies than they actually were.

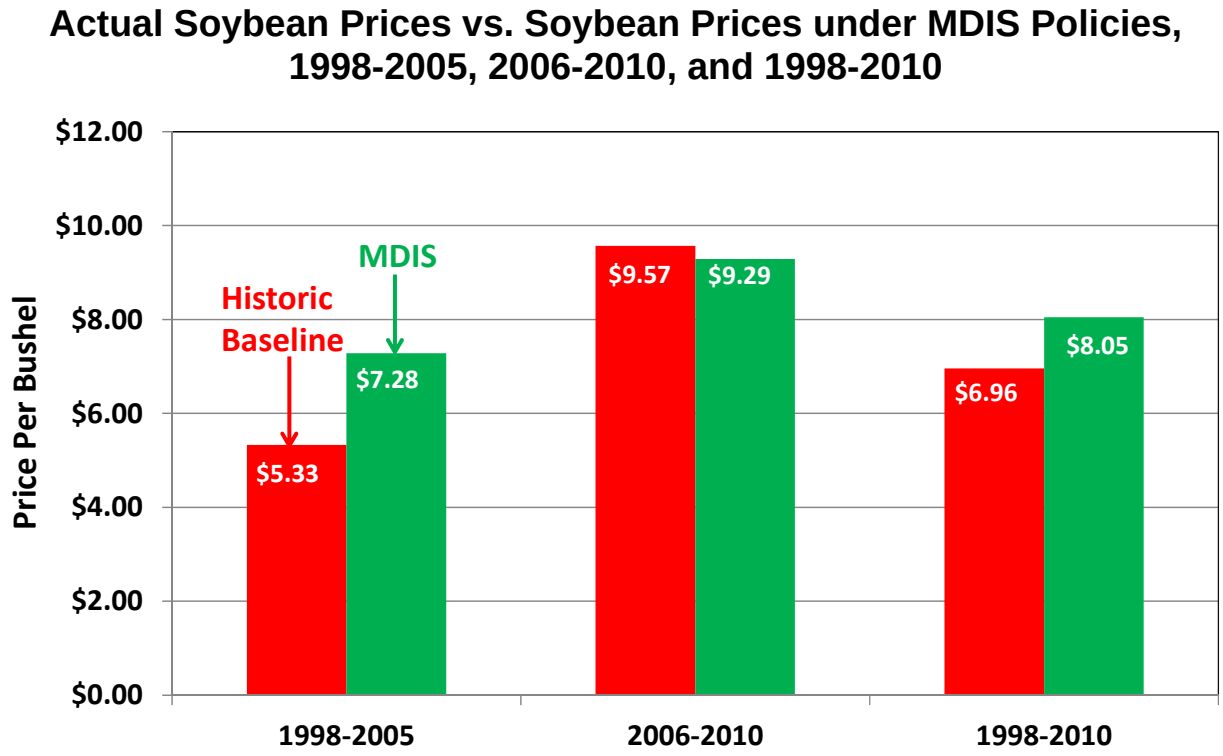

Figure 17. A comparison of actual soybean prices to soybean prices generated under a simulation of MDIS policies, 1998 to 2010. During the 1998-2005 period, average soybean prices under MDIS policies would have been $1.95/bu. higher than the actual prices experienced during that period. Though prices under MDIS were slightly lower in the 2005-2010 period compared to actual prices, for the full 13-year period average soybean prices would have been $1.09/bu. higher than under policies in effect during that period.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

With higher soybean prices under MDIS policies, the value of soybean production is greater between 1998 and 2006 than it was in the baseline, while the value of production would have been lower between 2007 and 2010 (fig. 18). For the entire 13-year period, the value of production with the baseline policies was $268 billion while with a farmer-owned inventory it would have been $302 billion, an increase of $34 billion

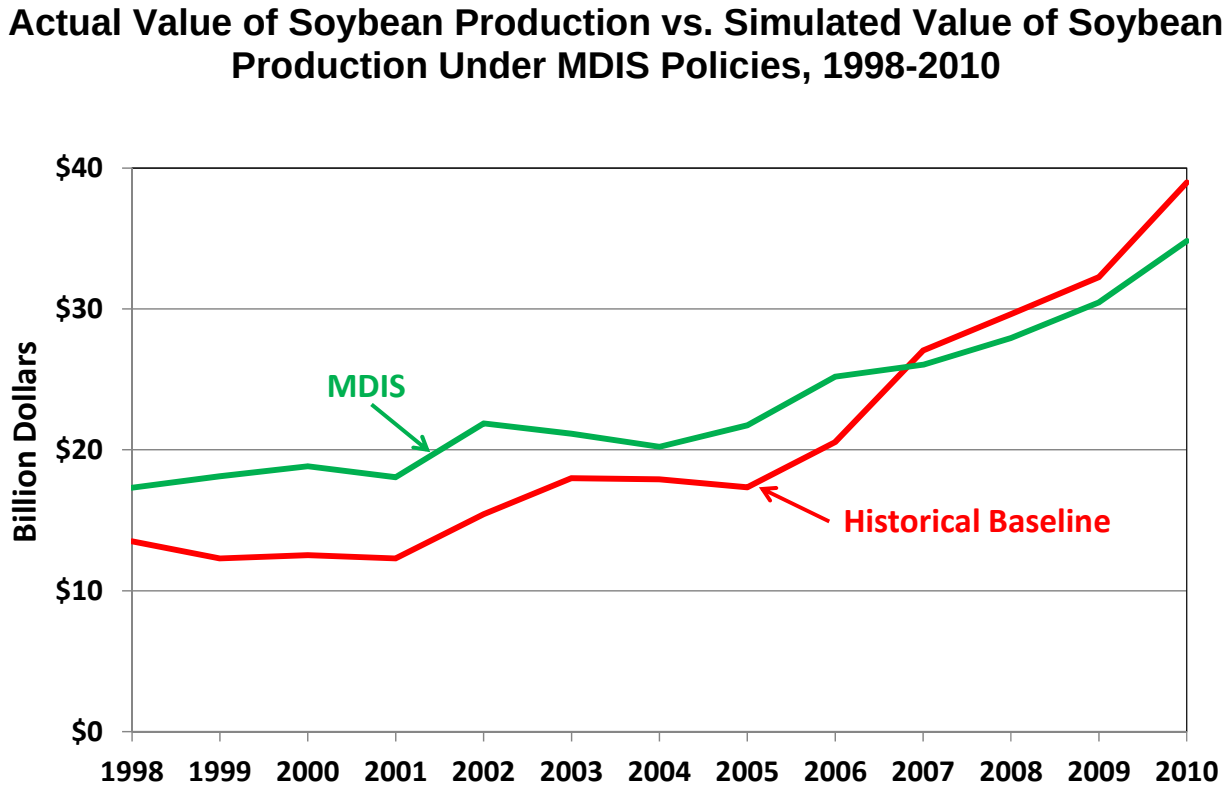

Figure 18. A comparison of the actual value of soybean production to the value of soybean production generated under a simulation of MDIS policies, 1998 to 2010. The value of production under MDIS policies was $34 billion higher for the full 13-year period than it was under policies in effect during that timeframe.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

A farmer-owned inventory system would have provided soybean farmers with an average increase of $3.4 billion per year in the value of production plus government payments than was experienced during the 1998-2005 period (fig. 19). During the 2006-2010 period, the combination of the value of production plus government payments would have decreased by $1.3 billion per year for soybean farmers. For the entire 13-year period, MDIS policies would have provided soybean farmers with $1.6 billion per year more than they received under the historical policies.

Actual Value of Soybean Production Plus Government Payments vs. Simulated Value of Soybean Production Plus Government Payments Under MDIS Policies, 1998-2010

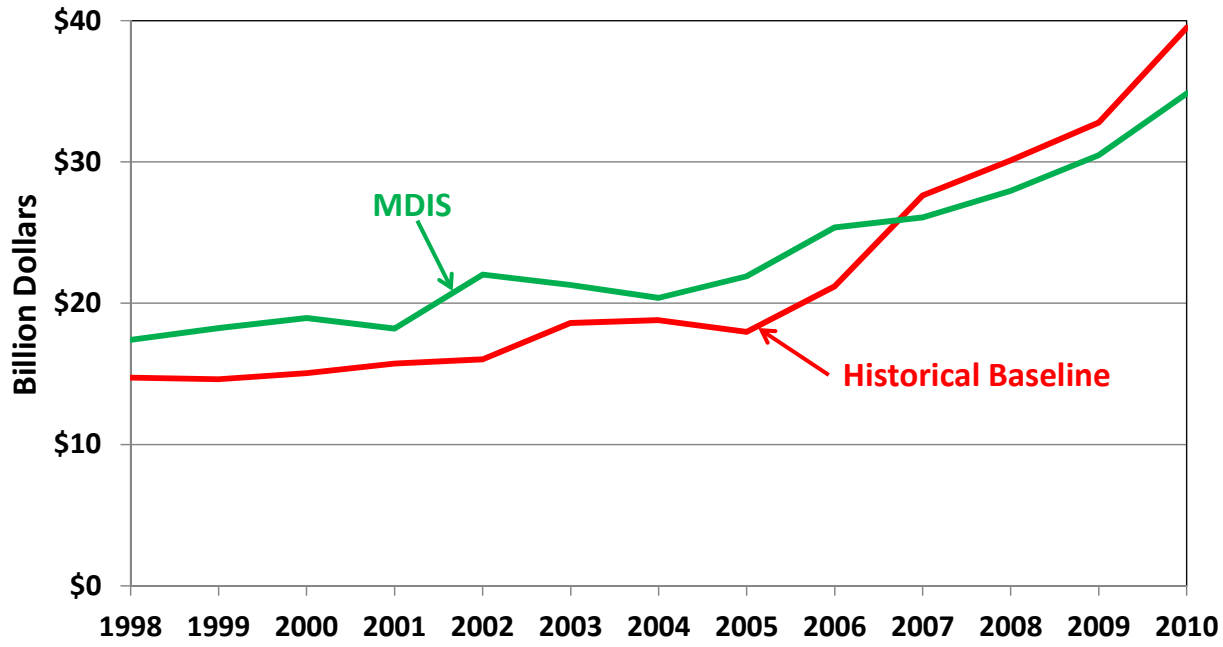

Figure 19. A comparison of the actual value of soybean production plus government payments to the value of soybean production plus government payments generated under a simulation of MDIS policies, 1998 to 2010. MDIS policies would have resulted in a $158 billion value of production plus government payments for soybeans in the 1998-2005 period, $27 billion higher than under policies in effect during that period. For the full 13-year period the value of production plus government payments would have been $27 billion higher than the actual value of production plus government payments.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

Because MDIS policies would have moderated price volatility, exports would have been affected. By increasing prices in the early period of low prices, soybean exports would have decreased slightly. Conversely, during the high prices in 2007 to 2010, a farmer-owned inventory would have lowered soybean prices, which would have resulted in slightly increased exports (fig 20).

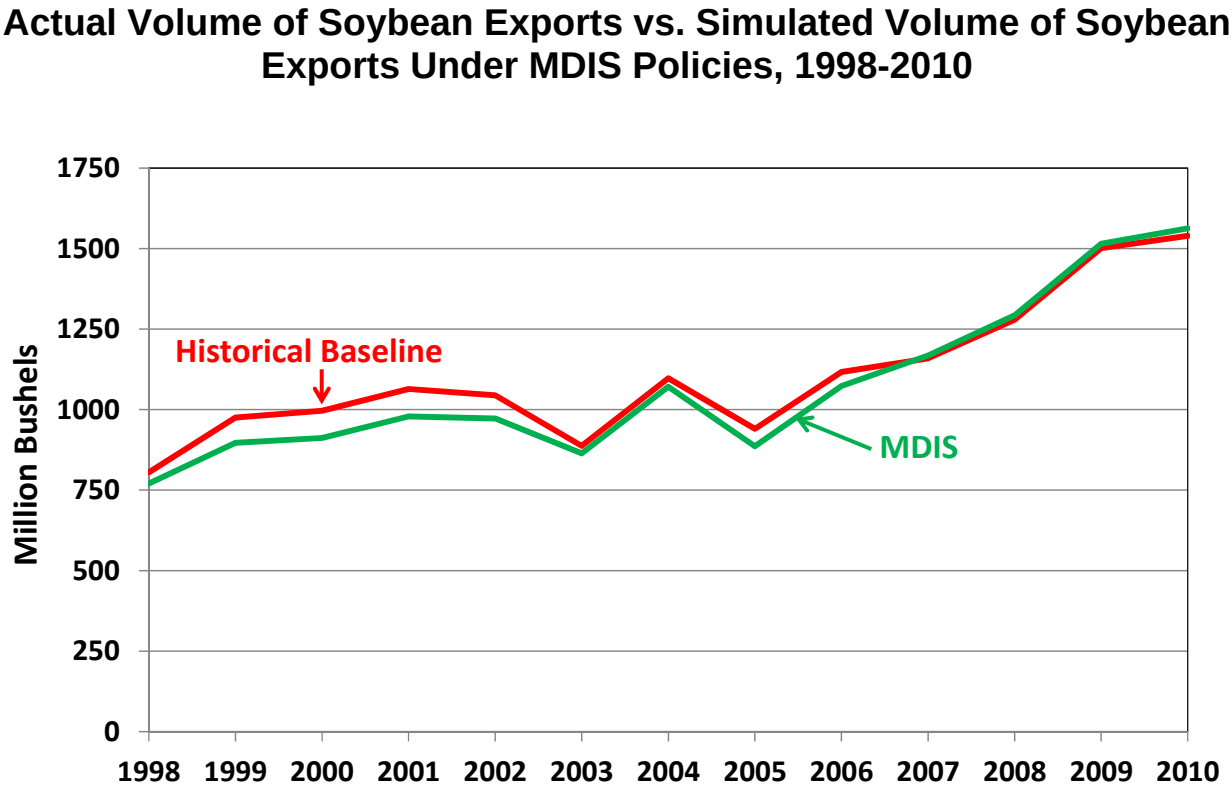

Figure 20. A comparison of the actual quantity of soybean exports to the quantity of wheat exports under a simulation of farmer-owned reserves, 1998-2010.
Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

From 1998-2005, MDIS policies would have brought a higher value of exports for soybeans, totaling an additional $12 billion over the 8-year period. For the latter period, 2006 to 2010, the value of exports under a farmer-owned inventory would have been lower than historical levels, due to lower prices. Over the complete 13-year study period, the value of soybean exports was $9.8 billion higher with MDIS policies than under historical conditions for that period. Just as with the two other crops, corn and wheat, a farmer-owned inventory would have provided extra export income in the years when soybean farmers needed the income the most.

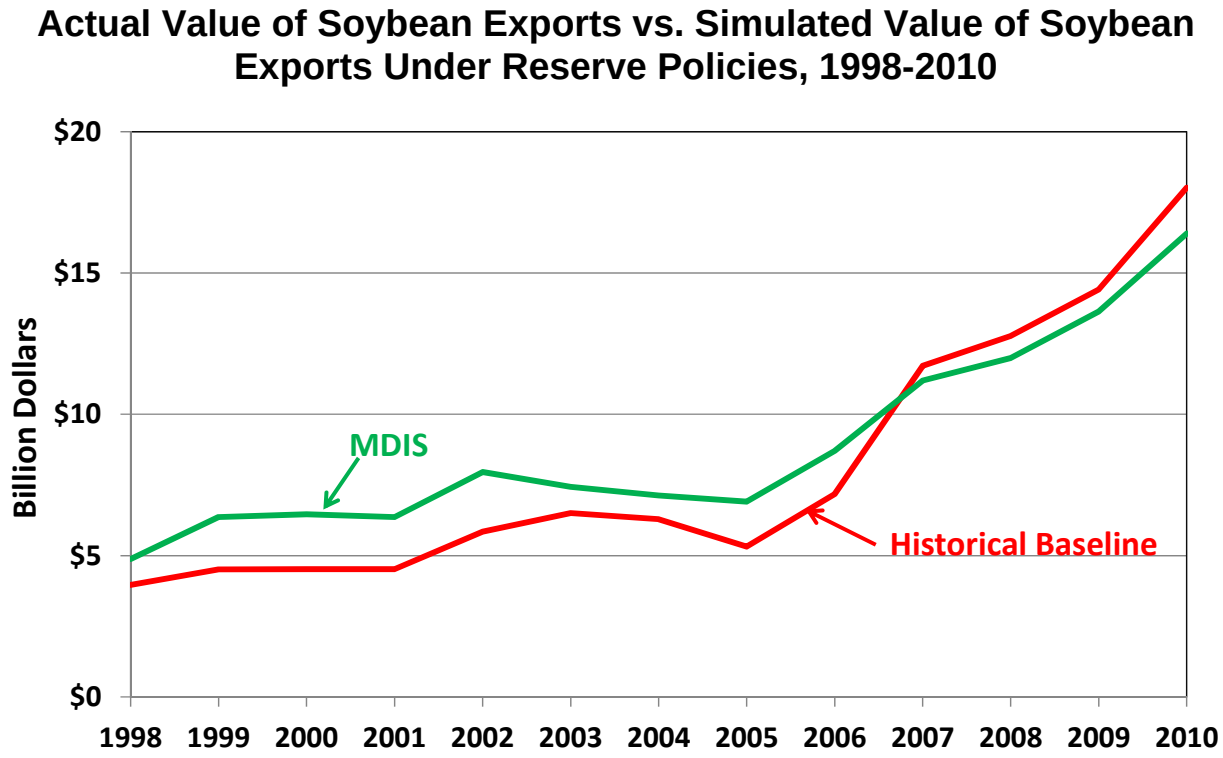

Figure 21. A comparison of the actual value of soybean exports to the value of soybean exports under a simulation of MDIS policies, 1998-2010. During the 1998-2005 period, MDIS policies provided soybean farmers with an average increase in the value of exports of $1.5 billion a year when compared to the actual value of soybean exports for that period. For the full 13-year period, MDIS policies resulted in an average increase in the value of exports of $800 million per year compared to the actual value of exports under policies in effect during that period.

Source: USDA-ERS and Agricultural Policy Analysis Center POLYSYS simulation.

Phase II

Background for 2012 Farm Bill

The 2008 Farm Bill expires September 30, 2012. The path to reauthorizing farm bills usually has a number of twists and turns and often false starts.

The current farm bill reauthorization process included offering the fate of the next farm bill to a twelve-member Joint Select Committee on Deficit reduction, the so-called super committee. During mid-2011, the supercommittee collected input from stakeholders and from the leadership of the House and Senate agriculture committees. The idea was that the supercommittee would craft legislation that would meet the farm bill's share of a deficit reduction package, roll it into a package of domestic and military spending cuts, and present the it to Congress for an up or down vote with no amendments allowed. Failure of the supercommittee to come up with a ten-year, government-wide deficit reduction package or failure of a Congressional to agree to it would trigger $1.2 trillion across the board cuts beginning in fiscal year 2013. The committee did fail to come to an agreement, thereby setting up the triggering of the budget cuts, and in the process, orphaning any agreed-upon proposal for the next farm bill. No details on farm bill negotiations were released.

The leadership of the House and Senate agriculture committees had offered the supercommittee $23 billion in cuts over ten years. This is more than agriculture's expected $15 billion in cuts as its share of the $1.2 trillion in government outlays. The administration has suggested a larger reduction. Clearly, agriculture is facing reduced a federal budget for farm programs.

Extending the current farm program's mandatory commodity safety net components is, of course, an option. The most talked-about farm program design includes elimination of direct payments and making crop/revenue insurance the central feature of the next farm program. Others prefer to raise the loan rates and/or target prices from the levels in the current program.

If prices remain "high," the exact nature of the 2012 farm program becomes less important because large government costs are unlikely be triggered, making budget reduction targets easier to achieve. Indeed, prices may remain at the relatively high levels experienced in 2011 but history suggests otherwise. History shows that periods of a few years of high prices are followed by longer periods of "low" prices. So evaluations of farm programs should include analyses of costs reflecting the possibility that history might repeat itself.

The analysis that follows looks at selected combinations of economic situations and policy alternatives, including an economic setting in which prices fall somewhat but remain relatively stable of over time. A second set of analyses looks at economic circumstances that result in low prices similar in magnitude to the 1998 to 2002 period followed in later years by price increases similar to recent years. The policy alternatives analyzed under that economic setting include continuation of the current program as it is, with direct payments eliminated, with updated loan rate levels and finally with the replacement of the current program with the Market-Driven Inventory System described earlier.

USDA Baseline, 2012-2021

The Phase II study is anchored to the 2012 USDA baseline, released February 2012, and examines the impact of various policy regimens in terms of variation away from the baseline numbers.

Under the 2012 USDA baseline, corn prices decline from $6.70 per bushel in marketing year 2011 to $4.30 by 2013. The prices were adjusted downward from the higher 2010 and 2011 corn prices, which were affected by below-trend yields and other supply and demand causes. Corn prices gradually increase after 2013 reaching $4.68 per bushel by marketing year 2021 (fig. 22). Price patterns of the seven other program crops—grain sorghum, barley, oats, wheat, soybeans, cotton, and rice—exhibit patterns similar to the one shown for corn.

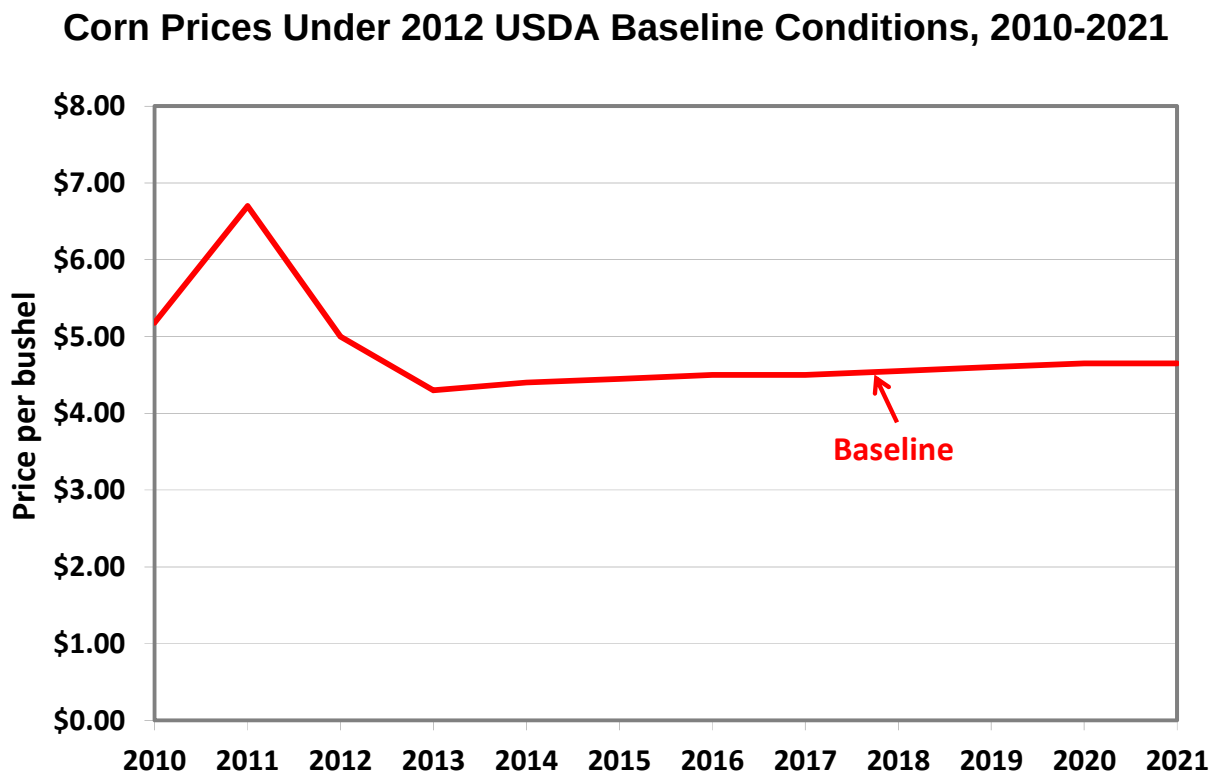

Figure 22. 2012 USDA baseline corn prices, 2010-2012. The USDA baseline shows corn prices declining from $6.70 per bushel in marketing year 2011 to $4.30 in 2013. Corn price only partially recovers by 2021 reaching $4.68 per bushel, about $2 below the 2011 price.
Source: 2012 USDA baseline.

After initial drop in the first two years, the baseline projection for the value of production for the 8 program crops—corn, grain sorghum. barley, oats, wheat, soybeans, cotton, and rice—reflects the expectations of modest increases in both prices and yields that are built into the baseline (fig. 23).

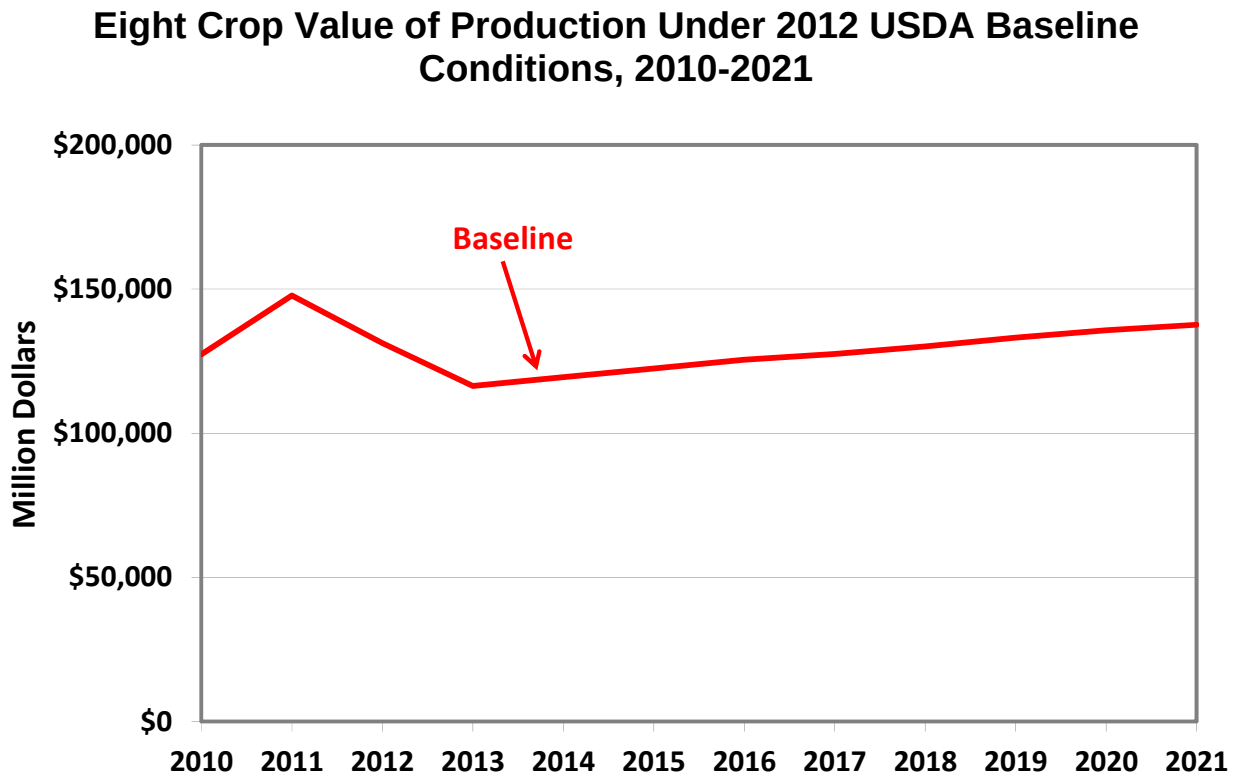

Figure 23. 2012 USDA baseline projection for the value of production for the 8 major crops, 2010-2012. The slope of the baseline for the value of production is slightly steeper than for price alone because increases are expected in both prices and yields as farmers allocate acreage to maximize the value of production. Thus, the 2021 value of production for the 8 crops nears the level achieved in 2011 while price alone, as seen for corn in figure 22, does not come close to achieving its 2011 high.
Source: 2012 USDA baseline.

Government payments for the 8 major crops remains flat at $4.819 billion for the 2012-2021 baseline period (fig. 24). That number represents Direct Payments, which are paid without regard to price or production levels. Because baseline loan rates and target prices are assumed to be the same as under the 2008 Farm Bill and are well below the expected prices for the 2012-2021 period, they are not triggered in the 2012 USDA baseline.

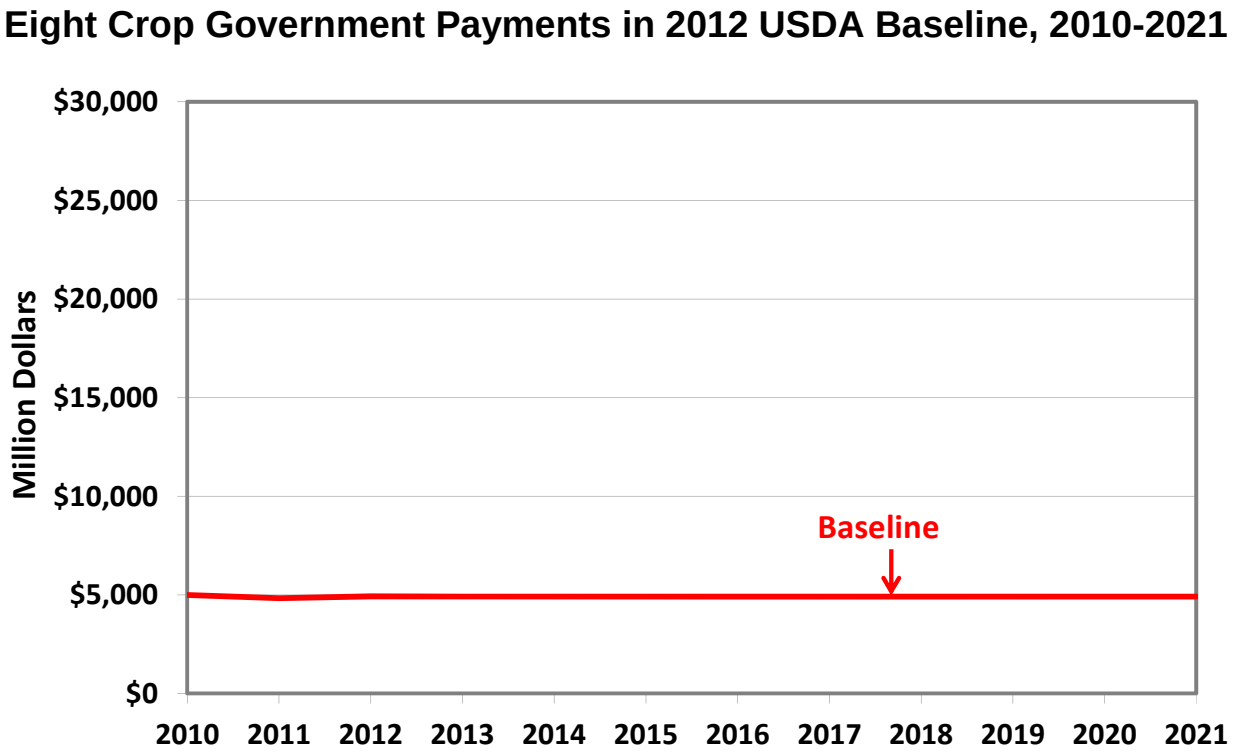

Figure 24. 2012 USDA baseline projection for government payments for the 8 major crops, 2010-2012. The baseline government payments for the 8 major crops remains constant at a level just above $4.9 billion, reflecting the cost of the Direct Payment program. Because prices are above baseline loan rates and target prices during 2012-2021 period, payments are not triggered for the Counter-Cyclical Payment program or the Marketing Loan Gain program.
Source: 2012 USDA baseline.

Realized net farm income reached nearly $100 billion in 2011. The 2012 USDA baseline shows a much less prosperous agriculture by 2015, when realized net farm income is down by more than 25 percent compared to its 2011 level. Realized net farm income gradually increases over the 2012 to 2021 period, but at the end of the period, net realized farm income is only 85 percent of its 2011 value. On the other hand, baseline realized net farm income for each of the years exceeds the average realized net farm income for 2002 to 2011 of $71.7 billion.

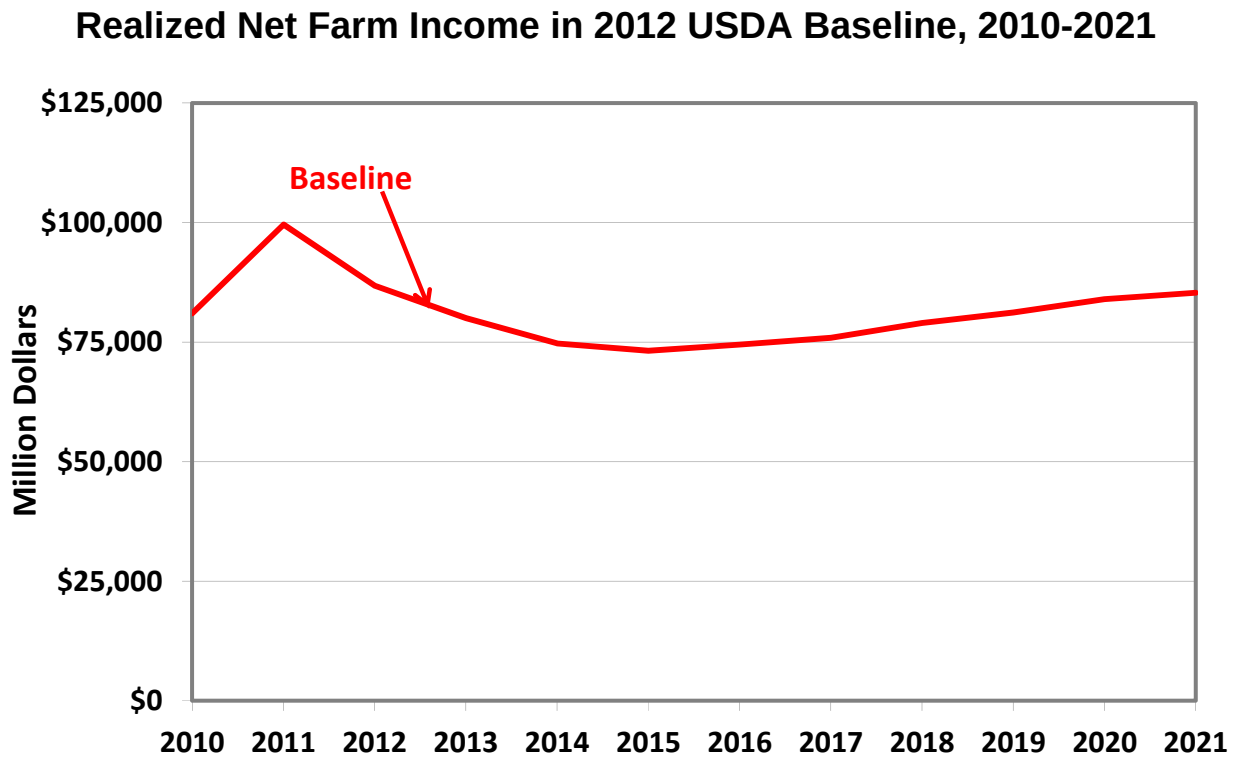

Figure 25. 2012 USDA baseline projection for net farm income, 2010-2012. Net farm income in the 2012 USDA baseline is expected to remain above $73 billion. While this number is below the 2011 peak of $99 billion, it is above the 2002-2011 average of $71.7 billion.
Source: 2012 USDA baseline.

Scenario 1 – Shocked Baseline, 2012-2021

Because safety net programs are not triggered under baseline conditions the effectiveness of the current farm program or any proposed farm program in protecting the farm sector in the case of adverse events is not tested. Thus the question that needs to be asked of current and proposed farm programs is not how they will work and how much they will cost under baseline conditions but how they will perform under stress. To test how an extension of the current farm program would function under stress, we imposed a yield 10 percent above the baseline on the 8 major crops for the 2012-2014 crop years. In the 2017 and 2018 crop years we imposed a 10 percent decrease below baseline yields with a 5 percent decline in 2019. The purpose of these yield shocks was to reproduce price conditions similar to those that were seen in the 1998-2010 period—a timeframe that saw both low prices accompanied by massive government payments and record high prices. These price conditions could be produced not only by changes in U.S. yields, but also by various combinations of changes in demand and yield as well as changes in production elsewhere in the world. The yield shocks imposed on corn resulted in yields above 180 bushels per acre in the 2012-2014 crop years and yields below 160 bushels per acre in 2016 and 2017 (fig. 26).

Corn Yield in 2012 USDA Baseline vs. Corn Yield in Shocked Baseline, 2010-2021

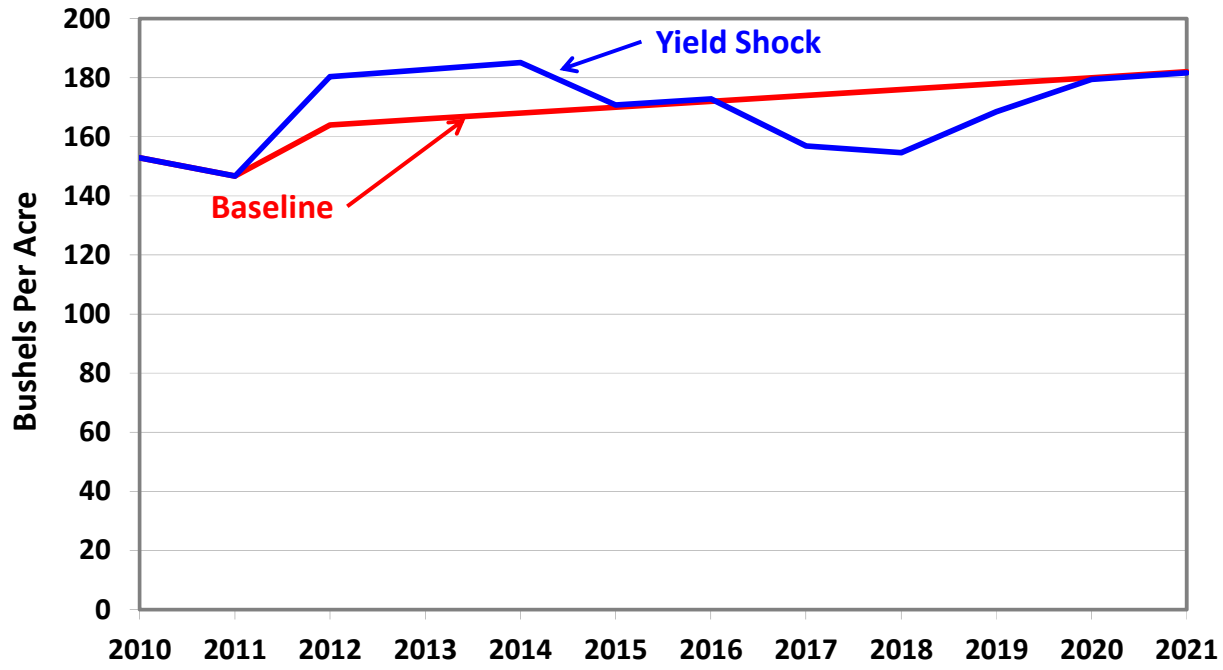

Figure 26. U.S. corn yields, 2012 USDA baseline and a shocked baseline, 2010-2021. The shocked yields reflect yields 10 percent above the baseline in 2012-2014 and yields 10 percent below the baseline in 2017 and 2018 and 5 percent below the baseline in 2019. The purpose of imposing these yield shocks was to reproduce the crop price conditions seen in the 1998-2010 period.

Source: 2012 USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

The yield shocks imposed on the 2012 USDA baseline drove corn prices to below $3.00 in 2013 and 2014 and above $7.00 in 2018 and above $6.00 in 2019 (fig. 27). Price swings like this impose large adjustment costs on crop farmers when prices fall below the cost of production for a multi-year period and the users of crops like livestock producers when prices quickly swing from low to high. In the 2012-2016 period, corn prices averaged $3.43, nearly $1.00 below the 2013 baseline minimum corn price of $3.40.

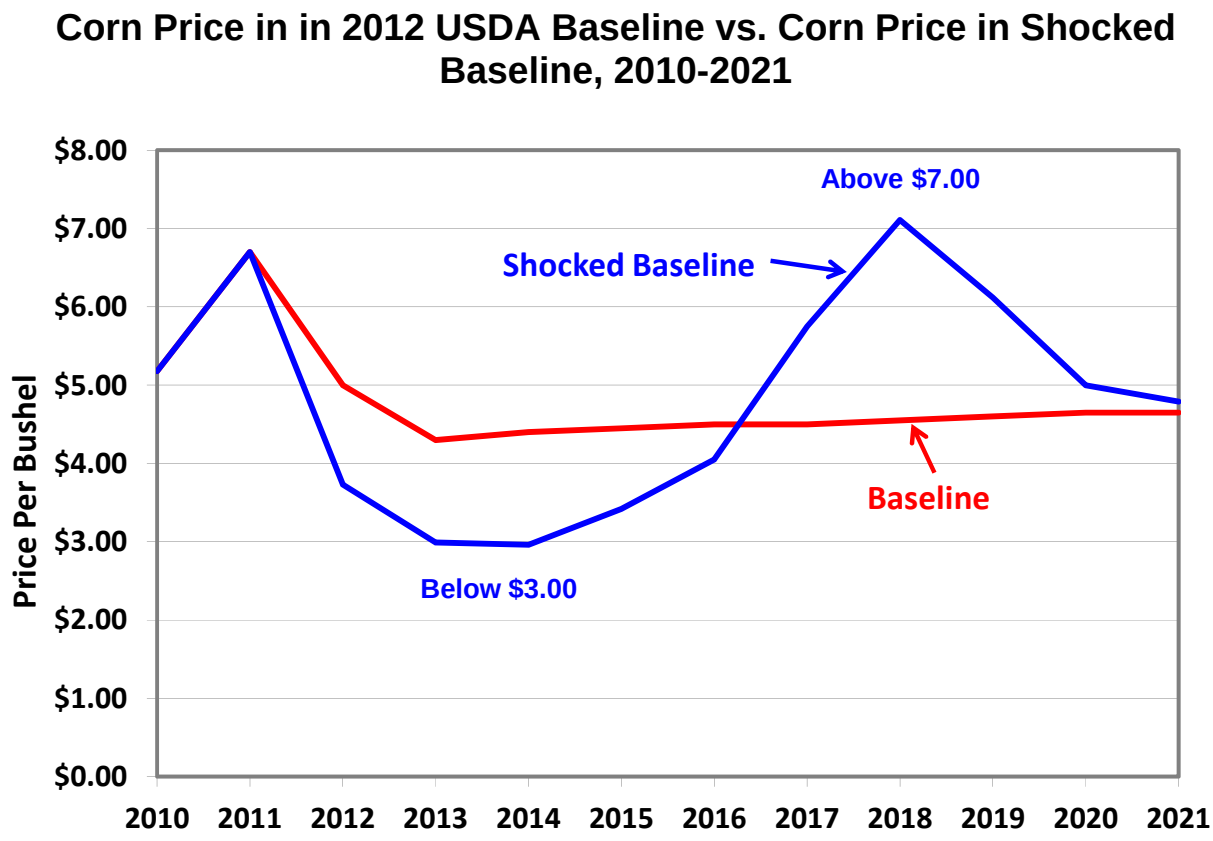

Figure 27. U.S. corn yields, 2012 USDA baseline and a shocked baseline, 2010-2021. The yield shocks imposed on the baseline resulted in corn prices that fell below $3.00 for 2013 and 2014 and rose above $7.00 in 2018. The low prices imposed losses and large adjustment costs on crop producers in the 2012-2016 low price period where the market price was below the cost of production while imposing losses and large adjustment costs on livestock producers and other corn users when corn prices rapidly rose to a peak of over $7.00 in 2018.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Because the loan rates and the target prices were below the depths that prices reached in the shocked baseline, government payments were limited to the Direct Payment program, leaving the 2012 USDA baseline and the shocked baseline to provide the same level of payments (fig. 28).

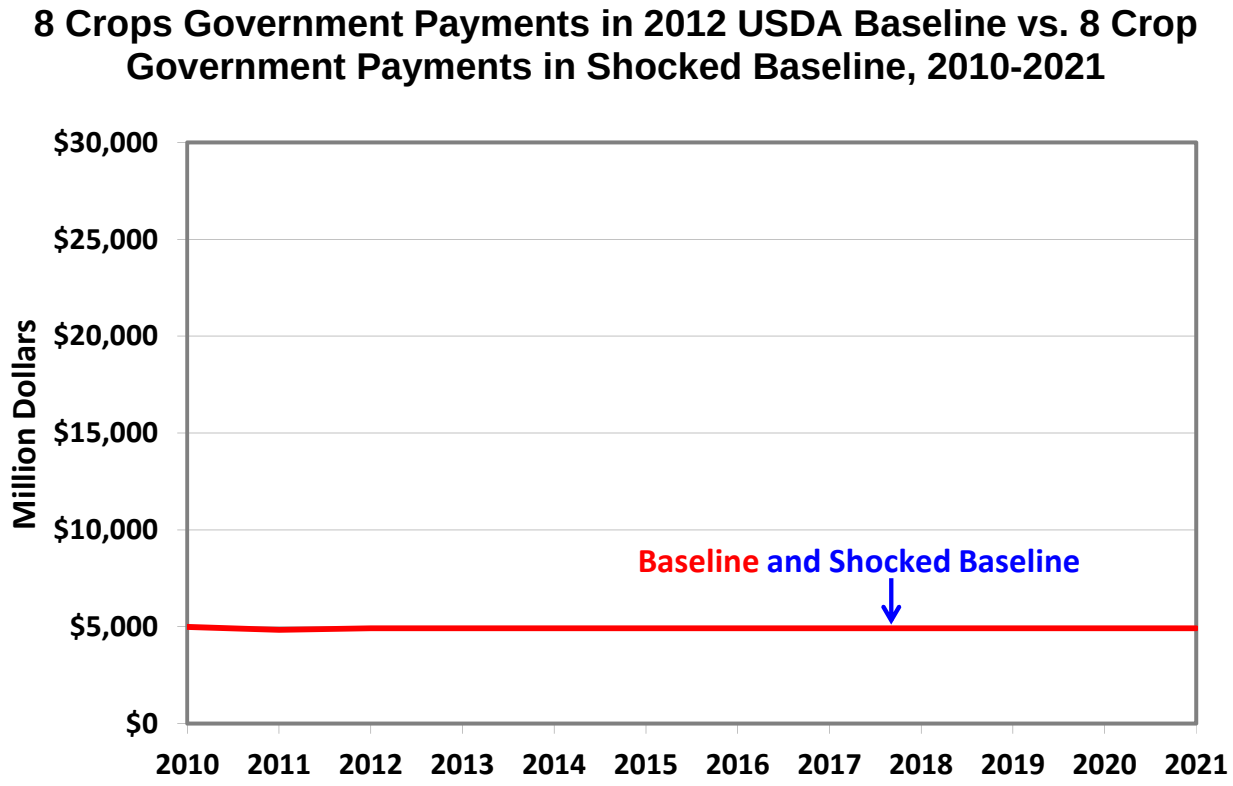

Figure 28. U.S. government payments, 2012 USDA baseline and a shocked baseline, 2010-2021. The unchanging level of government payments despite the low crop prices comes from the nature of the Direct Payment program which provides an unchanging level of support whether farmers need it or not. Because corn prices did not fall low enough to trigger Marketing Loan Gains or Counter-Cyclical payments these programs remained out of operation during the low price period.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

With low commodity prices as a result of imposing high yields in the 2012-2014 period, the value of production plus government payments minus cash expenses (a measure of net income) fell below $12 billion for the 2013-2015 period with a low of $7.8 billion in 2014. This compares to a baseline low of $36.2 billion in 2013 (fig. 29).

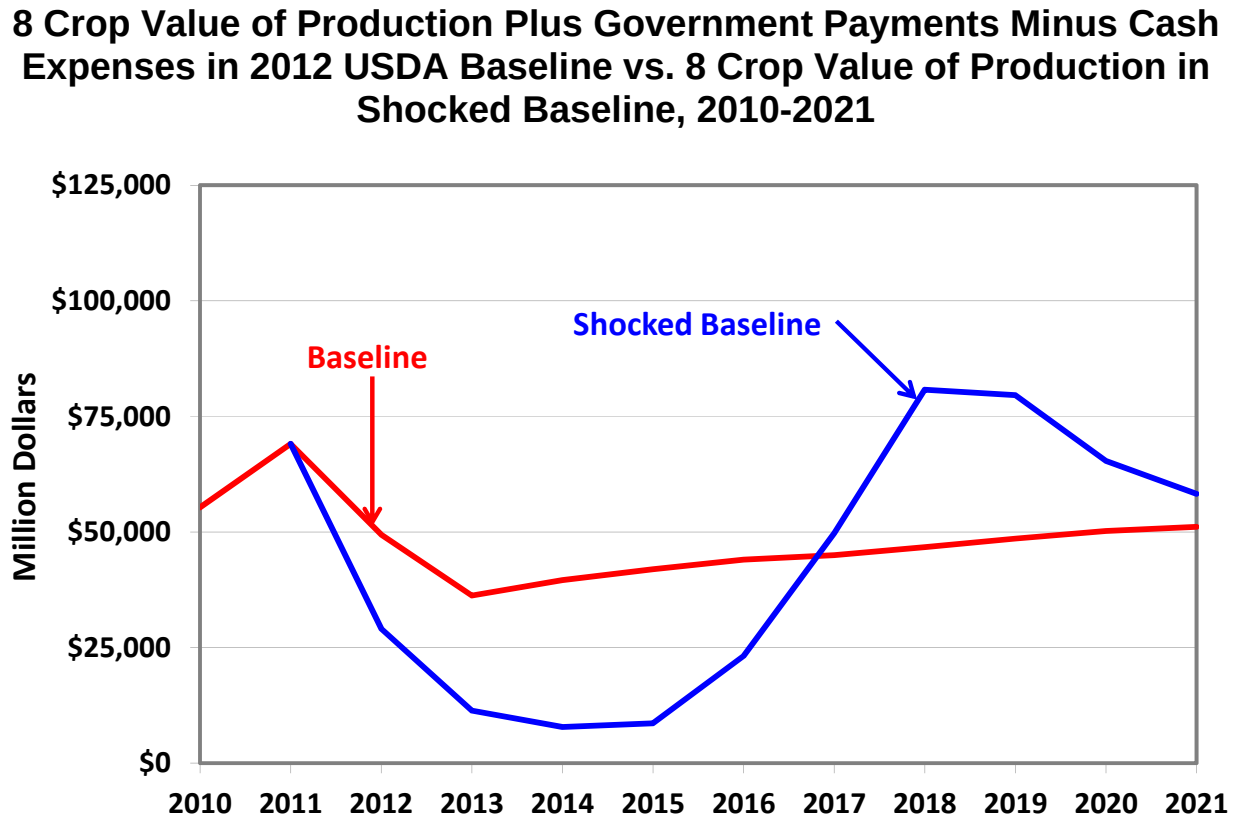

Figure 29. Value of production plus government payments minus cash expenses for the 8 major crops, 2012 USDA baseline and a shocked baseline, 2010-2021. As a result of record high yields in the shocked baseline, crop prices fell resulting in a 5 year trough in the value of production plus government payments minus cash expenses (a measure of net income), leaving farmers with minimal net income from their crop operations.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

The low prices that resulted from the shocked baseline resulted in net farm income falling below $55 billion (fig. 30), a level not seen since the 1997-2002 period. The POLYSYS model used in this analysis does not include an insurance component, but depending upon the level of insurance available and chosen by farmers, insurance losses could be record large. Because the prices remained low for a period of time, the level of protection that revenue insurance would provide would decline over time, leaving farmers with less protection in the latter portion of the low price period when they may need it the most.

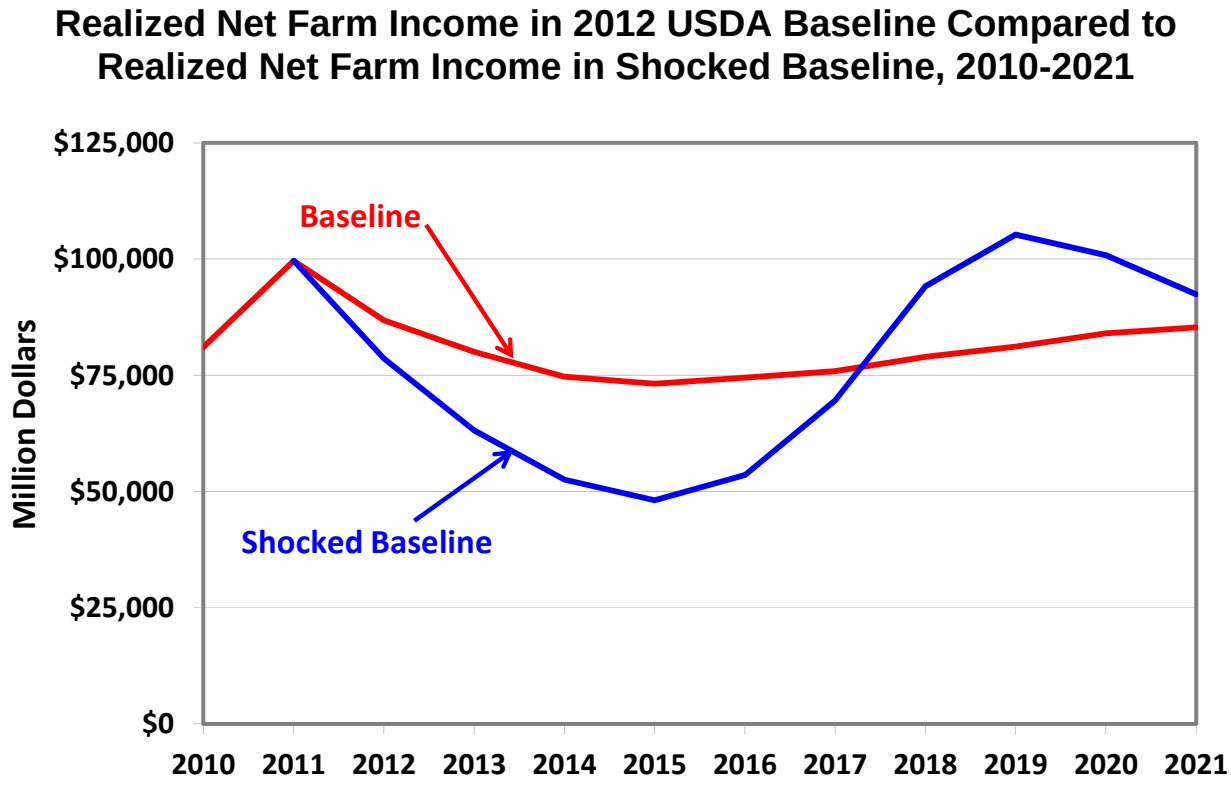

Figure 30. Realized net farm income, 2012 USDA baseline and a shocked baseline, 2010-2021. Realized net farm income under the shocked baseline drops by half between 2011 and 2015 compared to a 25 percent drop in the USDA baseline. The difference between 2012 USDA baseline net farm income and the shocked baseline net farm income for the 2012-2017 period totaled $99.6 billion in lost income, while the 2018-2021 period provided farmers with only $56 billion in additional income.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Scenario 2 – Shocked Baseline with No Direct Payments, 2012-2021

In the current discussions surrounding the 2012 Farm Bill, one of the changes that seems certain is the elimination of the Direct Payment program which has become politically unsustainable in the current period of high crop prices and net farm income levels approaching $100 billion. To reflect the elimination of Direct Payments, we developed Scenario 2, which was identical to the shocked baseline except for the elimination of the Direct Payment program. The result is that no government payments would be paid over the 2012-2021 baseline period used for calculating the cost of the 2012 Farm Bill (fig. 31).

8 Crop Government Payments in 2012 USDA Baseline vs. 8 Crop Government Payments in Shocked Baseline with No Direct payments, 2010-2021

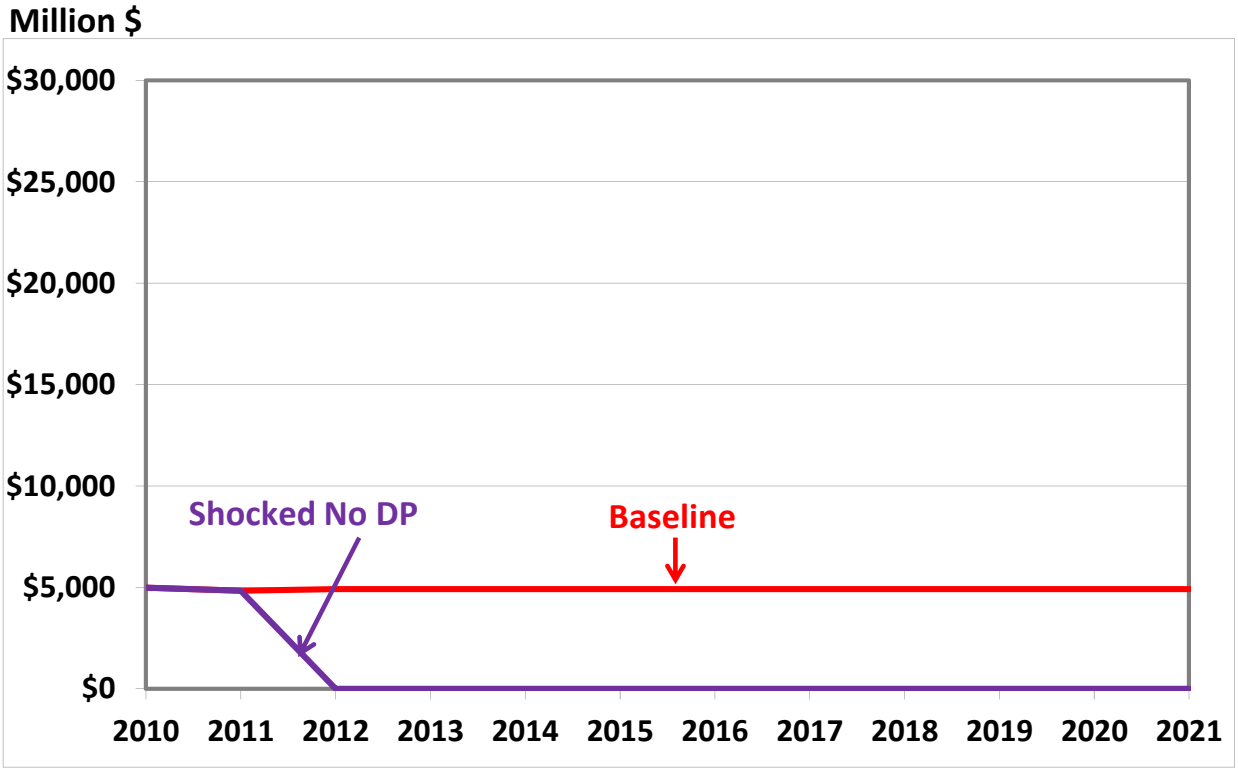

Figure 31. Government payments for the 8 major crops, 2012 USDA baseline and the shocked baseline with no Direct Payments, 2010-2021. Because the only payments in the 2012 USDA baseline were the Direct Payments, the elimination of the Direct Payment program in scenario 2's shocked baseline with no Direct Payments resulted $0 in government payments.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

With no Direct Payment program in effect in the shocked baseline with no government payments, the value of production plus government payments minus cash expenses fell to $4 billion or lower in 2014 and 2015 (fig. 32).

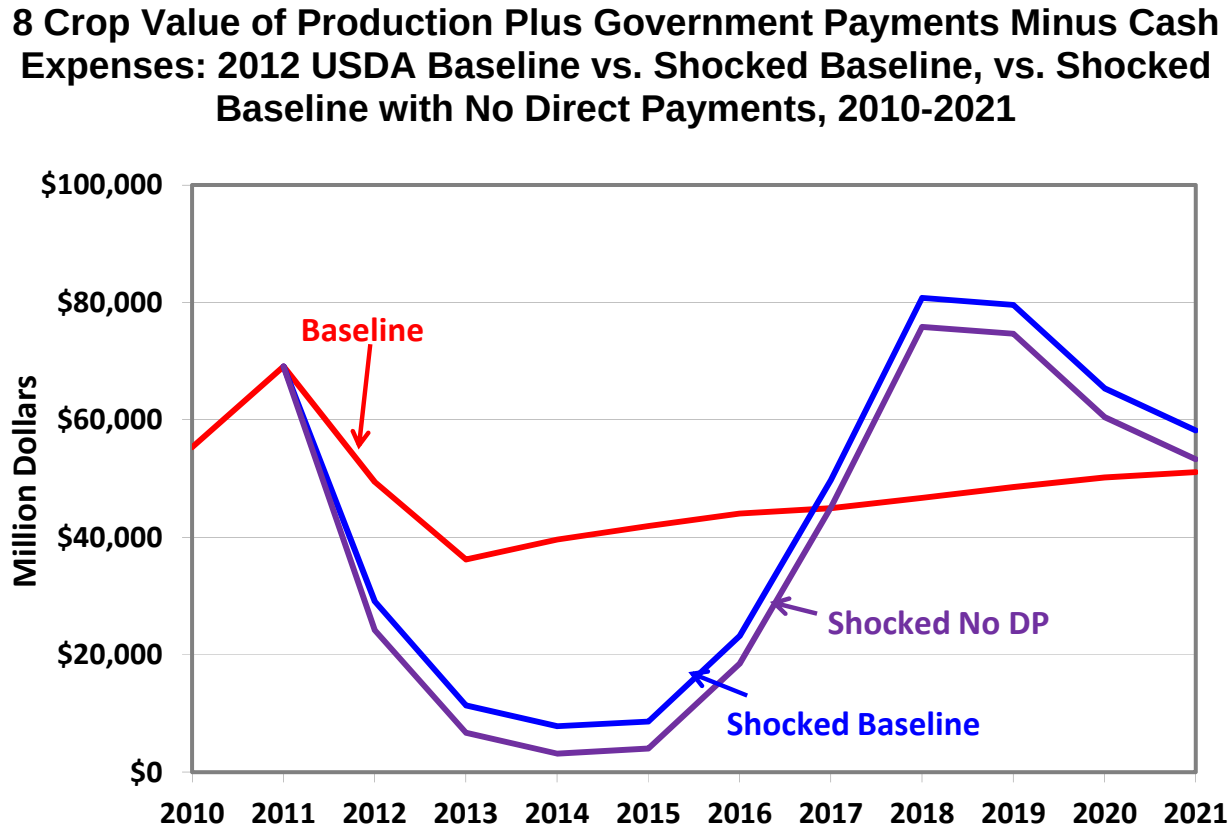

Figure 32. Value of production plus government payments minus cash expenses for the 8 major crops, 2012 USDA baseline, shocked baseline, and the shocked baseline with no Direct Payments, 2010-2021. The elimination of the direct payment program reduced the value of production plus government payments minus cash expenses by $4.9 billion in all years, cutting this measure of net income in half for 2014 and 2015.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Scenario 3: Shocked Baseline with Higher Loan Rates and No Direct Payments

As a result of the discussion of the elimination of the direct payment program and because of the awareness of the ineffectiveness of the current loan rates—and thus the Marketing Loan Gain program—which are so far below the cost of production so as to provide little protection, some farmers have begun discussing the prospect of raising the loan rate in order to provide some effective downside protection in the farm safety net. To test the effectiveness of increasing the loan rates we developed Scenario 3 maintaining the shocked baseline and raising the corn loan rate to $3.50. The loan rates for the other crops were raised to so as to maintain their current loan ratio to the corn loan rate. This minimizes the impact of loan rates on the farmer's decision on the crop mix to be planted on her/his farm. Scenario 3 like Scenario 2 contains no Direct Payments.

The low crop prices in the 2013-2015 period resulted in prices that were low enough to trigger government payments that exceeded $25 billion in 2014 (Fig. 33). While higher loan rates would help in raising farm income, government costs could explode. Likewise they provide grain users with no protection during periods of low prices. In effect the Marketing Loan Gains backfill crop farm income in low price years while subsidizing the users of grain with a below-the-cost-of-production product. Then when things turn around these users of grain are hit with purchasing their needs at prices well above the cost of production. These swings are more devastating to users than relatively stable but steadily increasing prices.

8 Crop Government Payments in 2012 USDA Baseline vs.8Crop Government Payments in Shocked Baseline with New Loan Rates and No Direct Payments, 2010-2021

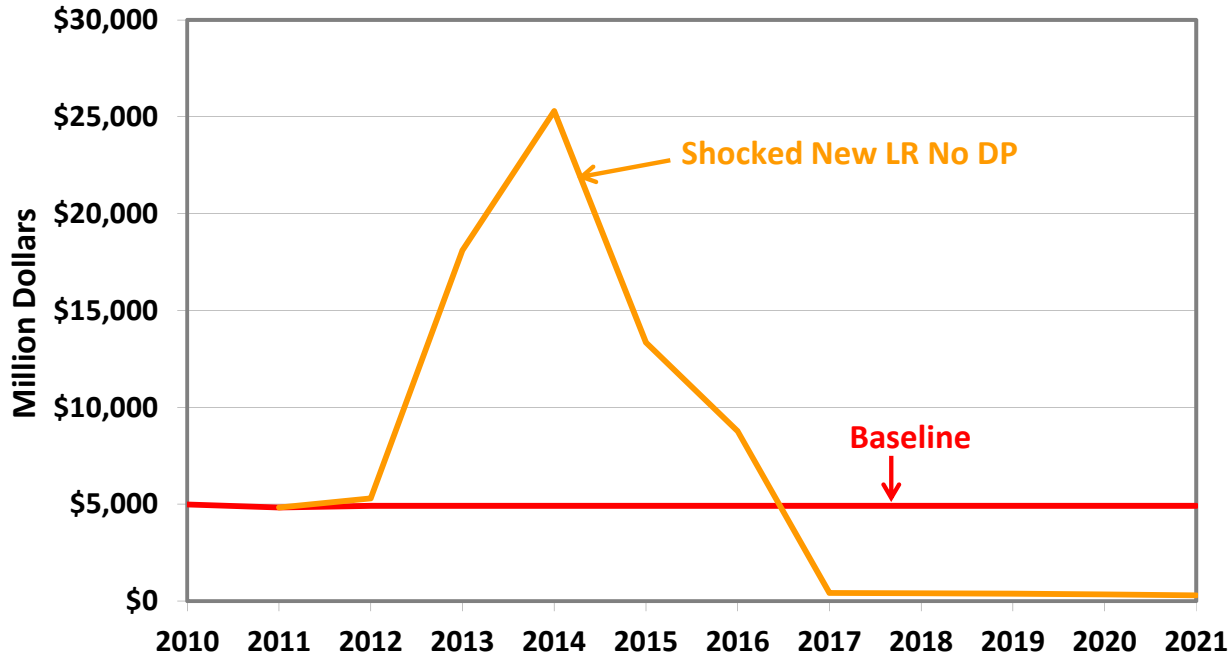

Figure 33. Government payments for the 8 major crops, 2012 USDA baseline and the shocked baseline with new loan rates and no Direct Payments, 2010-2021. The low prices in the 2013-2015 period triggered massive government payments in the form of Marketing Loan Gains that reached $18 billion for the 8 major crops in 2013 and exceeded $25 billion in 2014. Government payments for the 10-year baseline period totaled $72.7 billion compared to $49.2 billion for the Direct Payment program.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Figure 34 shows that the shocked baseline with higher loan rates and no direct payments provides some level of protection, as measured by the value of production plus government payments minus cash expenses when compared to the shocked baseline that includes direct payments.

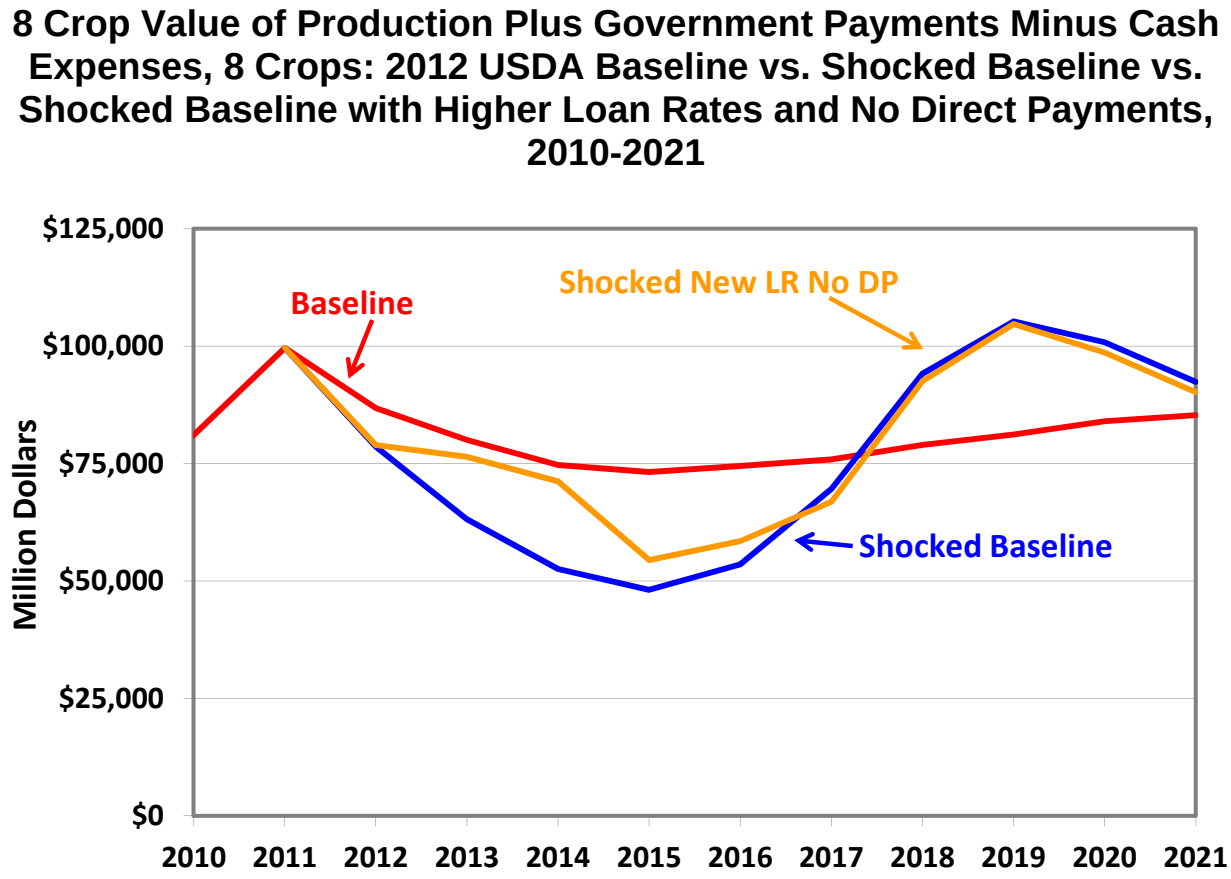

Figure 34. Value of production plus government payments minus cash expenses—a measure of net income—for the 8 major crops, 2012 USDA baseline, the shocked baseline, and the shocked baseline with new loan rates and no Direct Payments, 2010-2021. The higher loan rates provide crop farmers with significantly higher net income in 2013 and 2014 while providing less protection in 2015 and beyond.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Scenario 4: Market-Driven Inventory System (MDIS)

To help moderate the high and low prices seen in the earlier shocked scenarios and to control government costs we implemented a Market-Driven Inventory System (MDIS and pronounced Midas) which in addition to using the loan rates set in Scenario 4 also sets a release price—160 percent of the loan rate—and allows farmers to receive the loan rate for crops they enter into MDIS. In exchange farmers receive a storage payment of $0.40/bu./year. The farmers must maintain the crop in good condition and cannot sell the crop until after the market price exceeds the release price and release is authorized by the Secretary of Agriculture. The release price is set at 160 percent of the loan rate to allow for a price band that is wide enough to allow for the normal functioning of the market in allocating supplies. For corn with a loan rate of $3.50, the release price would be $5.60 (fig.5).

The MDIS storage limits were set at 3 billion bushels for corn, 800 million bushels for wheat, and 400 million bushels for soybeans. In addition, Direct Payments, Marketing Loan Gains, and Counter-Cyclical Payments are eliminated for all crops except rice and cotton.

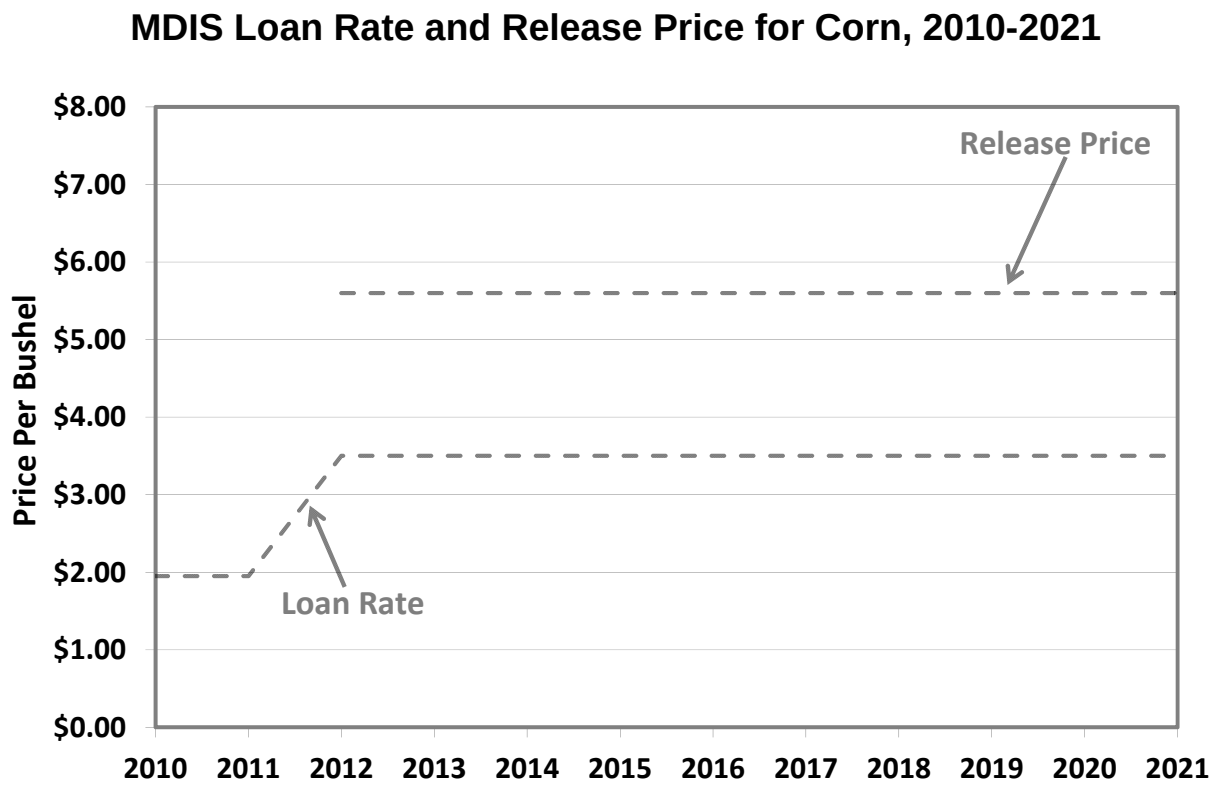

Figure 35. Corn loan rate and release price, MDIS, 2010-2021. The loan rate and the release price for MDIS are set so as to provide a wide enough price band to allow for the normal functioning of the market while avoiding destructive distortions that occur when prices fall well below the cost of production for long sustained periods of time or when price increase to levels above the cost of production, inducing investments that result in long-term increases in production which typically result in another cycle of low prices.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

The 2012 USDA corn price baseline projections is approximately midway between the MDIS corn loan rate and release price for the baseline years of 2012-2021 (fig. 36). If the corn prices were to remain in between the loan rate and the release price, MDIS policies would not come into effect, except for the elimination of the Direct Payment program.

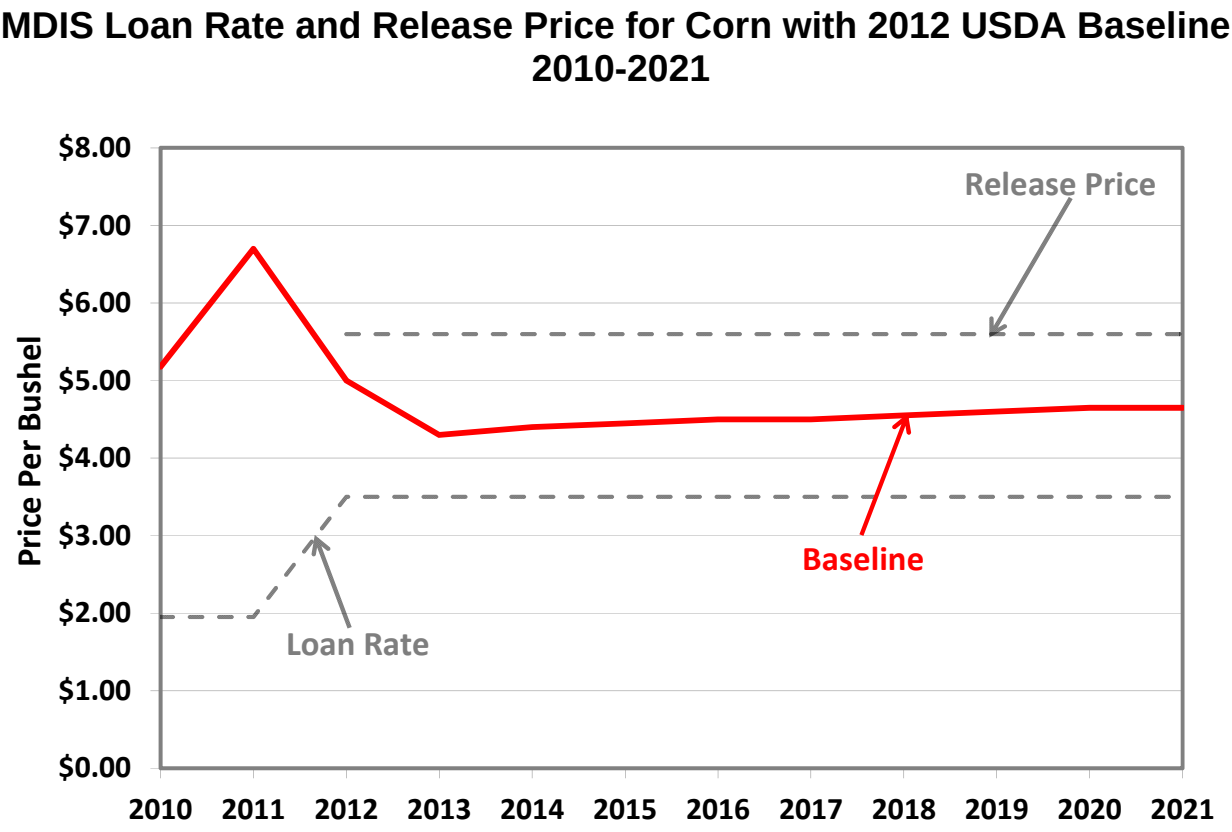

Figure 36. Corn loan rate and release price, MDIS, and the 2012 USDA baseline price for corn, 2010-2021. The baseline corn price is midway between the loan rate and the release price suggesting that these rates are reasonably tailored to current market conditions.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

When the corn price from the shocked baseline is imposed on figure 36, one can see that during the low price period 2013 to 2015 the corn price falls below the loan rate while in the 2017 to 2019 period it exceeds the release price (fig 37), indicating periods in which MDIS policies would come into effect.

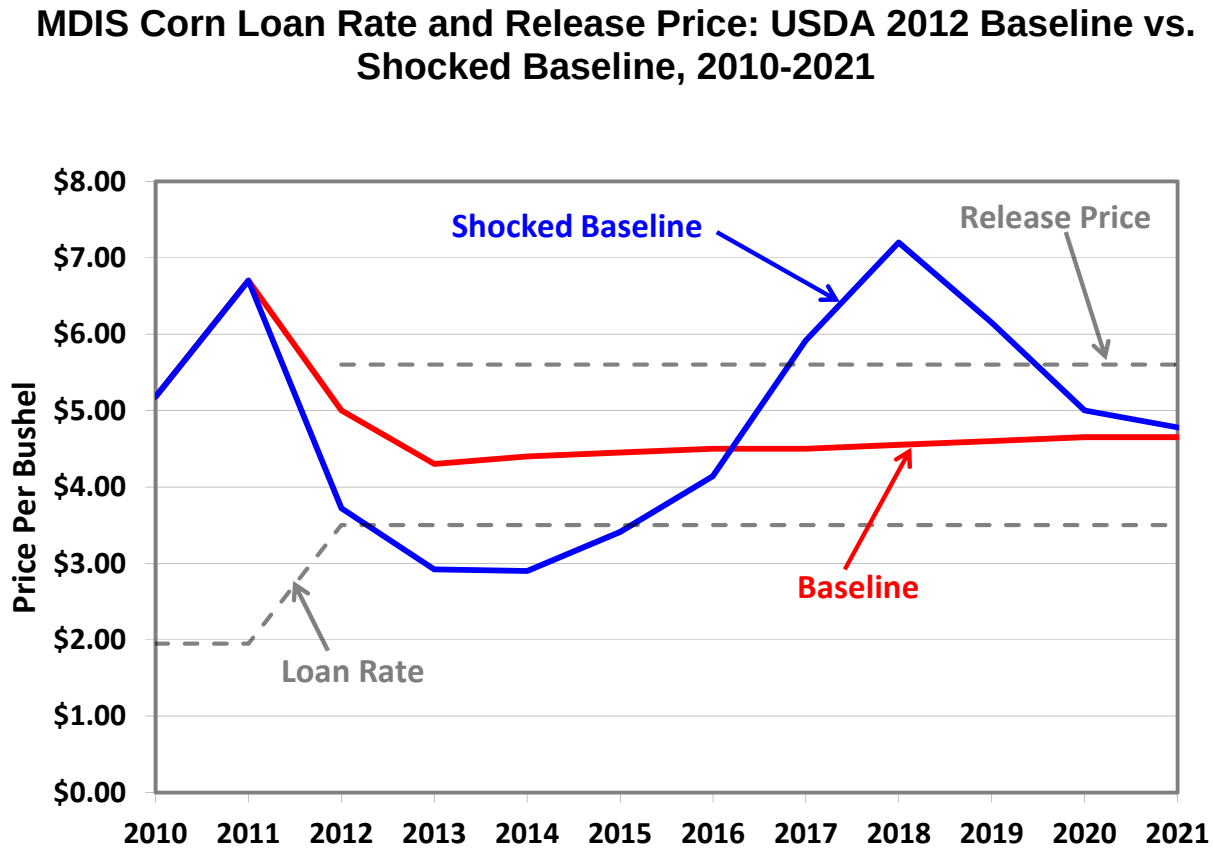

Figure 37. Corn loan rate and release price, MDIS, 2012 USDA baseline and the shocked baseline, 2010-2021. The shocked baseline results in periods in which the price of corn would fall below the loan rate (2013-2015) and periods in which the price of corn would exceed the release price (2017-2019).
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

As expected, MDIS policies would increase corn prices during low price periods raising then in the period from 2012-2016 (fig 38). Likewise they would prevent prices from reaching overly extreme highs and that could draw excess resources into agricultural production.

MDIS Loan Rate and Release Price for Corn: 2012 USDA Baseline vs. Shocked Baseline vs. MDIS Policies under Shocked Conditions, 2010-2021

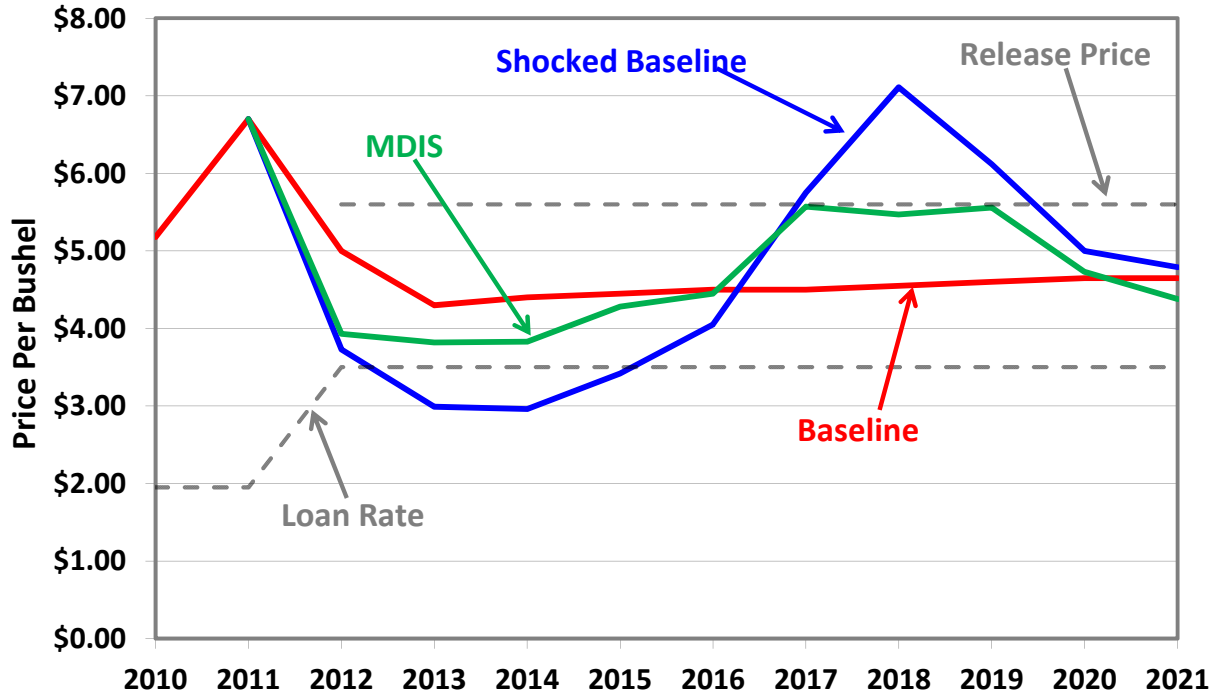

Figure 38. MDIS loan rate and release price, corn: 2012 USDA baseline, the shocked baseline, and MDIS, 2010-2021. MDIS policies have the expected effect of moderating price swings on both the low side and the high side allowing market forces to more efficiently allocate resources in agriculture. During low price years, crop farmers would receive higher prices than they would under shocked baseline conditions while receiving less, but still profitable prices, during the high price years.
Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

When prices are low, 2.2 million bushels of corn are put under loan in the MDIS as well as 800 million bushels of wheat and 400 million bushels of soybeans (fig 39), moderating crop prices on the low side as we saw for corn in figure 38. In addition, when prices become tight after 2016, farmer-owned inventory stocks are released into the market assuring demanders of a steady supply of grain while at the same time moderating the price swing and giving time for production to recover.

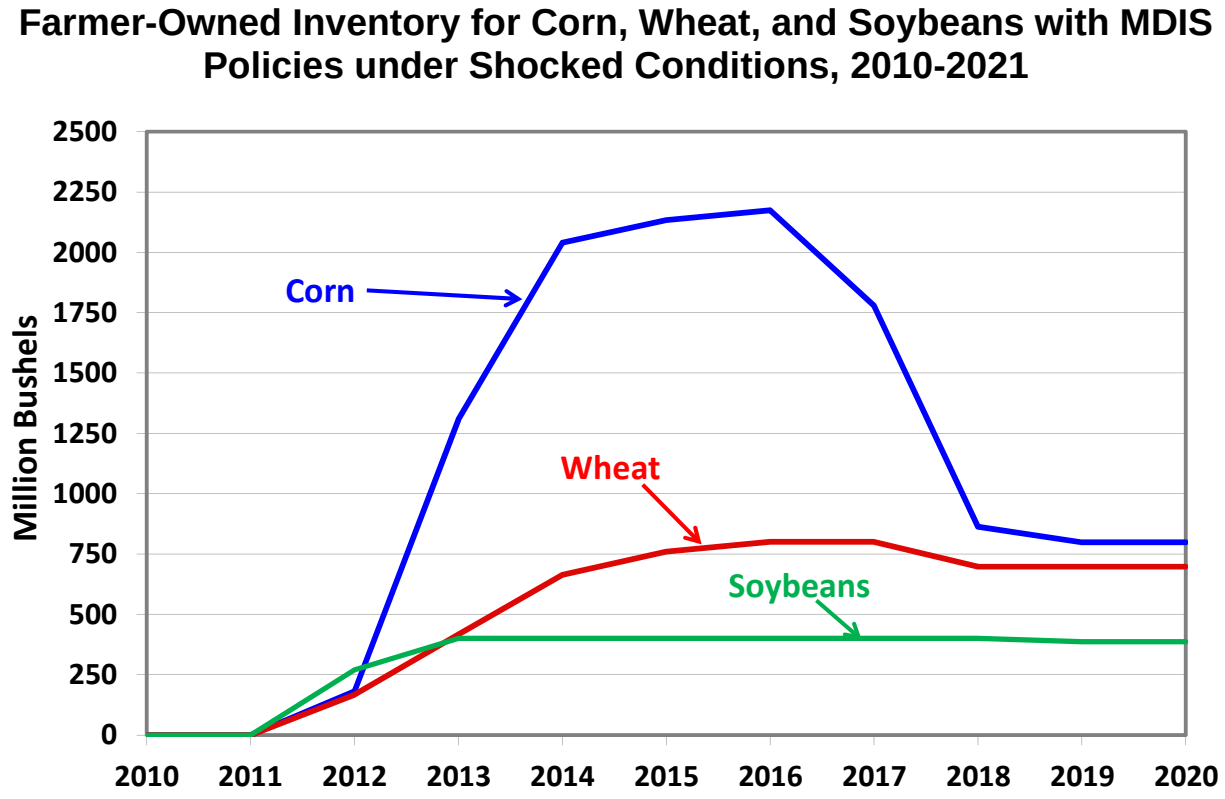

Figure 39. Farmer-Owned Inventory, corn, wheat, and soybeans: MDIS, 2010-2021. Under the modeled shocks, the corn inventory would not reach its maximum limit. In addition, the high prices would allow farmers to sell a total of 1.4 billion bushels of corn inventory and 103 million bushels of wheat inventory at the loan rate. Farmers who participate in the Market-Driven Inventory System for corn are able to sell corn that they put under loan at $3.50 for $5.60, a $2.10 gain.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Under MDIS policies, the value of exports for the 8 major crops is raised well above the value experienced in the shocked baseline during the low price period of 2012 to 2016 (fig. 40). Only in 2018 and 2019 is the value of the exports of the 8 major crops under MDIS below the highs set in the shocked baseline.

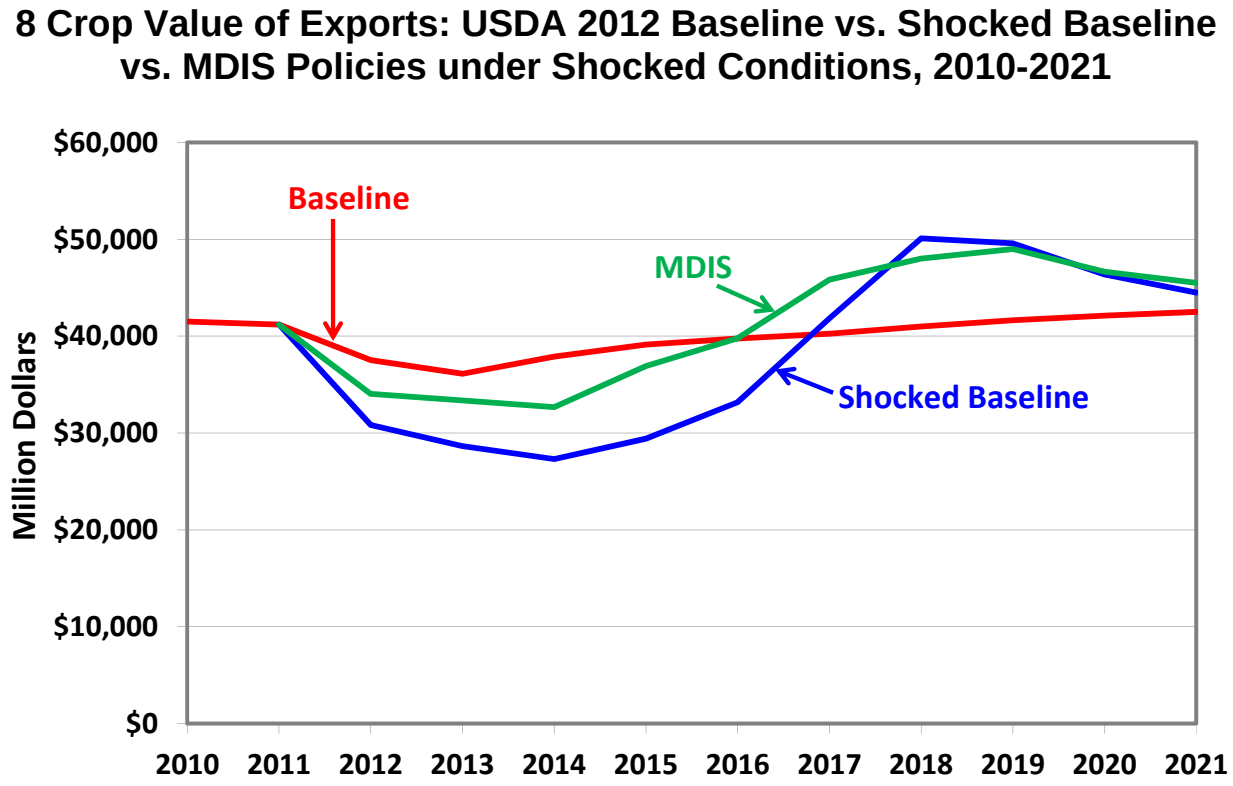

Figure 40. Value of exports for the 8 major crops, 2012 USDA baseline, shocked baseline and MDIS, 2010-2021. In the 2012-2016 period, MDIS policies increase the value of exports for the 8 major crops well above the levels seen in the shocked baseline. The higher prices like those generated in the early years under MDIS reduce the quantity of exports but that reduction is small compared to the size of the price increase, causing the value of exports to increase.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Government payments for the 8 crops under MDIS are lower than those under either the shocked baseline or the shocked baseline with the new loan rates and no Direct Payments (fig. 41). Over the 10 years baseline period used by the Congressional Budget Office to calculate the cost of farm programs, MDIS costs a total of $26.2 billion. That is $23 billion lower than the 2012 USDA baseline cost of government payments for the 8 crops and $46.4 billion lower than the shocked baseline with new loan rates and no Direct Payments. The holding of a farmer-owned inventory is less expensive than the current Direct Payment program and provides farmers with a superior safety net.

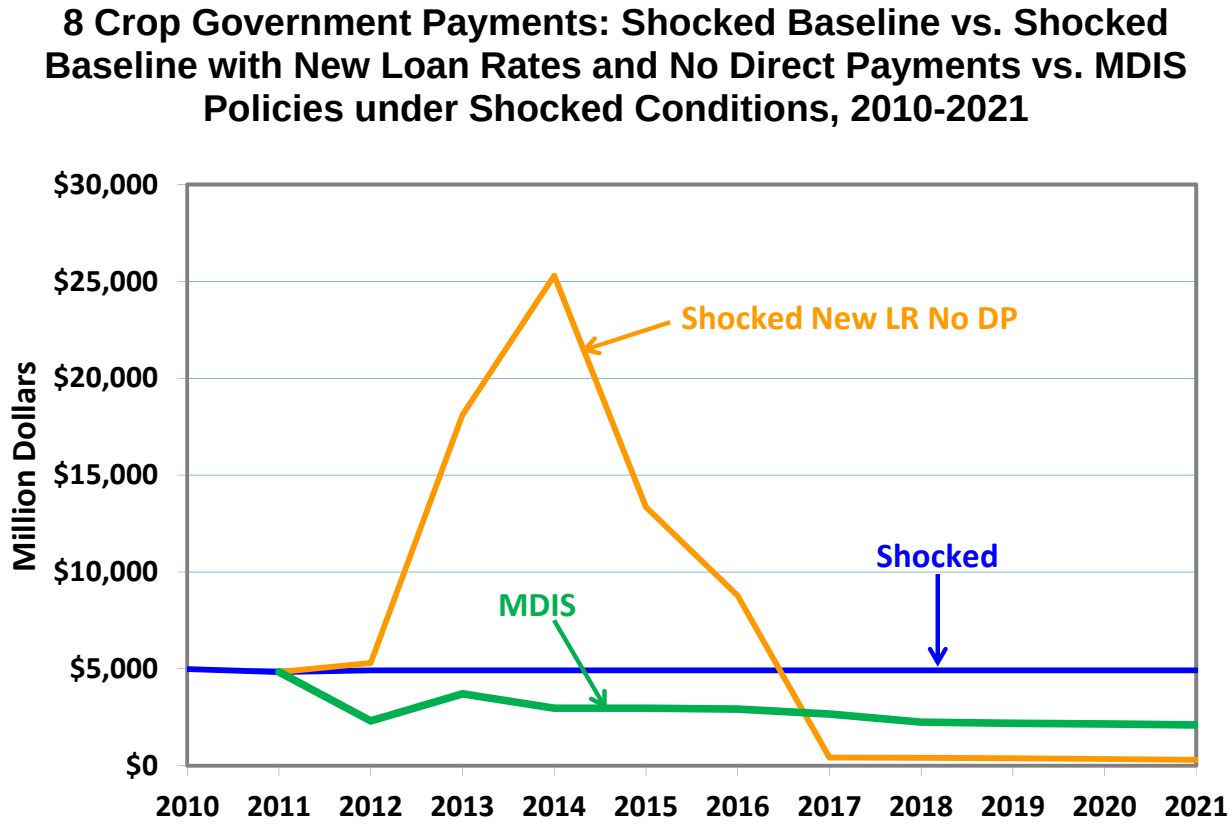

Figure 41. Government payments, 8 crops: 2012 USDA baseline, shocked baseline and MDIS, 2010-2021. MDIS costs the Federal government less than either current programs or a program that simply increases loan rates while providing farmers with a superior safety net. In addition because MDIS stabilizes prices, it reduces the systemic risk portion of crop insurance (long periods of low prices and sudden price spikes) thus having the potential to reduce the cost of crop insurance as well. MDIS also reduces the risk of grain users like cattle feeders by putting an upward bound on the cost of feed, allowing them to quantify their risk before purchasing cattle.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

By raising crop prices during an extended period of low prices, MDIS policies increase the value of production plus government payments for the 8 crops to a level significantly above the shocked baseline and closer to the unshocked 2012 USDA baseline (fig. 42). MDIS also moderates the level of income in high price periods, reducing the tendency for farmers to overinvest in crop agriculture in the U.S. and around the world an activity that typically has led to the next long period of low prices. Over the ten years, 2012-2021 MDIS policies result in a marginally higher value of production plus government payments minus cash expenses for the 8 crops ($1.32 trillion) than either the 2012 USDA baseline ($1.28 trillion) or the shocked baseline ($1.24 trillion). It achieves these results despite inducing government payments for the 8 crops that are 53 percent of the government payments that would be paid out as Direct Payments under both the 2012 USDA baseline and the shocked baseline—a savings of $23 billion.

8 Crop Value of Production Plus Government Payments Minus Cash Expenses: Shocked Baseline vs. Shocked Baseline with New Loan Rates and No Direct Payments vs. MDIS Policies under Shocked Conditions, 2010-2021

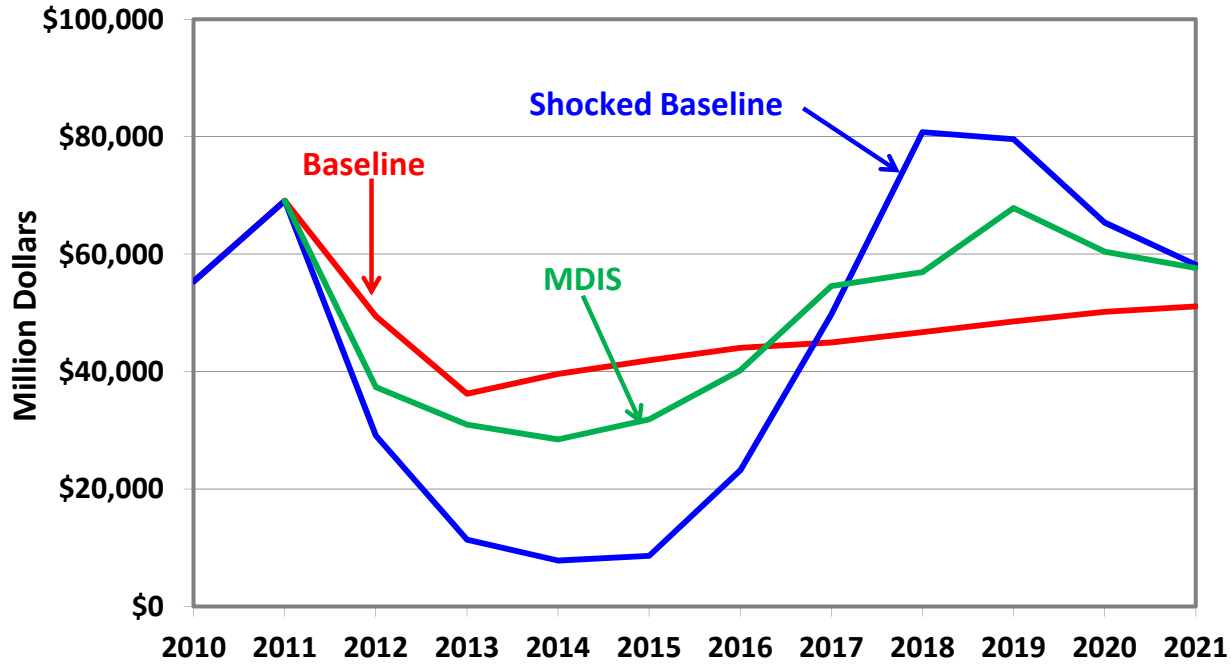

Figure 42. Value of production plus government payments minus cash expenses, 8 crops: 2012 USDA baseline, shocked baseline, and MDIS, 2010-2021. When yields are high and prices are low, MDIS provides significant protection for crop farmers by increasing the value of production plus government payments minus cash expenses. Over the ten-year period, 2012-2021, MDIS provides producers of the 8 crops slightly higher value of production plus government payments minus cash expenses than they would have received under either the 2012 USDA baseline of the shocked baseline, despite net crop income of over $80 billion in 2018.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

As with value of production plus government payments minus cash expenses for the 8 crops, MDIS substantial raises net farm income during periods of low prices. Total net farm income for the ten-year period, 2012-2021, for both the 2012 USDA baseline and MDIS are virtually identical and approximately $37 billion higher than the shocked baseline despite net farm income in the shocked baseline of over $100 billion in 2019 and 2020 (fig. 43).

Net Farm Income: 2012 USDA Baseline vs. Shocked Baseline vs. MDIS Policies under Shocked Conditions, 2010-2021

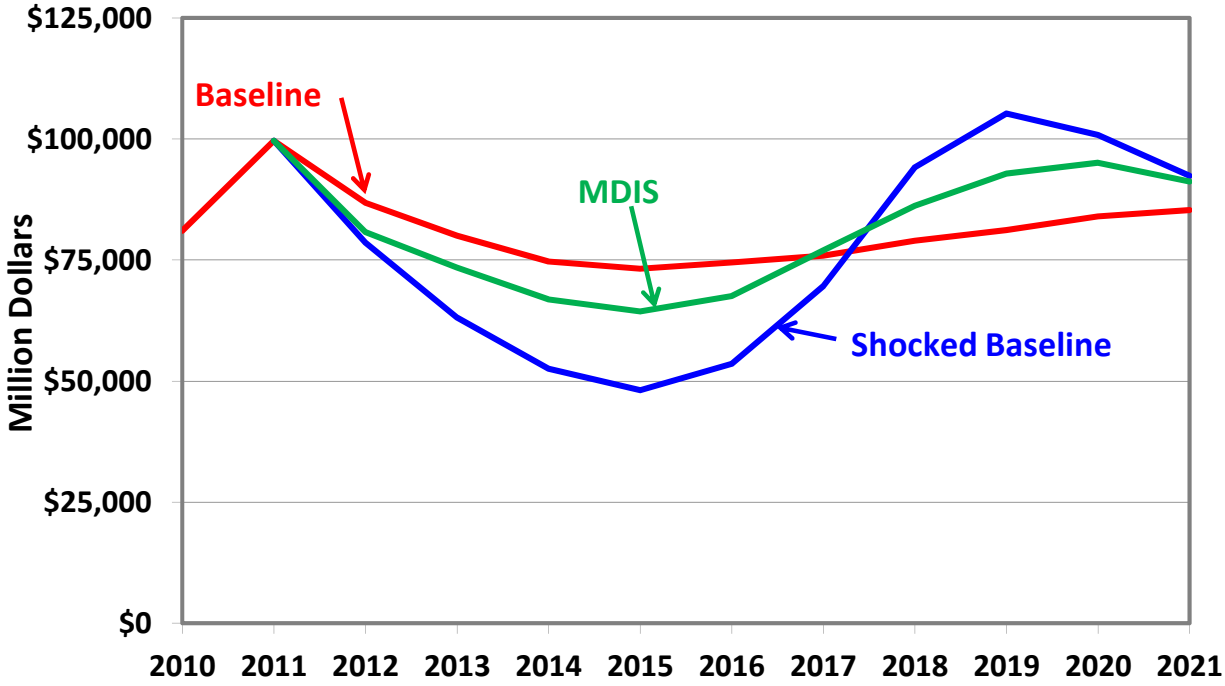

Figure 43. Net Farm Income: 2012 USDA Baseline, Shocked Baseline, and MDIS, 2010-2021. Under yield shocks like those in the model, farmers will receive higher net farm income with MDIS policies than the they would receive in the shocked baseline, during the years 2012-2017. In addition MDIS net farm income for the 10-year, 2012-2021, period is virtually identical to the net farm income received in the 2012 USDA baseline that has no shocks. The ten-year net farm income for MDIS is 5 percent higher than the net farm income in the shocked baseline despite net farm income above $100 billion in 2019 and 2020.

Source: USDA baseline and Agricultural Policy Analysis Center POLYSYS simulation.

Stakeholder Impacts

A policy with the ability to hold inventories of corn, wheat and soybeans has benefits for a large number of stakeholders, including taxpayers, consumers, crop farmers, livestock farmers and industrial users of raw agricultural commodities.

TAXPAYERS

Compared to current policies, the most obvious beneficiaries of a policy of holding an agricultural inventory would be U.S. taxpayers. In a time of tight federal budgets, any policy that can provide farmers with the same level of farm income at less than half the government cost is a policy that must be taken seriously. By setting up a system that allows the price to reflect the cost of production, these policies allocate the costs to the major users of commodities, both domestic and international, rather than expecting the U.S. federal government to subsidize their purchases. Government costs are lower in large part because the loan rate would be paid on only the portion of the crop that is held in a farmer-owned inventory and not on every bushel that is produced—in the model, this amounts to only a portion of the corn in a given year vs. making a loan deficiency payment on every bushel for every year the price is below the loan rate. In addition, the loan plus interest (if it is charged) would be paid back to the government when the grain is released from the reserve into the commercial market. In the long-term, the only potential net cost is the interest that is forgiven plus storage payments to the farmer.

CONSUMERS

In addition to the benefits they would receive under a Market-Driven Inventory System as taxpayers, U.S. consumers would benefit from more stable commodity prices that would reduce the volatility of food costs. While commodity prices under reserve policies increased in the low-price period according to the model, the farm portion of most processed food costs that U.S. consumers eat is relatively small, resulting in minimal long-term pressure on food prices. Average commodity prices in the high price period under proposed MDIS policies would not have increased as much as they did under existing policies, reducing upward pressure on food prices.

Because the U.S. would hold some inventory stocks under MDIS policies, importers of U.S. corn, wheat and soybeans would be assured of a stable supply of storable commodities in the international marketplace, reducing the need for countries to protect local supplies of grains.

CROP FARMERS

Under the proposed MDIS, crop farmers in the U.S. would have benefitted from higher crop prices in the 1998-2005 period. Farmers would have also benefited from slightly lower prices in the 2006-2010 period as the lower prices reduce the tendency to capitalize higher returns into land. While sufficient to keep current land in production, the moderated prices do not provide the kind of price signals that would lead to an overexpansion of productive capacity and lower prices over the longer term.

With a reasonable loan rate, farmers could make long-term investments in their farming operation that improve their long-term profitability. While farmers would be provided a level of price stability with an inventory program, they would not be guaranteed a profit. Farmers would still need to engage in wise agronomic and financial management to survive. Farmers also would

have benefited from price signals that more closely reflect the supply/demand situation at a given time, than when futures prices reflect herd-following speculative behavior on the part of some market participants.

Farmers who put their corn, wheat and/or soybeans into farmer-owned reserves would benefit from the receipt of storage payments. In addition, they would have the possibility of benefiting from the future sale of their stored commodity at the higher release price.

With farmers constituting as much as 60-70 percent of the poor in developing countries, higher prices in the 1998-2005 period under proposed MDIS would not adversely affect these farmers because of the large amount of food that they produce for self-consumption. In addition, they would receive a more stable income for the product they do sell into the market.

In times of high prices, many subsistence farmers and urban poor are often priced out of the market increasing the number of chronically hungry persons in the world. As a result of the price spike in 2007 and 2008, over 200 million people fell into the chronically hungry category. By moderating the price spikes, MDIS policies reduce the price pressure on the poor in developing countries. In addition inventory policies assure participants in the marketplace of an adequate supply of grain, reducing the hoarding tendency which often results in localized price spikes.

Because the U.S. would not be subsidizing commodities below the cost of production, accusations of dumping during trade negotiation sessions would be lessened.

LIVESTOCK FARMERS

The major benefit of reserves to livestock producers comes through the long-term moderation of prices. In the 2006-2010 period, higher prices put some producers over the financial edge; however, a market-driven inventory system would have reduced commodity prices to a more reasonable and survivable level. Livestock producers are vulnerable to rapidly increasing prices, which they cannot quickly pass on to the consumer. MDIS policies provide livestock producers with security in the availability of feed supplies and the range of commodity prices they might expect.

INDUSTRIAL USERS

Industrial users of agricultural commodities would benefit from a farmer-owned inventory by having access to a stable supply within a more predictable price range, allowing them to engage in long-range planning. Industrial users would be able to adapt when sharp disruptions in supply or demand threaten to reduce available supplies because the inventory stocks would be available to provide supplies of commodities and mitigate market disruptions such as those experienced in recent years. Within the loan rate and release price band, prices would respond to the supply/demand situation, sending appropriate price signals to both producers and consumers of agricultural commodities.

Summary

The program described and analyzed here is called the Market-Driven Inventory System (MDIS). Its central feature is a farmer-owned inventory system that—while it stays out of the way of market forces under normal conditions—moderates prices at the extremes. The intent of MDIS is that inventory activity would only be activated when crop prices become so low or so high that the prices clearly are not providing normally profitable agricultural firms with reasonable investment and production signals. By working with the market, MDIS would ensure that farmers receive their income from the market not from government payments.

This analysis of MDIS has two parts. The first (Phase I) is a rerun of history from 1998 to 2010 with one change: the commodity programs during that period are replaced with MDIS. The second (Phase II) uses the U.S. Department of Agriculture Ten-Year Baseline released in February 2012 as the starting point for the analysis. Since ten-year-ahead baseline projections lack real world variability, we imposed on the baseline a pattern of shocks that roughly mimic the variability experienced by crop agriculture in the 1998 to 2010 historical period. Obviously, this is only one of literally thousands of possible future paths that agriculture could experience, but it provides a concrete situation that is easy to relate to.

The POLYSYS simulation model is the analytical model used in this analysis. POLYSYS simulates changes in policy instrument levels and/or economic situations as variation away from a baseline situation. In this analysis, historical data become the baseline for Phase I and the USDA baseline was used for Phase II. The crop allocation decisions are made with linear programming models using county-level data as a proxy for farm-level decisions. The crop prices and demands as well all livestock variables are estimated at the national level. National estimates of revenues, costs and net returns are also estimated.

In the historical portion of the analysis, the actual historical supply, demand and price numbers are compared with what those numbers are estimated to have been had MDIS been in effect. With MDIS in operation, markets work uninterrupted until prices are estimated to fall below a recourse loan rate or, if MDIS inventory is available, prices exceed 160 percent of the loan rate. If the computed prices are estimated to go outside those bounds, the model computes the amount of grain to put into inventory stock or to release from inventory stock so price returns to within the price band.

For the historical analysis, the beginning corn loan rate is computed as half way between the variable cost of producing a bushel corn and the corresponding total production cost. In 1998 that number is computed to be $2.27 per bushel of corn. The 1998 loan rates for other crops are computed to be in the same proportion to corn loan rates as those legislated in the 1996 farm bill, except for grain sorghum for which the loan rate is raised to be equal that of corn and for soybeans for which the loan rate is raised to $6.32. The loan rates of all crops are adjusted for 1999 through 2010 using the prices paid by farmers chemical input index. The maximum quantities of grain allowed in the MDIS inventory are specified (3 billion bushels of corn, 800 million bushel of wheat, 400 million bushels of soybeans). Farmers with MDIS recourse loans are paid 40 cents/bushel/year to store the grain and are required to keep the grain in condition.

The rules are that the grain under MIDS must stay in inventory, that is, cannot be redeemed by paying off the loan and marketed until the price goes above the release price of 160 percent of the loan rate and notification is specifically received. With MDIS in effect, all government payment programs, except MDIS inventory storage payments, are eliminated for corn, grain sorghum, oats, barley, wheat, and soybeans. A whole-farm set-aside would be

available for use at the secretary's discretion if MDIS inventory maximums are reached and prices fell below loan rates. Rice and cotton are not included in MDIS and remained eligible for current program payments.

The results of the historical portion of the study can be summarized as follows: During 1998 to 2010 actual government payments totaled $152 billion; had MDIS been in effect the estimate is $56 billion, a savings of nearly two-thirds. With MDIS in effect, annual net farm income was, on average, higher in the early part of the period (1998-2005) and lower in the latter part of the period (2006-2010), but for the full 13 years the MDIS net farm income averaged only slightly lower ($51.1 billion vs. $52.1 billion). Crop prices were significantly higher under MDIS in the early part of the period and for the full 1998 to 2010 period prices were higher by a quarter, half dollar, and dollar per bushel for corn, wheat and soybeans respectively compared to actual prices. Had MDIS or a similar inventory-based commodity program been in effect from 1998 to 2010 the value of crop exports would have exceeded the actual value of exports during that period.

The analysis for the second portion of the study or Phase II follows the approach and most of the basic specifications used for Phase I. The loan rates for this analysis (all in $/bu.) are: $3.50 for corn, grain sorghum and barley, $2.49 for oats, $5.28 for wheat and $8.97 for soybeans. The loan rates have the same proportion to corn as the loan rates in the 2008 farm legislation. The loan rates are held constant for the full 2012 to 2020 period. The MDIS inventory maximums, storage payment rate and release percentage of loan rates are the same as in the historical analysis. The USDA baseline was the beginning point for the analysis but production shocks were used to mimic the variability that crop and livestock agricultures experienced between 1998 and 2010. The result comparisons below are between this shocked baseline assuming continuation of current commodity programs and the MDIS alternative. The MDIS simulation includes those same production shocks.

Results follow the same general pattern observed in the historical and can be summarized as follows. Government payments with a continuation of the current program and shocked production total $65 billion over the ten years from 2012 to 2021; with MDIS the estimate is $26 billion, a 60 percent reduction Net farm incomes averaged over the ten years are almost identical ($79.2 billion per year under the current program and slightly higher with MDIS at $79.6 billion). Because crop prices average higher with MDIS than under the current program, the value of exports over the ten year period is higher with MDIS by $15 billion or $1.5 billion per year on average (more in the first part of the period; less in the latter part of the period).

Conclusions and Policy Implications

The following conclusions and policy implications can be drawn from the study.

- MDIS reduces crop price extremes that otherwise cause severe economic dislocations in the crop and livestock sectors and cause exaggerated market signals that lead to inefficient resource allocations in the short-run and non-optimal investments in the longer-run.
- MDIS provides trade benefits to crop farmers by helping ensure that exportable grain quantities are available in the farmer-owned inventory system when worldwide supplies are short and thus help preserve the U.S. reputation as a dependable supplier in world markets.
- MDIS would discourage or derail "dumping" accusations by competing grain exporters. Also, the value of U.S. grain exports would be larger and agriculture's trade balance would improve because MDIS actions that raise crop prices when crop supplies are in excess compared to utilization also increase the value of grain exports.
- MDIS would help stabilize grain prices internationally to the benefit of those producers and consumers for which grains are a staple food.
- MDIS could save tens of billions of dollars paid under existing government payment programs and additional tens of billions in "emergency" payments and government subsidies to revenue insurance programs otherwise needed to offset the almost inevitable periodic severe collapses in grain prices. With MDIS, grain farmers receive their income from the market and grain demanders are not subsidized or overcharged.

Appendix

Appendix A

Unique Characteristics of Crop Agriculture

So what is it about aggregate crop agriculture that makes it unique and causes it to experience repeated financial belly flops? Understanding the nature of crop and food markets is the key to recognizing the precarious situation that, in turn, crop demanders and producers may face in the years ahead.

Farmers are price takers, not price makers. As a result, farmers continually search out new technologies to reduce per-unit costs as the means of improving net income since they cannot influence prices. Because of weather and pests, individual farmers and the agricultural sector experience an inordinate degree of supply variability compared to firms and industries of other sectors.

Yield volatility and inability to greatly influence production once a crop is planted would contribute to farmers' price and income problems even if agricultural markets adequately self-corrected from one production period to another. But this is one of the central problems of agricultural markets: adjustments in total resource-use from one production period to the next do not occur in the crop sector as quickly or completely as in other product-producing sectors.

In the case of a typical non-agricultural product sector—whether it is houses, clothes, or DVDs—low prices induce consumers to buy more while at the same time causing producers to produce less. The responses of consumers and producers work in concert to relatively quickly restore the market to equilibrium in which price equals the cost of producing an additional unit of the product.

Now consider food and agriculture. Consumers do not switch from eating three meals a day to four or five in response to a dramatic decline in food/agricultural prices. Lower food prices may make it possible for consumers to eat out more often and purchase more expensive food products, but aggregate food consumption remains relatively flat. The amount that is needed is relatively fixed and remains stable over a wide range of prices.

When considering aggregate crop production, a very similar phenomenon is evident. Crop farmers reduce their production little in response to declines in major-crop price levels, particularly if the price remains above the variable cost of production. Some farmers will continue to operate as long as the bank will let them.

Whether owner or renter, operators generally do not let land lie idle since they have no incentive to do so. Also, since the quantity they produce does not affect price, they tend not to scrimp on yield-determining inputs in the face of declining output prices. On-farm expenditures likely would be cut, but compromising seeding rates and application rates for fertilizer and pesticides generally "costs" too much in lost revenue to be a significant source of reduced expenditures.

Changes in the relative prices of farm commodities cause farmers to alter their mix of crops, but the overall level of total agricultural output remains fairly constant. Even in the long term, when a farmer goes out of business, the land generally remains in agricultural production as part of another farmer's operation.

Since neither agricultural producers nor agricultural product consumers readily respond to the signal that markets use to self-correct—price—the result, quite understandably, is that aggregate agriculture does not self-correct in a reasonable length of time. Lack of price responsiveness would not be a problem for agriculture if the combination of domestic and export

demand expanded as fast as or faster than the expansion in aggregate supply. If, on the other hand, aggregate supply expands faster than demand, prices decline and crop agriculture continues to produce at essentially full productive capacity. It has been a societal policy to make public investments to continually expand agriculture's productive capacity and ensure supply growth. Over time, growth in productive capacity has tended to exceed total growth in domestic and export demand, largely because of public policy.

In addition, the lack of price responsiveness causes wide swings in prices when weather and other uncontrollable factors—for example, competition from exports in the past or the current demand for ethanol feedstock—cause random or sudden shifts in either domestic supply or demand. These shifts have always been, and will continue to be, a feature of agriculture and historically only last a few years. We are currently experiencing a high price period where demand grows faster than supply and prices increase sharply.

In the years following WWI, the U.S. has generally dealt with the chronic price/income problems of the crop sector in one of two ways: 1) implementing policies that manage the productive capacity of the U.S. crop sector in much the same way that a CEO of an industrial firm does on a regular basis (treating the causes of the problems) or 2) adopting policies that assume that on average, crop production and prices are acceptable and what is needed are policies to protect farm income from occasional low prices (treating the symptoms of the problems). As we have seen, beginning with the work of Henry A. Wallace as U.S. Secretary of Agriculture in 1933, U.S. policy was designed around the concepts of the establishment of an ever-normal granary to deal with variability in production and demand, and supply management to gauge the use of the productive capacity of crop agriculture to the current level of demand. Through his earlier work as a farm newspaper editor and publisher, Wallace came to recognize that though it makes sense for every farmer to reduce production by a small amount in the face of oversupply and lower prices, no one farmer has an incentive to do so because individual farmers cannot affect price. This phenomenon aligns with the classic free-rider problem of economic theory; if every other farmer decreases production by a small amount, then there is an incentive for an individual farmer to increase production to take advantage of the higher prices. Only by the decision of a CEO, or, in this case, the secretary of agriculture operating under authority given by Congress and signed by the president, can agriculture remove this incentive by implementing a reduction in the use of the productive sector, often through an acreage set-aside. To protect against variability of supply (production) and demand, supply management policies in crop agriculture are combined with a commodity storage program in order to ensure a stable supply of product to the marketplace. Storage programs are generally managed using a floor price (loan rate) at which supplies are put under storage and a higher release price at which supplies are made available to commercial markets.

Over time, these programs fell into disfavor, on the one hand being blamed for establishing too high a loan rate, which reduces domestic demand and prices the U.S. out of the export market—and on the other being blamed for setting the release prices too close to the loan rate, which creates excessive stocks that overhang the market and prevents farmers from benefitting from price rallies that have been cut off by the release price. These concerns were crystallized by the Payment-in-Kind (PIK) Program of the Reagan years which, combined with weather-related disasters, resulted in a dramatic reduction in acreage in 1983 and, consequently, a sharp reduction in the need for equipment, repairs, seed, fertilizer, various farm chemicals and other services farmers use in crop production. The input suppliers who heretofore had not been the dominant player in farm bill debates became fully engaged, seeking policies that would never

again confront them with a sharp reduction in demand for their service. The result over the next dozen years was a move toward lower loan rates, more emphasis on subsidized market development and the institution of risk management tools—primarily insurance—that protected farm income while leaving the production function untouched. Because these new risk management policy tools deal with the symptom (low farm income) and not the causes (overproduction) they have ended up costing double what the supply management programs cost while guaranteeing income levels well above the cost of production in high price years and little income protection in low price years.

Appendix B

A Brief History of Reserves

In the past, prices were supported by offering farmers non-recourse loans using the farmers' storable commodities as collateral. Grain and other commodities accumulated by the government under the non-recourse loan programs served as sources of reserves or buffer stocks which could be used during years of severe production shortfalls. This provided more supply-dependability to the domestic livestock industry and major corn import customers. These functions can be illustrated by looking at the impact.

1947-1952

During World War II (WWII), the U.S. government controlled prices as part of the war effort. As the war came to an end, price controls were taken off and farmers became concerned with whether or not they would face the same low price/overproduction problems they faced at the end of World War I (WWI). The low prices that began at the end of WWI plagued farmers for most of the next twenty years.

The Commodity Credit Corporation (CCC) began to store corn in 1938. Storage peaked at 132 million bushels of corn in September 1941, two months before entering the war, providing some stability until production was ramped up to support the war effort. By September 1942, CCC corn stocks were down to 30 million bushels. They were at zero for the remainder of the war.

In the 1946-1947 crop year with wartime price controls at an end, corn prices rose to a season average price of $1.53 per bushel on a production of 3.2 billion bushels and a demand of 3.1 billion bushels. Year-ending stocks were 283 million bushels.

The CCC held no stocks going into the 1947 crop year when a wet spring and poor planting conditions drove production down by 27.7 percent (862 million bushels) to 2.4 billion bushels. This production was well below the previous year's demand.

With carry-in stocks of just 283 million bushels, 1947 season average corn prices rose to $2.16, exports fell from 127 million bushels to 7 million bushels and domestic demand fell by 472 million bushels. In a time of tight supplies, a bad weather year resulted in extraordinarily high corn prices for producers and demanders alike.

As sometimes happens, a short crop year is followed by a bin-buster and plummeting prices. 1948 saw a 56.9 percent increase in production, year-ending stocks increased to 27.9 percent, and prices fell to a season average of $1.28 with some local areas seeing prices below $1.00.

While the CCC program was in effect, legislation limited CCC's authority to build or lease storage facilities. This reduced the ability of the CCC to mitigate the negative price impact of the bumper crop of corn. Eventually 68 million bushels of the 1948 corn crop were placed in CCC storage. But it was a case of too little, too late.

Although 1949 saw the eleventh largest year-to-year percentage decline in corn production (-10.9 percent), production was still slightly ahead of demand. This small surplus added to the previous year's crop surplus resulted in an increase in total year-ending corn stocks. CCC stocks increased to 253 million bushels, while commercial stocks fell by 153 million bushels and the season average price slipped to $1.24 from the previous year's $1.28. Without the price supporting effect of CCC stocks, prices could have fallen much further.

Grain surpluses and low prices became an increasing problem. In his book, Farm Policies & Politics in the Truman Years, Allen Matusow writes, “By the beginning of 1950 [in the middle of the 1949 corn crop year], a great disquiet was permeating American agriculture. Net farm income, which totaled a record $17.3 billion in 1947, had declined to $13.7 billion in 1949 and was expected to fall to $12 billion in 1950. To support prices in 1949, the CCC had nearly exhausted its $4.7 billion borrowing capacity, forcing the administration to request an additional $2 billion for 1950. The largest corn carry-over in history threatened hard times in the Midwest, and the nearly 300 million bushels of [corn] under government loan would no doubt be augmented by new surpluses in the coming season. Faced by the prospect of overproduction in 1950, the government decreed acreage allotments for all basic commodities.”

The agricultural crisis vanished in June 1950 as the U.S. found itself in the midst of a war on the Korean Peninsula. As Matusow put it, “suddenly the surpluses of yesterday became essential material for fighting the Korean War.” As at the beginning of WWII, the CCC stocks proved beneficial in enabling the country to meet new market dynamics.

1970-1973

Following the Korean War, CCC corn stocks built up to unprecedented and politically unacceptable levels. By the late 1950s ending-year government stocks exceeded one billion bushels of corn, representing as much as 37 percent of demand. In the 1960s, acreage reduction policies were put into place to reduce the level of CCC stocks. By the end of the decade the corn stocks-to-use ratio was in the low single digits. The absolute level of CCC stocks was reduced to below 300 million bushels.

In 1970, despite an increase of 2.6 million acres, corn production fell by 535 million bushels, 11.4 percent, due to a yield decline of 13.5 bushels to a national average of 72.4 bu./ac. As a result of the production shortfall, year-ending CCC stocks fell from 255 million bushels to 30 million bushels and feed usage declined by 232 million bushels. The 1970 corn price average received by farmers increased by 15 percent to $1.33, thirty cents higher than it was in 1967.

Farmers responded to the higher corn price by increasing 1971 corn plantings from 66.9 million acres to 74.2 million acres. The additional acres and a national average record yield of 88.1 bu./ac. resulted in an increase in production of 1.5 billion bushels. Feed utilization returned to trend line levels. CCC stocks slightly increased to 47 million bushels while the year-ending commercial stocks-to-use ratio exploded from 14 percent in 1970 to 21 percent in 1971. For the first time in history commercial stocks exceeded 1 billion bushels. Not surprisingly, the corn price fell to $1.08.

In 1972, farmers once again responded to the low price, this time by shifting 7.1 million acres back out of corn and into other crops. This acreage reduction was offset by another record corn yield, 97.0 bu./ac., resulting in production that was just 66 million bushels below the prior year. Much to everyone’s surprise, the USSR responded to their own short crop by importing grain instead of reducing their livestock numbers. Corn exports jumped by 50 percent from nearly 800 million bushels to 1.3 billion bushels. In addition, feed utilization increased by 200 million bushels. As a result the season ending stocks-to-use ratio declined by half to 11 percent and the price jumped 45 percent to $1.57.

In 1973, strong export demand continued as production remained flat for the third year in a row. The production was flat despite a 5.2 million acre increase in corn acreage due to lower yields. The stocks-to-use ratio fell to 8 percent and the corn price zoomed to $2.55 per bushel, 136 percent above the price two years earlier.

It looked as if export demand was going to be able to sop up any excess U.S. corn production. As a result, under Secretary of Agriculture Earl Butz, reserves and stocks management were abandoned as policy instruments as he urged farmers to plant fencerow to fencerow. Farmers responded and by the 1977 crop year corn prices had fallen to $2.02 from a season average high of $3.02 in 1974.

While it is clear that stocks were too high in the post-Korean War years of the late 1950s, abandoning Wallace's concept of an ever-normal granary by seeking to eliminate all government stocks had its consequences as well. At the very time that an ever-normal granary could have stabilized supply, the granary was empty. Wide annual yield swings and farmer reaction to the subsequent high/low prices set up a yoyo effect in the corn market that left it temporarily unprepared to provide a sufficient supply of crops to meet the new export demand in 1972.

As a result, the immediate high prices had three effects: the drawing of additional resources—particularly land—into crop production, an increase in the price of land and a reduction in the amount of corn used by animals for feed. Between 1973 and 1974 feed demand declined by 1 billion bushels and would not recover until 1978. The presence of an effective reserve in the early 1970s could have moderated the yield-related price swings, provided supplies adequate to meet the increased export demand, avoided a disastrous soybean embargo, and slowed down the rate at which additional land resources were drawn into crop agriculture.

Late 1970s and the FOR

In the late 1970s, growing surpluses necessitated the implementation of farmer-owned reserves. In the five crop years prior to the surge in exports (1967-1971), an average of 68.3 million acres was planted in corn, while an average of 21.8 million corn acres were taken out of production. By 1975, farmers had responded to two years of good corn prices with plantings of 78.7 million acres, 10 million acres more than the 1967-1971 average. In the absence of a diversion program corn acres jumped again in 1976 to 84.6 million acres. Corn acreage remained above 80 million acres until the 1983 Payment In Kind (PIK) program.

With this additional acreage, corn production in the 1975-1979 period exceeded total utilization by 1.5 billion bushels despite an annual increase in exports of 1.3 billion bushels by the end of the period and an annual increase in domestic demand for feed of 1.4 billion bushels by the end of the period. In the middle of this period, a change in administration brought about a change in policy and the introduction of the farmer-owned reserve under the Carter administration to manage the growing surplus while supporting prices—wheat and rice in April 1977 and feed grains in September in the 1977 Farm Bill. As President Carter said as he signed the 1977 Farm Bill into law:

> It, for the first time, makes a major step toward tying target prices to actual production cost … This bill also sets up a means for maintaining adequate food reserves. Although we have been blessed recently with bountiful crops, we don't have an excessive reserve supply of crucial food and feed items on hand. This bill permits us to maintain adequate reserves, and it also encompasses a provision that's very dear to me, and that is that most of the reserves will be under the control of farmers and that there's a very careful safeguard against the dumping of agricultural products on the market, artificially, to force prices down and, therefore, to damage the economy of farm families. (1977)

By 1979, the farmer-owned reserve had accumulated 670 million bushels of corn with an additional 260 million bushels in CCC stocks. Together these stock programs kept commercial stocks at a modest 14.5 percent and the season average price of corn at $2.48 a bushel. The

farmer-owned reserve was emptied in 1980 when the corn yield fell by 16.9 percent and total production declined by 1.3 billion bushels. The availability of the farmer-owned reserve allowed the U.S. to maintain export levels while continuing to make grain available for domestic feed and other use.

PIK AND THE 1980S

Throughout the 1980s and early 1990s, the farmer-owned reserve faced increased political pressure. 1980 and 1981 crop years saw near-record and record yields with production exceeding 8 billion bushels for the first time. Despite the availability of corn at or near the loan rate ($2.40 in 1980 and $2.55 in 1981), exports dropped by 400 million bushels in 1980 and nearly another 200 million bushels in 1981. Feed demand increased by 300 million bushels in 1981, barely offsetting the decline in export demand. With record production and declining total demand, farmer-owned reserve and CCC stocks filled quickly as farmers forfeited some corn to the CCC and held onto the rest of their grain in a three-year farmer-owned reserve in hopes of above loan rate prices down the line. Faced with 3 billion bushels of corn enrolled in government programs, the Reagan administration instituted the Payment-In-Kind (PIK) program encouraging farmers to take land out of production in exchange for ownership of grain in the two government programs.

The response from farmers was dramatic as 1983 corn acreage fell by 25 percent to 60.2 million acres. What no one counted on was bad weather. The national average corn yield fell by 38.1 percent from the previous year's record 113.2 bushels per acre. As a result, production fell by 50 percent to 4.2 billion bushels and the price rose to $3.21. Combined CCC and farmer-owned reserve stocks fell from 3 billion bushels to 756 million bushels, making grain available even with dramatically reduced acreage and yields.

With the adoption of the 1985 Farm Bill, the CCC and farmer-owned reserve loan rates were reduced from $2.55 to $1.92 as they were blamed for the decline in exports. The argument was that high loan rates kept the U.S. price above the world price and gave our export markets to other export competitors. By 1990, these rates were reduced to $1.57 making storage programs ineffective. Total stocks peaked once again in the 1985-1987 crop years growing to 4.3 billion bushels (54.9% of total utilization), but significantly shrank as the result of a 29 percent fall in corn yield in 1988, reducing corn production by 2.2 billion bushels.

Following the adoption of the 1990 Farm Bill, government stocks became marginal. The 1996 Farm Bill and the wide use of the marketing loan program spelled the end of the government holding any significant amount of grain reserves. The expectation of the authors of the 1996 Farm Bill was that the commercial sector would determine and hold the necessary stock reserves.

1996-2010

With the adoption of the Federal Agricultural Improvement and Reform Act of 1996, the holding of grains either by the Commodity Credit Corporation or farmers in a farmer-owned reserve was made ineffective with the extension of the marketing loan program to all crops. Under the marketing loan program, farmers did not have to forfeit their crop to pay off their government loan when the price fell below the loan rate. Instead, when the price was below the loan rate, they could go into the local county office and pay off the loan at the posted county price and be forgiven the difference between the posted county price and the loan rate. Thus, it

was to the advantage of farmers to attempt to pay off their loans when they thought the posted county price was the lowest, because that would minimize their repayment amount. In addition they could keep the grain so that instead of removing excess grain from the market this program allowed the grain to overhang the market, keeping prices below the loan rate for over four years.

Part of the logic behind the end of the grain storage program was the belief that if there were a need for stocks, participants in the commercial sector would buy up those stocks at a low price and later sell them at a higher price with no cost to the government. As became apparent in the 2006-2007 period when non-farm investors began to join farmers in investing in ethanol plants and the USDA projected a massive increase in the use of corn for ethanol production, there were no commercial stocks to ease the transition. As a result, commodity prices skyrocketed as the USDA projected a decade of corn stocks-to-use ratio in the 5 percent range, less than half of the usual range in the teens. As the present study shows, the availability of government stocks would have made stocks available to the market while moderating the price rise. Sufficient stocks would also have been available to stabilize the market in mid-2010 when it became apparent that the 2010 crop might not meet expectations.

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