AN EMPIRICAL EVALUATION OF THE ACREAGE EFFECTS OF U.S. FARM PROGRAM PAYMENTS

Barry K. Goodwin
North Carolina State University

Ashok K. Mishra
USDA-ERS

Paper presented at

Modeling U.S. and EU Agricultural Policy: Focus on Decoupled Payments

A Workshop Sponsored by

USDA/Economic Research Service

and

Farm Foundation

October 4-5, 2004

Washington, D.C.

AN EMPIRICAL EVALUATION OF THE ACREAGE EFFECTS OF U.S. FARM PROGRAM PAYMENTS[1]

Abstract

This analysis utilises county-level data from the U.S. corn belt to evaluate the extent to which U.S. farm program benefits, particularly the Agricultural Market Transition Act (AMTA) and market loss assistance payments, bring about distortions in production. A simple county-level analysis is used to evaluate various aspects of the distortion question. Overall, the results suggest that fixed farm program payments are nearly production-neutral. There is some evidence that AMTA payments may have led to modest increases in production of soybeans, and that MLAs may have increased production of corn and soybeans. However, acreage effects are very modest.

1. Introduction

U.S. agricultural policy underwent significant changes with the 1996 Federal Agriculture Improvement and Reform (FAIR) Act. In principle at least, the FAIR Act was meant to signal a transition toward a new policy environment characterised by diminished government involvement in agricultural markets. Market price supports and deficiency payment programs were replaced by a program with fixed payments (called "production flexibility contract" or "Agricultural Market Transition Act" (AMTA) payments) and a loan deficiency payment program intended to establish minimum support prices for program crops, including soybeans. AMTA payments were based upon historical program benefits which, in turn, were determined by a farmer's historical production (base yields and acreages) of program crops (*i.e.* corn, wheat, cotton, grain sorghum, etc.). AMTA payments were intended to decline each year until the FAIR Act expired in 2002. The legislation prescribed about $36 billion of AMTA payments to be made to farmers over a seven year period. This corresponded to approximately $5 billion in payments each year to those farmers with base acreage which had been established through production of program crops in earlier years.

The FAIR Act brought about fundamental changes in U.S. policy in that some program benefits no longer were tied to specific acreages or production requirements. Program benefits, at least those delivered in the form of AMTA and market loss assistance payments, were no longer tied to the production of specific crops or even to active production at all. AMTA payments are instead based upon historical production (*i.e*. base acreage in program crops) over the period preceding the FAIR legislation. In this vein, AMTA payments are considered to be unrelated to production decisions and thus are not expected to distort production and marketing decisions.

Of course, the extent to which the FAIR Act actually constituted a change in U.S. farm policy is a topic of substantial debate, especially in light of the Farm Security and Rural Investment Act of 2002 which was signed into law on May 13, 2002. The 2002 Act provided generous increases in support and extended the fixed AMTA-type payments for another six years. Not only were the payments extended under the 2002 Act,

---

1. The authors of this paper are Barry K. Goodwin, Professor at North Carolina State University, and Ashok K. Mishra, USDA-ERS.

This research was supported by the OSU-OARDC, the Andersons' Endowment, and the OECD. We benefited significantly from extensive discussions with Carl Zulauf and helpful comments from Matt Holt, Jeffrey Hopkins, Teresa Serra, Ed Young, and Paul Westcott. Views, opinions, and conclusions are the authors' alone and do not reflect those of the USDA or other organisations.

Direct correspondence to Goodwin at Box 8109, North Carolina State University, Raleigh, NC 27695, (919) 515-4620, E-mail: barry_goodwin@ncsu.edu.

producers were also given the opportunity to update their base acreages and yields which determine some farm program payments and, perhaps more important, to include historical acreage for soybeans and other oilseeds in their base. This may have increased payments for many growers, especially in the Corn Belt. Provisions for updating this historical base, especially if such provisions are anticipated by growers, may bring into question the extent to which the payments are actually production-neutral. Anticipation of future opportunities for updating base acreage may influence current production decisions.

Although it has long been recognised that domestic farm programs that distort production or price have the potential to affect international markets and thus foreign competitors, the distortionary effects of domestic farm programs became an important issue in the Uruguay Round of the General Agreement on Tariffs and Trade / World Trade Organization (GATT/WTO) negotiations in the 1980s and 1990s. Along with the conventional focus on export subsidies and market access, domestic farm programs were targeted for reductions in support and other reforms. A philosophy underlying the Uruguay Round Agreement on Agriculture (URAA) involved a classification scheme whereby domestic policies were characterised by the extent to which they were considered to be "trade-distorting." Policies that were considered to be minimally trade distorting, such as conservation programs, domestic food aid, and research and extension expenditures were termed to be "Green Box" policies and not subject to limits on overall expenditures. An important fact is that, because they are presumed to be decoupled from production, AMTA payments are considered to be a green box policy and thus are not subject to the negotiated reductions in support. Those policies that were judged to have more serious implications for market distortions were grouped into an "Amber Box." The URAA included mandated reductions in amber box policies of 20% relative to a 1986-88 base period for developed countries. Finally, "Blue Box" policies included those amber box policies that involved supply management provisions and were based on fixed areas and yields.

A point of contention underlying this classification system involves the lack of a precise definition of "minimally trade-distorting." Even with such a definition, policies that are viewed as decoupled may have small effects on production and thus international markets. For example, *ad hoc* disaster relief payments (not to be confused with market loss assistance payments), which have been a feature of U.S. agricultural policy for the past twenty years and have been viewed as production neutral, may, nonetheless, have some small market effects that reflect the altering of production decisions based on the expectation that widespread crop losses could trigger disaster payments.[2]

An assumption in this argument is that agents are forward-looking and are cognizant of the potential for such payments to be forthcoming should market conditions dictate. A similar argument could be made for the market loss assistance (MLA) payments made in 1998-2001.[3] For example, some have argued that after large payments were made in 1999, producers may have conditioned 2000 production decisions on the expectation that such payments would again be made if market prices were low.

In the case of fixed income support payments, such as those provided under the AMTA provisions of the FAIR Act, it is less clear that agents will alter their production decisions as a result of the payments. In the case of risk-neutral producers with perfect capital markets, fixed payments should not have an effect on production. However, recent research by Hennessy (1998) pointed out that agents with declining absolute risk aversion

---

[2] A related issue is a piece of anecdotal evidence found in the crop insurance demand literature. It is widely accepted by researchers and policymakers alike that ad hoc disaster payments have served as a disincentive for producers to purchase crop insurance, in spite of the fact that these payments are of an *ad hoc* nature and thus are not guaranteed by policy. See, for example, the results of Goodwin and Kastens (1993), who found that expectations regarding the provision of *ad hoc* disaster relief diminished incentives for agents to purchase crop insurance. In recognition of this phenomenon, eligibility for disaster assistance has frequently required crop insurance enrollment is subsequent years.

[3] It should be noted that U.S. notifications to the WTO have classified MLA payments as amber box (trade distorting) measures.

(DARA) preferences will be willing to assume more risk as wealth increases (*i.e.* because of fixed farm payments), since such an increase lowers their aversion to risk. Their willingness to accept more risk may result in expanded production or may otherwise alter their production techniques. These "second-order" effects might be expected to be small, though their existence and magnitude is essentially an issue to be sorted out through an examination of the empirical evidence.[4] Of course, although production patterns and program payments may be relatively straightforward to measure, modelling producers' risk preferences is notoriously difficult. Conclusions regarding payment-induced distortions through the effects of fixed payments on risk preferences are dependent upon a particular form of risk aversion which may not adequately describe producers' responses to risk.

Provisions of the 2002 Farm Act also lead one to question the extent to which the fixed AMTA payments actually were production-neutral. As noted above, producers were given the option to update their base and program yields-parameters that determine the actual fixed, decoupled payments that will be received. The choice is optional — producers can keep their current base and program yield— but are alternatively able to update these parameters to reflect production patterns in recent years. It is impossible to empirically gauge the extent to which producers might have anticipated this opportunity. It certainly is possible, however, that expectations regarding the opportunity to update program parameters on the basis of production during the latter years of the FAIR Act may have had an important effect on acreage and production decisions. Further, it is even more likely that the updating provisions may influence future production decisions now that the precedent for updating has been established. In this light, the new direct payments may be tied to production decisions in spite of their fixed nature.

It has been noted that behaviour that is often interpreted to be a response to risk by risk-averse agents may actually reflect liquidity and borrowing constraints. Stylised models of expected utility maximisation by risk-averse agents often neglect to consider the liquidity and borrowing constraints that may be faced by agents with imperfect or incomplete capital markets. Thus, in addition to the effects of policy-induced changes in wealth on DARA agents and the anticipation of future policy changes, it is conceivable that changes in current or guaranteed future wealth (as in the case of AMTA payments) would affect the behavior of capital constrained agents. In light of the difficulties associated with identifying parameters of agents' risk preferences, this is essentially an empirical question.[5]

Under what conditions does one expect a fixed payment to be production-neutral? In our view, a truly production-neutral payment will be one for which the level of payment is fixed and guaranteed and thus is not influenced by ex-post realisations of market conditions (*e.g.* low prices or area yields). Of course, as we note in greater detail below, the implementation of a particular policy may not entirely describe how it affects the decisions of market participants. In Hennessy's (1998) analysis, decoupled payments include those that may be triggered by *ex post* market or production conditions, although the actual payment level is not conditioned on an individual's specific level of production. Thus, policies such as the emergency market loss payments and other disaster relief measures are considered to be decoupled. Distinctions are often made between the

4. Indeed, Hennessey's simulation results suggested the wealth effects were likely to be modest. Sceptics argue that existing research has been unable to reach a strong consensus regarding the nature of farmers' risk preferences. Anecdotal evidence would lead one to believe that farmers are not strongly averse to moderate increases in the risk that they face, given the array of risk management tools and techniques available to them. Consider, for example, the widespread failure of actuarially-fair crop insurance.

5. Indeed, it may be a question that cannot be directly answered using the available data. Behaviour reflecting risk preferences may be observationally equivalent to that representing response to imperfect capital markets. Rarely is one able to make direct inferences about agents' risk preferences.

"wealth" and "risk" or "insurance" effects of policies.[6] These are essentially distinctions made on the basis of which moment of the price or revenue distribution is affected - the first (wealth effects) or the second (risk effects). Most payments affect both and payments clearly may have different effects in this regard. We would also argue, however, that the distinction becomes less clear when one is interested in empirically assessing how payments affect production. As we note below, an empirical model generally relates observed policy outcomes and program parameters to observed behaviour. Though it may be straightforward to relate payment receipts to production responses, it may be difficult to decompose the production response into risk and wealth components.

In light of the recent deliberations over the 2002 Farm Act and the WTO negotiations, the extent to which domestic support programs are trade-and market-distorting is an especially important issue. The issues are controversial and the debate is contentious. De Gorter (2000) argued that some green box policies, such as production flexibility contract payments should be placed in a "flashing amber box" because of their trade distortions. Chau and De Gorter (2000) argue that AMTA payments allow producers to cover fixed costs and thus may result in marginal farmers that would otherwise be forced to shut down being able to remain in production. Alternatively, marginal farmers could leave production and be replaced by more productive farmers who acquire their land. In a more general way, this is essentially an expression of the incomplete capital markets argument presented above.

The objective of this analysis is to evaluate the effects of fixed farm program benefit payments on the production decisions of U.S. producers. To this end, county aggregates are used to evaluate the extent to which AMTA payments may appear to have been linked to production decisions in the period that followed the implementation of the 1996 FAIR Act.

The plan of the paper is as follows. The next section discusses conceptual issues that underlie the empirical model. The third section discusses an empirical framework and econometric procedures for evaluating the effects of fixed farm payments. The fourth section presents an aggregate analysis of data at the county level. The final section of the paper offers a brief summary and contains some concluding remarks.

2. Conceptual issues

The appropriate conceptual framework for evaluating the effects of farm policies on producers' actions must consider a number of factors. Central to the issue of how producers will react to policy options is the fact that agricultural production involves a degree of risk. Yields are uncertain, as are prices, and the two random factors are highly correlated. Likewise, farms generally have multiple outputs and inputs and face non-independent risks from each source. Although this observation really involves stating the obvious, theoretical models typically abstract from the richer dimensions that characterise risk and thus may oversimplify in an effort to provide tractable descriptions of policy responses. In light of the central role of risk and uncertainty, producers' risk preferences play a key role in evaluations of policy effects. Indeed, risk management and the provision of "safety nets" has been a major factor in recent farm policy debates.

A large literature has evaluated the implications of risk-averse behaviour for agricultural production and supply analysis. Considerable evidence supports the view that agents are risk averse [see, for example, Hansen and Singleton (1983), Wolf and Pohlman (1983), and Chavas and Pope (1985)]. As we noted above, however, the actual effects of a policy change, such as the provision of AMTA payments under the 1996 FAIR Act, must be considered within the overall risk management and wealth situation of individual producers. For example, the empirical literature has generally concluded that agents do not have a strong demand for

6. Hennessy makes a distinction between wealth and risk effects of payments. We argue here that a truly decoupled payment really only involves wealth effects. Cahill (1997) presents definitions of varying rates of decoupling and considers the extent to which E.U. policies are decoupled.

actuarially-fair crop insurance.[7] However, theory predicts that risk-averse agents will fully insure if rates are actuarially fair. Pope and Just (1991) evaluated a class of risk preferences where risk aversion may be affected by wealth. Their empirical results confirmed that wealth was an important factor influencing acreage decisions of Idaho potato producers.

Hennessy's (1998) conceptual model and simulation results demonstrated that agents with declining absolute risk aversion (DARA) preferences may respond to fixed payments in a manner that distorts markets. Again, fixed payments that have important wealth effects may distort production by making producers less averse to risk. His simulation results indicated that this wealth effect is likely to be quite small when compared to the risk/insurance effects of programs that are tied to market variables, such as prices and yields. A key question underlying arguments regarding the risk preference effects of fixed payments involves the extent to which payments actually shift the wealth of farmers. What may appear to be "large" payments may not be so substantial when compared against a farmer's overall wealth, which tends to be quite large for the average U.S. farmer.

Our interest in this analysis lies in an empirical evaluation of county-level data and thus we make no pretence as to the development of a detailed theoretical model capable of incorporating all aspects of policy and production choice under risk. However, it is useful to consider the fundamental framework in which agents make production decisions. Agents are forward looking, and thus maximise a long-run stream of the expected utility of wealth. To the extent that production decisions from season to season are unrelated, this is equivalent to assuming that agents maximise the expected utility of wealth in each period. However, such an assumption is indeed strong and the fact that agents may choose to remain in production even when current expected revenues do not cover fixed costs -- if future expected profits are sufficiently high -- may imply that the problem involves expectations over multiple periods. Indeed, the importance of crop rotation and fallow requirements for many crops as well as the adjustment costs associated with changing crops and production levels suggests that the problem of modelling supply must consider the effects of actions over several periods.

Agents will act to maximise the expected utility of wealth, including changes brought about by discounted future expected profits. In each period, wealth is given by initial wealth, plus profits derived from production, direct government payments, and non-farm activities. The agent's problem can thus be characterised as maximising the expected value of:

$$V_t = \sum_{t=0}^{T} U\left\{\delta^t\left(\sum_i P_{it} Q_{it}\left(A_{it}, X_{it}, A_{it-1}, \varepsilon_t\right) - w'X - C\left(A_{it-1}\right) + G_t + PS\left(P_{it}\right) + W_{t-1}\right)\right\} \qquad (1)$$

where W_t is wealth, P_{it} is the price received for output i, Q(.) is output of product i, which is assumed to be a function of lagged acreage (A_{it-1}, representing rotational issues), acreage, and an exogenous shock, given by ε_t, X_t represents a vector of variable inputs, purchased at price w_t, and C(.) represents fixed costs, which also are influenced by lagged acreage. Government policies affect the producer's problem in several ways. First, prices received P_{it} may reflect support mechanisms such as loan deficiency payments. Second, payments based upon market conditions, such as market loss assistance payments (also known as "double-AMTA" payments) may be received at harvest, and thus expectations regarding such payments will play a key role in production decisions. Such payments are represented by $PS(P_{it})$, which represents the fact that such payments may be conditioned on market prices. Finally, fixed payments G_t will be important for their effects on wealth.

7. See Goodwin and Smith (1996) for a summary of this literature. Just, Calvin, and Quiggin (1999) found that the wealth (direct income) effects of crop insurance programs were much more important to explaining insurance demand than the risk-reducing effects.

A number of restrictions are relevant to the producer's problem, including capacity constraints and those constraints describing the availability and cost of borrowed capital. If capital markets are perfect, wealth can be adjusted to accommodate situations where revenues are not sufficient to cover costs. However, borrowers are likely to face credit constraints, determined by their credit-worthiness. In such cases, fixed payments may indeed be relevant to production. Agents select acreage and other inputs to maximise the expected value of the utility function. This yields reduced form acreage equations of the form:

$$A_t = f(A_{t-1}, P_t, w_t, G_t, PS_t, W_{t-1}). \tag{2}$$

Output prices and payments based upon market conditions at harvest (PS_t) are unknown at the time planting decisions are made and thus actions will reflect agents' expectation of the harvest-time values of these variables. Thus, an estimable, reduced-form acreage response equation will assume the form:

$$A_t = f(A_{t-1}, P_t^*, w_t, G_t, PS_t^*, W_{t-1}), \tag{3}$$

where asterisks correspond to expected harvest-time values, conditional on information available to agents at planting.

In cases where an agent's risk preferences are influenced by their level of wealth (such as Constant Relative Risk Aversion (CRRA) or Decreasing Absolute Risk Aversion (DARA)), their production decisions may be influenced by their level of wealth. In this way, fixed payments G_t as well as initial levels of wealth will be important. Of course, as we have noted and discuss in greater detail below, for the typical commercial farm in the U.S., the support provided by AMTA and other fixed programs is likely to be small relative to a farm's overall wealth level, although the stream of such payments over time may significantly influence the long-term financial situation for a farm.

3. Empirical framework and results

The analysis is conducted using county-level aggregate data on crop acreage in the Corn Belt. Data are collected from a variety of USDA sources, including the National Agricultural Statistics Service (NASS) and the Farm Service Agency (FSA). Unpublished data on county loan rates were obtained from the Farm Service Agency (FSA) of the USDA. Chicago Board of Trade (CBOT) futures market prices for corn, soybeans, and wheat were taken from the Bridge database. An expected price for each county was taken by calculating a state average basis for each state using season average prices collected from USDA-NASS and then adjusting the planting time price for the harvest time contract for the annual, state average basis charge. This yielded a state average expected harvest-time market price.[8] The greater of the expected cash price or the county loan rate was taken to represent the expected commodity price. Unpublished county level data describing farm program payment receipts in each farm program category were obtained from the USDA. These data were used to measure county-level aggregates of farm program receipts in the form of AMTA payments and market loss assistance (MLA) payments. These were placed on a per-farm and per-acre basis using county level data on the number of farms and number of farm acres in each county, taken from the 1997 Agricultural Census. Note that the market loss assistance payments included payments paid to oilseed producers under the "Oilseeds Program."

In light of the considerable heterogeneity of crop types, production practices, and policy types across different regions, it is important that a relatively homogeneous group of farms be evaluated. Thus, our analysis is focused on the Corn Belt region of the U.S. which we define using the USDA-ERS farm resource region

8. We utilised the average daily close prices in February for December corn and November soybean futures and the average daily price in September for the July wheat futures on the CBOT.

designation of the "Heartland." This region is comprised of a homogeneous grouping of counties in Illinois, Indiana, Iowa, Kentucky, Minnesota, Missouri, Nebraska, Ohio and South Dakota. Our focus is on acreage of corn, soybeans, and wheat -- overwhelmingly the primary crops in this region. All financial values are converted to real terms by dividing by the producer price index.

In cases where adjustment is costly or occurs with a lag, one will condition current decisions on the outcomes of prior planting decisions (*i.e*. in the preceding year or perhaps under the previous policy regime). Table 1 presents parameter estimates and summary statistics for county-level acreage equations for corn, soybeans, and wheat, estimated over the 1998-2001 period. Lagged acreage of each respective crop exerts a strong influence on acreage, representing the conventional partial adjustment process that is often found to be relevant to planted acreage. The aggregate results suggest positive supply elasticities for soybeans and wheat. The corn acreage response to price is not significantly different from zero.

Probably of greatest interest is the finding that AMTA payments appear to have a statistically significant, positive relationship with soybean acreage at the county level, though the effect is very small. The results imply that an additional dollar per acre of AMTA payments will add 168 acres of soybeans per county. No statistically significant effect is revealed for corn or wheat. Such a small marginal effect implies very modest elasticities. In particular, the AMTA acreage elasticities for corn and wheat are essentially zero. In the case of soybeans, the AMTA elasticity is 0.018, suggesting that the fixed payments have only a very small effect on acreage.[9]

In the case of MLA payments, a significant relationship with acreage is implied only for corn and soybeans, where an additional dollar per acre of MLA payments appears to raise county acreages by 225 and 138 acres, respectively. Again, this corresponds to a very small elasticity estimate of less than 0.01 in each case, which although statistically significant, is very close to zero. Thus, at the county level, the results do not imply large effects from AMTA payments or the market loss assistance payments. It should be acknowledged that our county-level models rely on aggregated data for which much of the variation in explanatory factors has been removed. Indeed, the fixed-effects parameters may account for much of the variation, especially in policy, that affected production in the post-FAIR years.

Results for the other factors hypothesized to be relevant to acreage shifts are in agreement with expectations. A large effect is implied for input prices. Higher fertilizer prices appear to have large effects on acreage, with shifts being implied from corn and wheat to soybeans. Finally, we wanted to determine the extent to which farm financial risk might have had important acreage effects. We considered a measure of risk at the county level-- the ten-year coefficient of variation on net farm income for the county, calculated from the U.S. Department of Commerce's Regional Economic Information System database. This measure was not statistically significant in any of the equations. Whether this reflects weaknesses in our measure of risk or rather implies that acreage decisions are not especially sensitive to income risk is unclear.

We repeated the county-level acreage response analysis using the level of acreage produced in each county in 1995 (immediately before the FAIR Act was implemented) rather than lagged acreage. Our goal was to condition on acreage prior to the implementation of the FAIR Act and the beginning of AMTA payments. The results were very similar to those included in Table 1 and thus are not presented here.[10]

---

9 Given the presence of a lagged dependent variable in the regression equation, long-run elasticities may be higher than indicated here. However, calculation of longer-run effects requires an assumption about agents' beliefs, i.e., concerning the expected duration of fixed payments.

10. These results are available from the author on request.

5. Concluding comments

The objective of our analysis was to utilise county-level data to consider the extent to which U.S. farm program benefits, particularly the AMTA and market loss assistance payments, may bring about distortions in production. Previous research has pointed out that wealth effects operating through risk preferences or the effects of payments on capital-constrained borrowers may result in distortions, in spite of the fact that the benefits of these programs are not directly tied to production of a particular crop. The issue is important in light of the recent U.S. Farm Act, which continued fixed "direct" payments, as well as the ongoing WTO negotiations and the debate over the distortionary effects of such fixed payments on markets. To address this question, we develop an empirical model to evaluate various aspects of the distortion question.

Our analysis is admittedly somewhat broad in its focus and as such produces results that are sometimes ambiguous. However, we do believe some important findings emerge from our analysis. First, there is modest evidence that AMTA payments may lead to increased production of soybeans, and that MLAs may have increased production of corn and soybeans. However, the acreage effects are very modest and the overall implications seem to suggest relatively modest acreage effects from outlays for AMTA and MLA payments.

Acreage elasticities with respect to AMTA payments for soybeans are 0.02 and are essentially zero for corn and wheat. This suggests that even a very large increase in these fixed AMTA payments would not be expected to significantly increase acreage. A similar result is implied for market loss assistance payments which also exhibit very small acreage elasticities, less than 0.01.

Overall, our results would seem to imply that fixed farm program payments are nearly production-neutral. In particular, although these payments do have a statistically significant effect on acreage of the major crops in the U.S. Corn Belt, the effects are very modest, with elasticities on the order of 0.01. The results suggest that very large expansions in AMTA payments would have only modest effects on the acreage of soybeans in the U.S. Corn Belt. This result is not surprising given the fact that such payments, though often large, represent relatively modest changes in the overall wealth of the typical Corn Belt farm. In particular, AMTA payments over these years averaged 1.8% of the typical farm's overall net worth.

Anecdotal evidence suggests another important effect necessarily neglected by our analysis. Farmers may have anticipated the opportunity to update program parameters such as yields and base. In this light, farmers may not have wanted to move from traditional crops or to idling land because they would not want to lose the opportunity to secure an updated base. The 2002 Farm Act certainly supports such a suspicion. The 2002 Act provided a number of provisions for farmers to update their program base and yields that determines the fixed payments. In light of this fact, farmers may have been slow to adjust to market conditions or other factors outside of policy because they are anticipating that base acreages will be updated. This may complicate an analysis of the production effects of farm program payments since AMTA payments are based upon historic base acreages and farmers may have anticipated having the opportunity to update base in the near future.

This raises an interesting question. Were farmers surprised by the provisions of the 2002 Farm Act and did this legislation affect their expectations for future farm policy benefits? Allowing producers to update their base acreage and yields which form the basis for fixed payments may be interpreted as tying the program benefits more closely to production decisions. To the extent that farmers expect that current production will be an important determinant of future program benefits, their production decisions may be altered by policy, even when such policy is administered through fixed payments. This is, of course, a research question that must await future policy developments. It will be important to evaluate acreage decisions under the new farm legislation to determine whether the 2002 provision to allow updating of program yields and base had an important effect on the relationship between fixed payments and acreage decisions.

Table 1. Parameter estimates and summary statistics: county-level acreage equations

Variable	Corn		Soybeans		Wheat	
Intercept	4736.524		-8364.1		-13602.5	
	(2972.2720)		(2773.0480)	*	(1721.0730)	*
Corn Price	-888.703		-7965.44		6056.882	
	(2063.8230)		(1937.5000)	*	(1215.3980)	*
Soybean Price	2295.635		3577.178		-996.31	
	(933.6118)	*	(874.6612)	*	(548.0211)	*
Wheat Price	-3201.15		1970.71		1021.42	
	(461.1421)	*	(434.7740)	*	(273.1260)	*
County Farm Acres	0.010323		0.015806		0.001959	
	(0.0024)	*	(0.0023)	*	(0.0009)	*
Acres $_{(t-1)}$	0.952239		0.943233		0.921455	
	(0.0056)	*	(0.0057)	*	(0.0058)	*
AMTA/farm	-46.7855		167.7565		-0.17127	
	(47.1465)		(40.5604)	*	(24.4509)	
MLA/farm $_{(t-1)}$	225.5854		138.1505		13.93524	
	(45.9700)	*	(43.0587)	*	(26.0915)	
Fertilizer Price	-35752.9		-644.146		-2477.25	
	(4167.9660)	*	(3898.4240)		(2448.8470)	
Income CV	-0.3431		11.89346		-1.96502	
	(20.8113)		(19.4296)		(12.2548)	
D $_{98}$	-532.732		-596.349		275.3825	
	(430.7310)		(404.3131)		(254.4218)	
D $_{99}$	-288.966		-70.613		13.5886	
	(453.3811)		(425.1351)		(267.3603)	
D $_{00}$	-6.13793		178.68		436.9469	
	(441.3311)		(414.2154)		(260.4836)	*
System-Weighted R-square			0.9875			

Numbers in parentheses are standard errors.
An asterisk indicates statistical significance at the $\alpha = .10$ or smaller level.

References

Cahill, S. A. "Calculating the Rate of Decoupling For Crops Under CAP/Oilseeds Program," *Journal of Agricultural Economics* 48(1997):349-78.

Chau, N. H. and H. de Gorter. "Disentangling the Production and Export Consequences of Direct Farm Income Payments," paper presented at the 2000 AAEA Meetings, Tampa, Florida.

Chavas, J. P and R. D. Pope. "Price Uncertainty and Competitive Firm Behavior: Testable Hypotheses from Expected Utility," *Journal of Economics and Business* 37(1985):223-35.

Deaton, A. S. *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy* Baltimore: Johns Hopkins University Press and the World Bank, 1997.

De Gorter, H. "A Comparison of U.S. and E.U. Government Policies for the Cereals Sector: Implications for the WTO Trade Negotiations," paper prepared for Unigrains, October 25, 2000.

Goodwin, B. K. and V. H. Smith. *The Economics of Crop Insurance and Disaster Relief.* Washington, DC: The American Enterprise Institute Press, 1995.

Goodwin, B. K. and T. L. Kastens. "Adverse Selection, Disaster Relief, and the Demand for Multiple Peril Crop Insurance," Research Report to FCIC, May 17, 1993.

Hansen, L. and K. Singleton. "Stochastic Consumption, Risk Aversion, and the Temporal Behavior of Asset Returns." *Journal of Political Economy* 91(1983):249-65.

Hennessy, D. A. "The Production Effects of Agricultural Income Support Policies Under Uncertainty," *American Journal of Agricultural Economics* 80(1998):46-57.

Just, R. E., L. Calvin, and J. Quiggin. "Adverse Selection in Crop Insurance." *American Journal of Agricultural Economics*, 81(November 1999):835-49.

Pope, R. D. and R. E. Just. "On Testing the Structure of Risk Preferences in Agricultural Supply Analysis," *American Journal of Agricultural Economics* 80(1998):46-57.73(1991):743-748.

Shonkwiler, J. S. and S. T. Yen. "Two-Step Estimation of a Censored System of Equations," *American Journal of Agricultural Economics* 81(1999):972-82.

Wolf, C. and L. Pohlman. "The Recovery of Risk Preferences from Actual Choices." *Econometrica* 51(1983):843-50.