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The impact of decoupling on Iowa feed grain producers

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by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I.

INTRODUCTION

U.S. agricultural commodity price support policies have been proven a durable component of farm policy. The non-recourse loan, for example, has survived more than fifty years of farm bill debate. Price support policies have survived in part because they have adapted to changing circumstances, and in part because of the compelling equation of fair prices with a fair deal for the nation's agricultural producers. More recently, the growing influence of the nation's commodity producer groups has provided support for these policies.

Despite price support policies' incumbent status, farm bill debate remains lively and broad. In 1981, Secretary of Agriculture Block proposed the Agricultural Adjustment Act which would have eliminated commodity programs altogether. However, Congress moved in the opposite direction and set loan rates and target prices on a path by which they would increase 9 percent per year (Reinsel 1989). Preceding the 1985 farm bill, debate ranged from complete production and price controls through an international quota system (proposed by Senators Harkin and Gephardt) to direct income payments and the relinquishing of any control over crop production (proposed by Senators Boschwitz and Boren).

In addition, the free trade negotiating position of the United States in the Uruguay Round of talks under the General Agreement of Tariffs and Trade (GATT) implies that U.S. agricultural price support policies may be eliminated in the future. The U.S. call for the liberalization of

international agricultural trade is a call for the elimination of price and production distorting domestic agricultural policies (subsidies, levies, price supports, supply controls), in the hope that a liberalized trade environment will ease the burden of costly trade wars and domestic agricultural programs, and increase the volume and value of U.S. agricultural commodities traded.

Typically, greatest attention in agricultural policy analysis is directed to the aggregate production and trade outcomes of current and alternative policies, while much of the rhetoric in policy debate involves the financial well-being of the farmer and the structure of the farm sector. With regard to international trade liberalization, the United States has not yet outlined a domestic farm policy consistent with the trade liberalization policy position it promotes in the GATT negotiations. With regard to decoupling, while claims are made about its impact on farmers and farm structure, there is a lack of studies of its impact at the farm level. While much is said about these two alternatives to current policy, little attention is paid to how 'we get there from here.'

In order to support claims about the impact of decoupling and international agricultural trade liberalization at the farm level, there is a need for studies that consider individual farmer income, financial status, and production responses under different policies and associated market environments. This study provides a detailed farm-level analysis of the impact of the elimination of price support programs using a firm level policy simulation model of a corn-belt cash grain farm.

Forecasts of U.S. and world agricultural trade by the Food and

Agricultural Policy Research Institute (FAPRI) provide estimates of commodity prices under three distinct policy/trade scenarios: (1) continuation of current price support programs; (2) unilateral free trade involving the phasing out of all U.S. commodity programs; and (3) global free trade extending the elimination of price distorting agricultural programs to all the major trading countries. In the free trade market environments, the farm is simulated (1) with no government programs and (2) with a decoupled payment set equal to the deficiency payment received by the current-program farm. Thus a total of four alternative scenarios are compared current price support programs.

Farm simulation brings into sharper focus differences between current price support programs and decoupling alternatives. Variables such as cash income, receipts from sales, cropping patterns, costs of production, long and intermediate term debt levels, taxes, family consumption and ending net worth can be calculated. Farm simulation allows the testing of claims of decoupling proponents that individual farmers will be better off financially without the restrictions on production imposed by current farm programs. By introducing decoupled payments equal to the deficiency payment received by the current-program farm, the income and financial status of the farms under different policies can be compared given the same level of government expenditure. While no current decoupling policy is represented explicitly in the farm simulation, the approach of decoupled payments is representative of the decoupling proposal of Senators Boschwitz and Boren in the Family Farm Protection Act (FFPA) of 1987.

Using farm simulation, this study provides a clearer picture of the implications of one type of decoupled agricultural policy. This study will serve as an addition to current analyses of alternative agricultural policies that consider aggregate production and trade outcomes.

CHAPTER II.

CONTEXT OF THE DECOUPLING DEBATE

Now woven into a complex web of supply control and surplus disposal and conservation compliance policies, price support policies seem a permanent component of U.S. agricultural policy. For participating farmers, commodity price support programs provide a significant addition to their farm income; for legislators, price support programs provide the carrot with which they encourage compliance with conservation practices, achieve limited control over surplus production, and continue politically important income transfers to agricultural producers.

The initial emphasis and operation of U.S. agricultural commodity programs was on achieving income support and price stabilization through different calculations of price support levels based on the concept of price parity with earlier periods. Of interest in the decoupling debate, historically, agricultural policy has evolved by increasingly separating or decoupling income support from the price level. The Brannan Plan of 1949, although rejected by Congress, proposed "that prices of perishable commodities not be supported in the market, but rather that direct government payments be made to farmers in amounts sufficient to make up the difference between the price received in the market and the support level specified by the Secretary" (Benedict 1953, p. 486). A major criticism of this early proposal for decoupling price levels and income support was the lack of provision for control over production (acreage controls or marketing quotas). The high guaranteed prices that farmers would have received under the Brannan Plan would have led to extremely high levels of

income payments from the government.

In 1973, the Agriculture and Consumer Protection Act instituted deficiency payments, defined as the difference between the target price (which was set to account for trends in domestic and world prices, costs of production, and supplies) and the greater of the non-recourse loan rate or the market price. Of course, if the market price was higher than the target price, no deficiency payment was necessary. As this was the case for most of the 1970s, the target price-deficiency payment approach seemed adequate and acceptable, and government outlays were relatively low.

In the beginning of the 1980s, global recession coupled with high real interest rates meant a reversal of the market price - target price relationship. As market prices for agricultural commodities declined below target prices, costs of government support through the commodity programs increased. In addition, the high U.S. non-recourse loan rates acted as a price floor in U.S. markets and a price ceiling in international markets for a time under which competing exporters could outbid U.S. producers and capture market share.

The Food Security Act of 1985, in response to these conditions, lowered loan rates. In addition, it added the marketing loan provision for cotton and rice, which extended the deficiency payment concept to include the difference between the loan rate and the market price if the loan rate should be higher, thereby encouraging producers to sell at market prices rather than defaulting on their loans and increasing the accumulation of government stocks. Each of these measures was intended to increase U.S. competitiveness in international markets.

This abbreviated description of the evolution of agricultural commodity programs in the United States, indicates the shift toward separation of income support and the price level. However, despite the trend toward separation of income support from the price level, a related shift or decoupling of income support from production of specific crops has not occurred. Neither target price-deficiency payment programs nor land retirement programs meet this criteria (land retirement programs because they remove land from production altogether). Yet since the 1985 farm bill, this kind of decoupling has been discussed with increasing seriousness. The motivation for this type of decoupling and the energy which has sustained it since the 1985 farm bill debate, derives from two different but convergent interests: (a) international trade liberalization, and (b) domestic policy reform.

International Agricultural Trade Liberalization

The current Uruguay Round of the General Agreement on Tariffs and Trade (GATT) involves multilateral trade negotiations (MTN) aimed at discussing and establishing agreement on ways to eliminate policies which distort international agricultural trade. The United States' forceful push for agricultural trade liberalization in the MTN is a bold and radical step. GATT's regulation of agricultural trade has been limited throughout the history of the GATT whose creation in the late 1940s was influenced largely by the United States.

> The GATT rules were written to fit the agricultural programs then in existence, especially in the United States. Since then the rules have been adopted or interpreted to fit various other national agricultural policies. So instead of developing

> domestic agricultural policies to fit the rules of international trade, we have tried to develop rules to fit the policies (Hathaway 1987, p. 104).

U.S. proponents of trade liberalization suggest that it would benefit many U.S. agricultural producers who are considered to be more efficient than some of their international competitors, and that it would lower the high cost of U.S. government programs which subsidize the agricultural sector. In addition, an international trade liberalization agreement is considered a way to avoid costly trade wars.

International agricultural trade has been shaped by national policy makers responding to domestic consumer and agricultural interests.

> In both exporting and importing countries, agricultural production, marketing, and trade decisions have been increasingly separated from world supply and demand conditions, and based on domestic political pressures have become highly dependent upon government intervention. The result is a series of beggar-thy-neighbor policies, which have sharply increased the level of tensions in world agricultural trade (Institute for International Economics 1988, p. 8).

Nevertheless, motivations for current price and trade distorting agricultural policies are strong and varied: supporting farm income, promoting national food self-sufficiency, protecting a developing agricultural sector, and raising revenue through taxation of the agricultural sector. Yet trade liberalization does not exclude agricultural policies which may meet these same goals.

> It is important to keep in mind that, even in the presence of a free trade world, government policies for agriculture can still be justified (e.g., optimal storage programs and income stabilization mechanisms); those who support the GATT process are generally in favor of government programs but would like to see those programs implemented which are neither output nor trade distorting (Schmitz 1988, p. 995).

However, any success the United States has in the MTN will have

implications for current domestic agricultural policy. For example, the most recent U.S. submission to the GATT calls for the phased elimination of administered price policies, income support policies linked to production and marketing, and any input subsidy that is not provided to producers and processors of agricultural commodities on an equal basis (U.S. Submission to the GATT 1989). U.S. policy makers will have to determine what constitutes an economically optimal and/or politically feasible agricultural policy under international trade liberalization if it occurs through the GATT.

Domestic Policy Reform

Decoupling has become a well-known term with an unclear meaning. Many different policies are considered to be "decoupled." The central meaning of the term decoupling is the idea that farm programs (income supporting or otherwise) operate on a free market basis without changing producers and consumers incentives to produce or consume specific crops over others. Current U.S. farm programs, although farmers participate in them voluntarily, encourage farmers to produce the program or price supported commodities by increasing their relative returns compared with other non-supported crops.

Domestic policy reformers who advocate decoupling farm income support from farm production consider current agricultural commodity programs inherently flawed. Critics of current farm programs liken current policies to driving a car with one foot on the accelerator (target price and deficiency payments, and/or high loan rates) and the other foot on the

brake (supply control provisions). Rather than joining their colleagues in the process of tinkering with current price support and supply control legislation, some critics argue that a new basis for agricultural policy is required.

Two examples in the 1980s indicate problems that can arise as a consequence of the operation of the programs. After rapid increases in demand for feed and food grains in the 1970s, U.S. farmers found themselves increasingly reliant on export markets. When foreign demand declined in the early 1980s and farm prices declined as well, U.S. loan rates served as a price floor for commodities which foreign competitors could underbid to gain market share at the expense of the United States.

The 1985 Food Security Act lowered the loan rate in order to regain U.S. market share. However, for feed grains and wheat, loan rates were lowered faster than target prices, resulting in rapid increases in government deficiency payments in the mid-1980s. These large deficiency payments also began to account for a greater share of farm income. For example, Figure 1 presents a graphical picture of the relative importance of government program payments in Iowa total farm income in the 1980s.

Proponents of price support and supply control policy recognize that the above problems exist, but believe that solutions can be found through adjustments and additions to existing policy instruments. Proponents of decoupling argue that allowing farmers to respond to market prices and manage more diversified farming operations would prove to be a more equitable and efficient farm policy in terms of production and government expenditures.

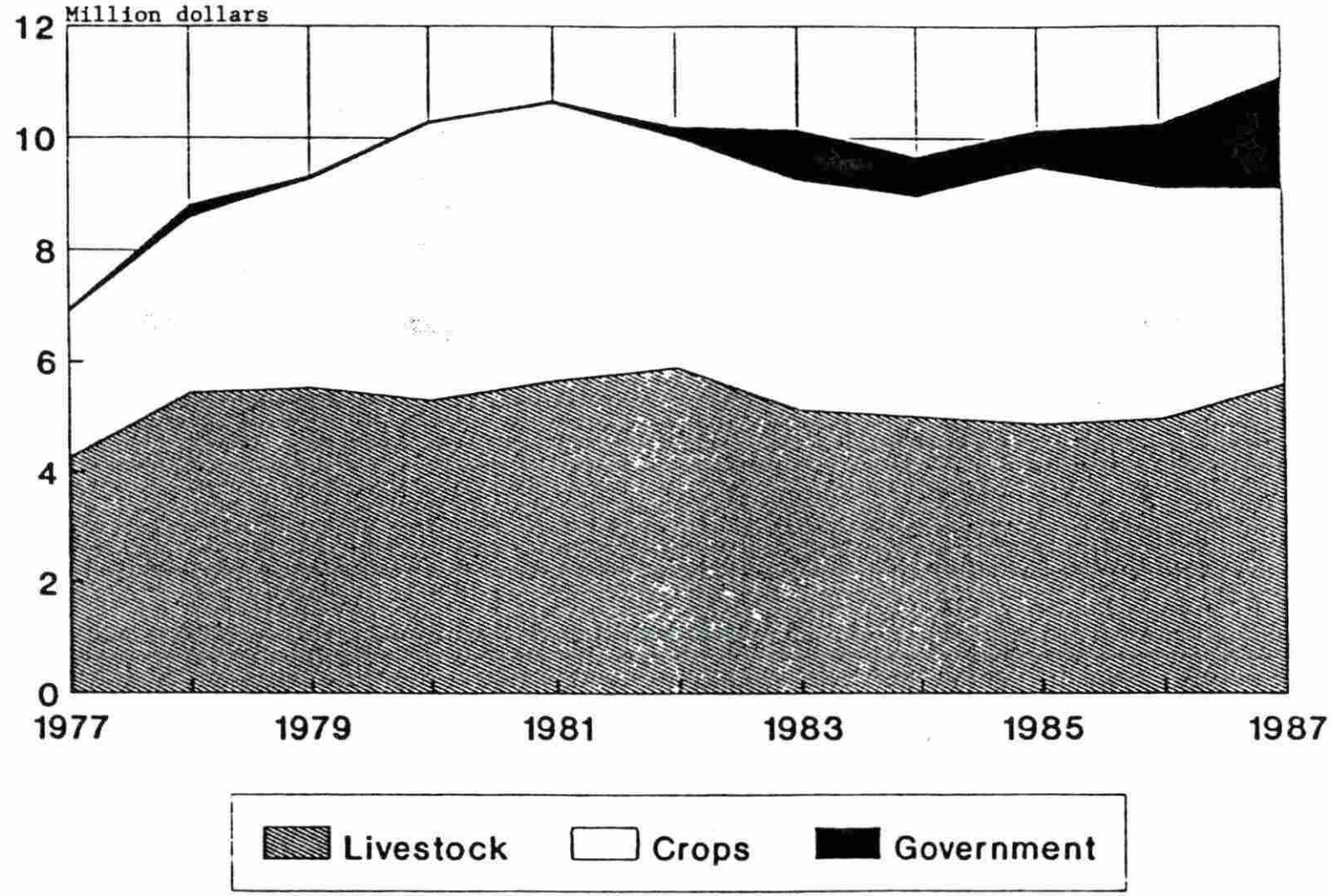

Figure 1. Iowa realized total gross farm income by source, 1977-87, from commodity sales and Government payments (Iowa Agricultural Statistics 1987)

Prospects for Decoupling

Whether decoupling will become U.S. national agricultural policy depends on developments in two distinct but interrelated debates. Some analysts advocate initiating decoupling unilaterally as a strategy for pressuring other nations in the MTN toward trade liberalization.

> . . . U.S. bargaining leverage in Geneva [location of Uruguay Round talks] will be enhanced rather than weakened by domestic reforms which put added price and budget pressure on foreign competitors. It is by not taking such reforms that the United States will disarm itself in Geneva. Those who talk about postponing such reforms in order to preserve 'bargaining chips' in GATT are playing into the hands of protectionist farm groups at home that are opposed to reform under any circumstances, and which have little or no interest in a successful GATT negotiation. . . . Fortunately for the United States, in some important product areas (such as cereals policy), both the multilateral and the unilateral reform processes can be pursued simultaneously, and can be used to reinforce one another (Paarlberg 1988, pp. 130-1).

Some advocates of domestic policy reform, support unilateral policy reform based on their conviction that current U.S. agricultural policies are unsatisfactory regardless of the international trade and policy environment.

> Even if complete trade liberalization by all nations ultimately proved to be an elusive goal, the United States still would reap substantial benefits from unilateral policy reforms. Reduction in loan rates to levels that do not distort domestic production and consumption decisions would improve the U.S. ability to compete for any expansion in trade that occurs. Elimination of supply control programs also would reduce the incentives provided to foreign competitors to expand production and at the same time would enable U.S. agriculture to operate more efficiently. U.S. producers would no longer risk losing important new market opportunities because policies have created artificial shortages that other producers must supply. The United States would be able to use its competitive advantages in agricultural production and trade much more fully, allowing it to capture a large share of the growth in recovering world markets (Agricultural Policy Working Group 1988, pp. 38-9).

However, agricultural policy and trade analyses of unilateral decoupling by the United States indicate unfavorable results for the farm sector. A Wharton Economics study of alternative agricultural policies finds that unilateral decoupling would result in lower prices and lower farm income levels than a continuation of current programs (Wharton Econometrics, Inc. 1987, pp. 4.1-4.27). Similarly, a Food and Agricultural Policy Research Institute (FAPRI) study of unilateral (U.S. only) and global free trade in agriculture finds that unilateral trade reform results in losses in the farm sector.

> Under the unilateral option, most of the costs are internalized in the United States. Commodity prices and incomes fall, and it is likely there would not be sufficient savings in government program costs to compensate those who suffer the income losses. The estimated cost savings are on the order of $5.6 billion annually, while the estimated income losses exceed $11 billion annually (Food and Agricultural Policy Research Institute 1988a, pp. 18-19).

Different implications for decoupling hold if global free trade is achieved. In this case prices would be higher, and government savings would be greater than income losses to producers, thus allowing hypothetical compensation, and making decoupling a more palatable option for both government and farmers.

FAPRI results show that in general price and trade outcomes estimated for global free trade compare favorably with projections for current price support programs.

> By contrast [with unilateral U.S. agricultural policy change], the global free trade option shifts a larger share of the cost to producers in other developed countries. The EC in particular would produce less and consume more at lower internal prices. The increased demand resulting from such adjustments leads to increased demand for exports from the U.S. and other exporting countries. World commodity market prices

> increase, except for soybeans, which substantially reduces the income losses of U.S. producers. Therefore, in the context of a global policy reform, the U.S. cost savings of approximately $6 billion annually would be more than adequate to offset the net farm income losses of approximately $3 billion annually. In this situation, it would be feasible to design decoupled payment programs to compensate producers for income losses, should that be politically desirable (Food and Agricultural Policy Research Institute 1988a, pp. 18-19).

Prospects for decoupling are highly uncertain due to the unprecedented level of exposure in policy debate and its linkage with trade liberalization in the MTN. Against decoupling are decades of dedication to price support and supply control legislation, and, as yet a lack of a clear articulation of a decoupled policy, notwithstanding the Family Farm Protection Act (FFPA) discussed in the next chapter.

The U.S. push for trade liberalization in the MTN is coming from the government not from the farmers. At the same time, the U.S. Department of Agriculture has not provided leadership in the development of a domestic policy compatible with its free trade stance. Support for decoupling comes from an assortment of grain companies, farmers, and policy makers who represent a variety of concerns and motives for changing farm policy. In contrast, the Secretary of Agriculture considers continuation of price support programs as a signal of U.S. resolve in the face of the trade policies of other countries, particularly the European Community, and any lowering of farm income support as a signal to farm trade competitors of retreat (Des Moines Register, 1989).

Alternative Decoupling Programs

Current decoupling literature includes a variety of policy

alternatives to price supports (Carr et al., 1989, Agricultural Policy Working Group 1988, Paarlberg 1988). Although decoupling is most often associated with the FFPA in the United States, decoupling has become a catch-all term of reference for any program which discontinues current price support programs in favor of a market-oriented policy. A partial list of "decoupled" approaches includes:

* Providing income assistance in the form of lump-sum transfers based on past levels of support, such as freezing payments at a level provided in the past, and possibly phasing them out over time;

* direct compensation for reductions in income or asset values that may occur following policy reform;

* transition assistance to help farmers adjust to alternative farming or employment practices;

* payments for socially-desired services, such as conservation practices;

* assistance for market-based risk-sharing arrangements, like crop or income insurance;

* investments in rural development and job creation (Agricultural Policy Working Group 1988, p. 38).

Some of the above approaches to decoupling phase-out government support during a transition to a market-oriented agricultural economy, some re-couple government support to specific farm activities, and some establish new compensatory mechanisms, such as expanded crop insurance programs or income insurance programs.

The FFPA is an example of the first approach to decoupling listed above: lump sum income payments to farmers are determined in a manner mimicking current deficiency payments. Both these payments and restrictions on cropping patterns are phased out over a five year period.

Thus, the FFPA is intended to serve as a transition to a "free market" agriculture, rather than continue to subsidize agriculture indefinitely. As proposed, the FFPA is the most comprehensive starting point for analyzing decoupling. It is considered generally as the basis for criticism of decoupling and the point of comparison with current agricultural policy in the United States. A detailed comparison of the effect of current price support and supply control policies and decoupling alternatives with respect to income, production, supply management and other variables is the topic of the next chapter.

CHAPTER III.

CRITIQUE OF CURRENT AGRICULTURAL POLICIES AND DECOUPLING

The decoupling debate in the United States involves two central questions: what are the impacts of the farm price and supply control programs on farmers production behavior? Does decoupling as generally defined mitigate, exacerbate, or neglect these problem areas? In this chapter, these questions will be considered from the perspective of economic theory, leaving aside the political considerations and forces shaping the decoupling debate. Specifically, a comparison will be made of the provisions of the 1985 Food Security Act and the proposed Family Farm Protection Act (as an example of decoupling with income support in the form of lump-sum transfer payments), and their respective implications for price and income stability, supply management, production, and farm income.

The Food Security Act of 1985 and the Family Farm Protection Act

The Food Security Act (FSA) of 1985 represents a continuation of commodity price support and supply management policies whose origins can be traced to the Agricultural Adjustment Acts of the 1930s. Basic policy instruments include: target prices and deficiency payments programs, non-recourse loans, and Acreage Reserve Program (ARP) and paid diversion programs.

These policy instruments are intended to support farm income and reduce risk by supporting and stabilizing commodity prices. The target price and deficiency payment provisions provide income support for farmers

producing program crops - feed grains, wheat, cotton, rice, tobacco. Non-recourse loans provide a measure of protection against low and/or unstable commodity prices. Acreage limitation provisions allow the Secretary of Agriculture to limit the amount of land farmers may devote to program crops in a given year thereby offsetting the incentive to produce program crops provided by target price, deficiency payment, and loan policies. Acreage limitation policies are intended to mitigate price erosion or the cost of additional government storage from surplus production of program crops.

At first glance, it seems that the FFPA has borrowed a lot from the current legislation. Non-recourse loans, marketing loans, diversion programs, and payments to farmers are familiar policy instruments. A closer, longer look reveals fundamental differences in how these policy instruments are used and how they interact with each other, implying that they will have a markedly different impact on the agricultural sector.

Tables 1 and 2 outline the major provisions for corn and soybeans, respectively, of the FSA and the FFPA. The following sections compare the commodity provisions of both the FSA and FFPA, and examine the effects, intended and otherwise, of the respective provisions.

Price and Income Stability

In contrast to its predecessor, the Agriculture and Food Act of 1981, the Food Security Act of 1985 is dedicated to lowering loan rates and, more slowly, target prices, in order to make U.S. agricultural exports more competitive and to improve farm income. Greater U.S. competitiveness in international markets is also the intent of the FFPA. The FFPA continues

the non-recourse loan, but at such a low level relative to market prices that its usefulness as a price floor in world commodity markets is limited to instances of extremely low prices compared with current levels.

In addition, both Acts intend to reduce the price floor effect of the loan rate by the use of marketing loans. The marketing loan provision allows producers to repay their non-recourse loans at the lesser of the loan rate or the world price. The purpose is to reduce defaults on loans, which takes crops off the world market when prices are below the loan rate and increase government stocks. Farmers can continue to sell their crops on the world market and pay off their loans at that rate. Marketing loans apply to rice and cotton under the Food Security Act, and to all program commodities under the Family Farm Protection Act. Again for the FFPA, the impact of this provision coupled with loan rates at low levels is to maintain price protection at a level about equal to variable costs so as to prevent bankruptcy.

Perhaps more importantly, it is questionable whether non-recourse loan programs qualify as "decoupled" since they are related to the price levels of specific crops. More suitable from the standpoint of decoupling, would be a net farm income insurance program, which would not affect the price level and risk associated with the production of any particular crop, but would provide some protection against unexpected price swings, etc.

Table 1. Comparison of policy instruments for corn

Policy	Food Security Act	Family Farm Protection Act
Non-recourse loan	Based on a moving average of the previous five years with the high and low values removed. Secretary can adjust 5 percent.	$1.30/bushel.
Loan rate adjustment	Secretary can adjust by 20 percent if average market price is not 110 percent of the loan rate in the last year.	
Loan repayment (marketing loan)	Lesser of (a) loan rate, (b) higher of 70 percent of loan rate or the prevailing world market price.	Lesser of (a) loan rate, (b) average world price.
Target price	$3.03/bushel.	Not applicable.
Deficiency or Equity payment	Target price - (greater of (a) national average market price, or (b) loan rate prior to any discretionary reduction program) * program yield * base acreage.	$1.04 per bushel * program yield * crop acreage base.

Table 1. continued

Policy	Food Security Act	Family Farm Protection Act
Acreage limitation (includes set aside and paid diversion)	12.5-17.5 percent acreage limitation applied to farm acreage base in 1986, 12.5-20 percent for 1987-90.	At the discretion of the Secretary of Agriculture to reduce total expenditure by the CCC and the Secretary. Not a prerequisite for receiving equity payments.
Farmer owned reserve (FOR)	Not to exceed 15 percent of the total estimated domestic and export use in the particular marketing year.	
Payment-in-kind (PIK)	A maximum of 5 percent of the deficiency payment.	If payment does not add to Federal outlays or lower net farm income.
Multi-year contracts	Multi-year set aside contracts only.	For two or more crop years, including all program provisions.

Table 2. Comparison of policy instruments for soybeans

Policy	Food Security Act	Family Farm Protection Act
Non-recourse loan	Equal to 75 percent of moving average of the previous five years with the high and low valus removed.	$3.50/bushel.
Loan rate adjustment	Secretary can adjust by 5 percent, but rate can not be less that $4.50.	Secretary can adjust by 5 percent based on market conditions during the two preceeding market years.
Loan repayment rate (marketing loan)	Lesser of the (a) loan rate, (b) prevailing world market price.	Lesser of (a) loan rate, (b) average world market price.
Deficiency or Equity payment	Not applicable.	$0.80/bushel * program yield * crop acreage base.
Acreage limitation	Not applicable.	At the discretion of the Secretary of Agriculture to reduce total expenditure by the CCC and the Secretary. Not a prerequisite for receiving equity payments.
Payments-in-kind	Not applicable.	If payment does not add to federal outlays or lower net farm income.

The experience of the last two decades shows increasing commodity price variability in the United States and international markets. Price variability has been the result of yield swings as well as forces and policies external to the agricultural sector of the United States. Cochrane describes price instability as inherent in world agricultural markets (Cochrane, 1979). Cochrane considers three elements contributing to this price instability: (1) inelastic world demand for total grains; (2) unpredictable world annual variability in grain production (on the order of 1 to 3 percent); (3) and the fact that the United States is one of few countries that maintains an open link with the world market thus its producers face price movements directly.

However, under current price support programs with target prices and deficiency payments, and non-recourse loans, the farmer passes the cost of price variability or downside price risk to the government. The current programs operate to insulate the participating grain farmer from international market price fluctuations: they can sell at market prices or if market prices are lower than the loan rate, default on their loans and receive the loan rate for the crop. Government payments to farmers and therefore the cost to the taxpayer can fluctuate dramatically depending upon world market conditions, and target price and loan rate levels.

The lower loan rate of the FFPA increases farmers exposure to the price variability of world markets as compared to the FSA. The FFPA, and decoupling more generally, has the opposite effect of current programs because it eliminates this buffer between farmers and world markets. Loan rates are set at low levels, close to costs of production, providing a

lower level of protection against price declines. U.S. farmers under decoupling will face the instability of world commodity markets more directly, and face greater downside price risk. However, it may be the case that farmers can compensate for this greater price risk through increased farm diversification, different marketing behavior, or crop insurance programs.

If price instability in world agricultural commodity markets seems to be increasing since the 1960s, what are the implications for price instability under decoupling? Will price instability be greater or smaller if GATT negotiations lead to international trade reform as envisioned by the United States? Johnson (1975) compares historical price stability in the 1960s with variability in the 1970s, pointing out that reduced international reserves and the increased efforts of nations - such as the Soviet Union, the European Community, and China - to stabilize domestic prices in the 1970s contributed to increased price variability. Johnson concludes that a liberalized trade environment reduces price instability by eliminating the shock applied to international trade when individual nations seek to protect or stabilize domestic markets.

Concerning price supports, McCalla and Josling (1985) show graphically that Johnson's argument holds for the single commodity case, but not, in theory, when multiple markets of linked commodities are analyzed.

> On reflection this is an intuitively reasonable result. In the absence of intervention, the shock in one market is dissipated in all three markets. If intervention reduces intermarket linkages, more of the shock must be absorbed in the primary market and less in other markets. Completely isolating markets forces all of the adjustment into the primary market. Thus it is not possible to say whether world markets of linked commodities with intervention are more or less vulnerable to exogenous shocks than in a free trade world. This result modifies the results in Chapter 2 (based on single-commodity analysis) that fixed-price intervention always destabilizes markets (McCalla and Josling 1985, p. 68).

In single-commodity analysis, price supports have the effect of making an exporting country's excess supply curve less elastic, which means that international prices become more variable given exogenous shocks - shifts in demand or shortfalls in production. However, when more than one market is analyzed the resulting comparison between intervention and free trade is less clear. Figures 2 and 3 (reproduced from McCalla and Josling 1985, Figures 3.4 and 3.5, pp. 66-7) provide a graphical presentation of McCalla and Josling's conclusion quoted above using wheat and feed grains as example commodities. In Figure 2, the price support (PP_w) creates an inelastic supply of commodity wheat in the exporting country (A), and a kink in the excess supply curve (E'_{sw}). This causes a lower world equilibrium price (P'_w). In addition, the increased production of wheat in country A, due to the price support, reduces the production of feed grains (S_{fa} to S'_{fa}), which competes in this example with wheat for production resources (land).

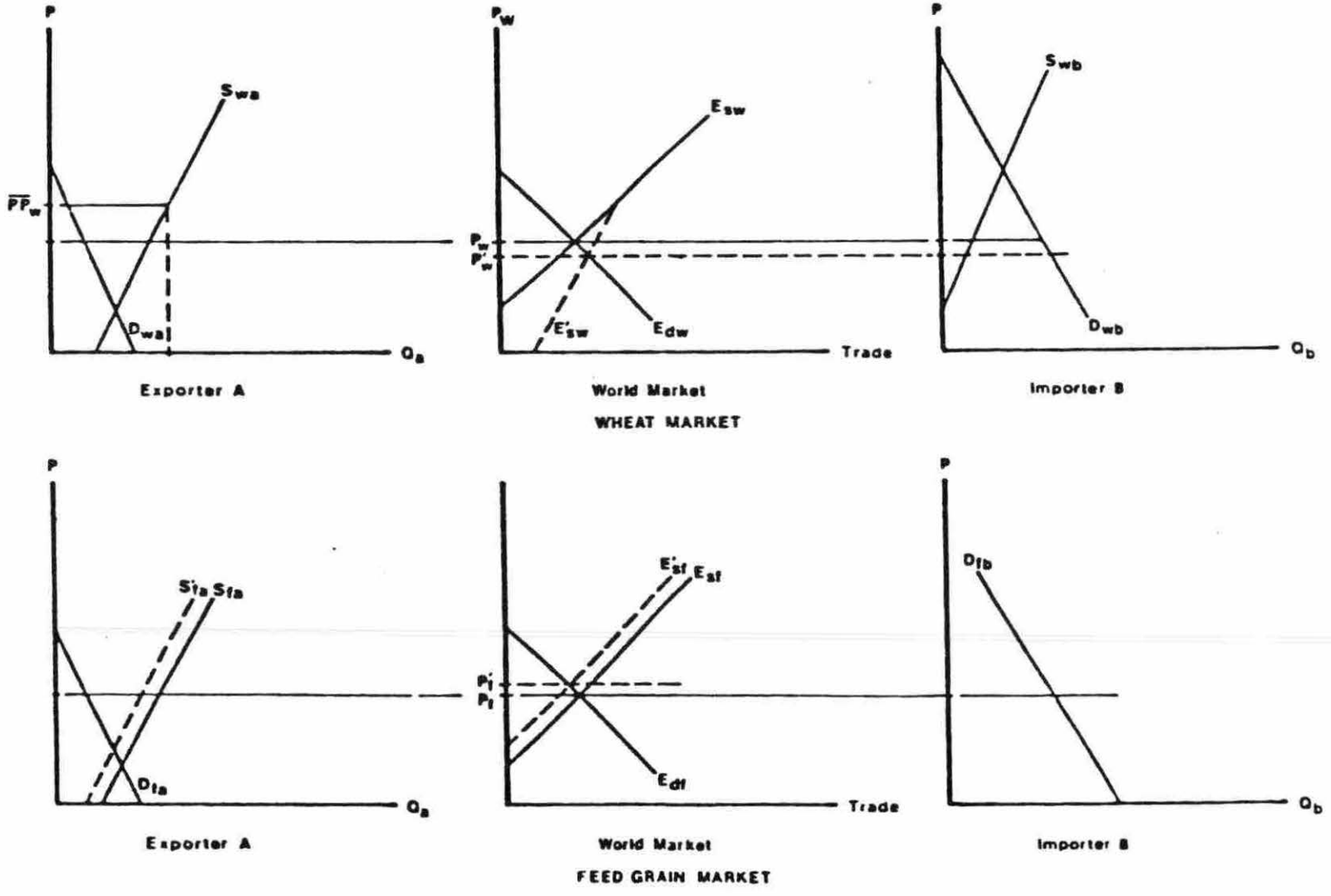

Figure 2. Impact of intervention in one commodity market on related commodity markets (McCalla and Josling 1985, p. 60)

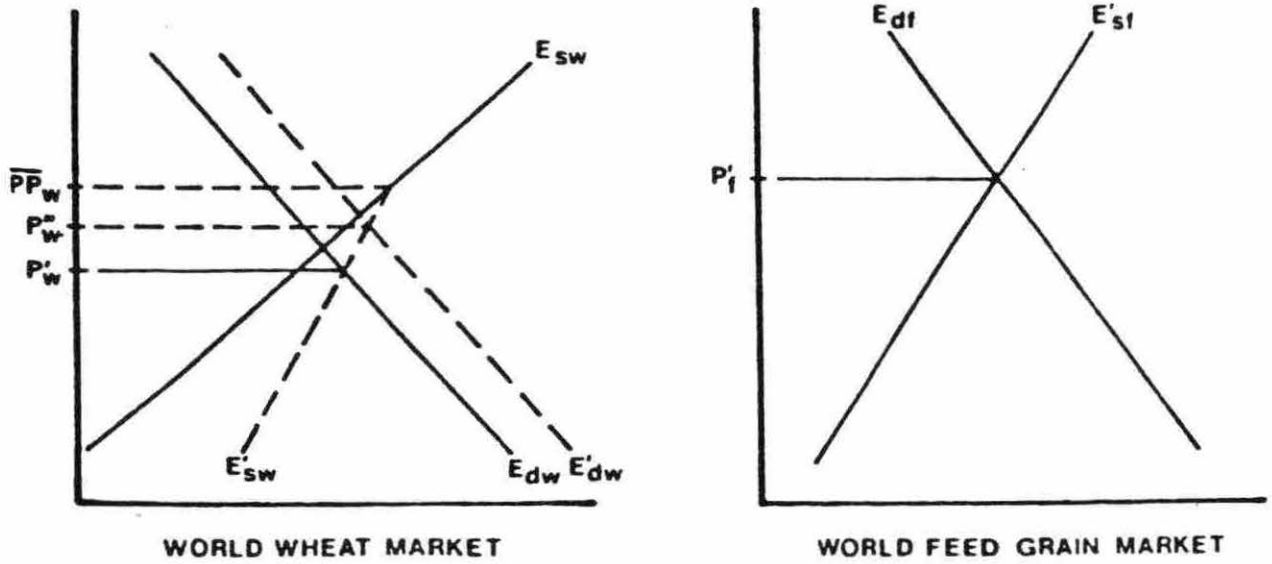

Figure 3. Price supports and transmission of supply shocks between markets (McCalla and Josling 1985, p. 67)

Figure 3 shows that unless an exogenous shock (E_{dw} to E'_{dw}) moves world prices above the support price (PP_w) for wheat, its production will not change, and there will be no interaction between wheat and feed grains markets. As a result, when multiple markets for linked commodities are analyzed, it remains unclear whether aggregate price variability is less under free trade or domestic producer price supports.

Supply Management

The FSA mandates idling of agricultural land through the Acreage Reduction Program (ARP) as a prerequisite for participation in the commodity programs (i.e., in the 1985 legislation, mandatory base acreage reduction for corn is 12.5-20%, 1988-1990). In contrast, the FFPA provides for a phasing out of specific crop acreage restrictions: "the producers on a farm may plant any combination of program crops so long as the producer remains within the total farm acreage base for the 1989 crop year" (Bill S. 1725, 1987, p. 50). Further, producers may plant nonprogram crops on anincreasing percentage of their base acres, beginning with 0% in 1990 and increasing by increments of 10% each year to 50% in 1995.

While the FSA forces a reduction of planted acres in each of the program commodities for commodity program participants, the FFPA relinquishes this responsibility to the producer increasingly over time.

The FSA relies on the ability of policy makers (Secretary of Agriculture) to foresee optimal acreage restrictions so as to avoid surplus production:

> In theory, acreage control and deficiency payment programs can be operated so that idled acreage exactly offsets the increased stimulus afforded by the payment. The grain programs appear to have been operated closer to this 'ideal' during the first two years of the FSA85 than under any previous legislation. However, if unbalanced, these programs have the potential to stimulate production and lower market prices. Even in ideal circumstances, resource allocation is affected because producers are required to plant particular crops to reap program benefits (Carr, et al 1989, p. 120).

The FFPA allows agricultural producers to respond to relative market prices and under free market conditions economic theory indicates that production of different crops will be balanced with demand.

The income support under the FSA is based on production, but calculated according to specific formulas and subject to limitations as shown in Table 1 for corn for example. Under the FSA, the farm acreage base, determined by a county committee, includes the sum of program crop acreage bases, the average acres planted to soybeans in 1986, and the average acres devoted to conservation uses in 1986 (Stucker and Collins, 1986). The crop acreage base for a program crop - feed grains, wheat, cotton and rice - equals the average of the acres planted over the preceding five years (Stucker and Collins, 1986). The two measures are related in that the sum of the crop acreage bases cannot be greater than the farm acreage base. In addition, the farm program yield (also known as the base yield) is fixed or frozen according to the historical yield record of the farm.

Increasingly, policy makers are concerned that current policies exacerbate or encourage the over-use of chemical inputs and fertilizers,

resulting in negative impacts on the environment. However, provisions such as fixed program acreage and fixed yield provisions, limit or eliminate farmers' ability to increase deficiency payments by increasing input use intensity. Fixed yields and acreage reduce a farmer's incentive to increase use of agricultural inputs, since at the margin the return on inputs per bushel above the fixed yield level is equal to the market price or the loan rate. Thus, the average price per bushel that the farmer receives declines with each additional bushel harvested above the fixed acreage and yield limitation. In this case the farmer is better off reducing input use (and yields) or marginal cost to the point where the marginal cost of the last unit of production above the program yield level is equal to the income from the sale of that unit, either the loan rate or market price.

If the program yield level is low, the producer's incentive to add inputs to boost yields on crop base acreage is dampened by the cap on bushels eligible for the target price. If this is the case, then an additional effect of the fixed program yield is that it reduces the tendency of input costs (including land) to increase with the target price level as described by Cochrane and Herdt (1976), that is premiums paid for land with base acres may be reduced as returns commensurate with its high yield potential are reduced.

However, price support programs encourage the continued production of corn, for example, which is a heavy chemical user when grown continuously on the same land. Thus, the net reduction in chemical use may be greater resulting from a shift to alternative cropping patterns than from the fixed

yield and acreage programs in current policy.

In the FFPA, acreage diversion programs are continued, yet they are not linked to participation in commodity programs. Thus the Secretary of Agriculture retains some influence over the total crop acres by offering to make diversion payments high enough to encourage enrollment of land, but loses control over the area devoted to specific crops, such as corn or wheat as in the FSA. The usefulness of a diversion program for total acreage without crop specific acreage controls is unclear. On the other hand, without price supports the incentive to overproduce will have been removed. In this setting, acreage set aside or retirement programs can be focused on environmental objectives.

International Trade

Target price and deficiency payments, marketing loans, and discretionary reductions in the loan rates were intended to break the direct link between government support of farm income and commodity prices. In this sense, price support policy since the 1973 farm bill increasingly separates the market price level and the level of price support guaranteed the farmer. Continuing this direction of evolution in the 1990 farm bill would involve extending the marketing loan provision to all program commodities. The impact of these programs is not to reduce production distortion, but to decrease market price distortion and allow U.S. commodities to remain competitive in world markets. As Boschwitz (1987)

points out, separating target prices and loan rates can still create problems if the loan rate remains above world market prices:

> Working hand in hand, price supports and production controls have given our markets away to foreign competitors. Because we set our loan rates above world market levels and backed those loan rates up with production controls, foreign competitors produced more (surprise, surprise !!). Our historic customers were drawn to cheaper sources of supply which we had essentially created by our protection of world prices. ... In 1983 under PIK we laid aside 83 million acres. That year our world competitors increased production by 63 million acres, and once in the business they tend to stay there (Boschwitz 1987, pp. 14-15).

In addition, during this period, U.S. market shares have been reduced because of foreign country subsidies on agricultural exports, and an over-valued U.S. dollar, which implicitly increases the relative price of U.S. exports. In contrast to its predecessor, the Agriculture and Food Act of 1981, the Food Security Act of 1985 is dedicated to lowering loan rates and, more slowly, target prices, in order to make U.S. agricultural exports more competitive. This is also the intent of the Family Farm Protection Act. With stable target prices, declining loan rates and increased price competitiveness in world markets carry a high price in terms of the potential cost of government commodity programs. During the last few years and in 1990 farm bill debate, increasing attention has been given to reducing these commodity program expenditures. Without being able to control world market prices, the United States' most obvious option is to reduce the level of the target price guarantee. Unfortunately, reductions in the target price levels directly decrease farm income. A side effect would be lower participation in government programs and therefore a reduction of government control over supply and other variables (such as

participation in environmental conservation programs). Overall, the government's options under the current program involve trade-offs between farm income, program costs, and international competitiveness.

Under the Family Farm Protection Act, the government's role, ideally, will be reduced to making equity payments and fulfilling diminished responsibilities with regard to the use of farmland. The agricultural sector - farmers - will bear more of the burden of decision making and costs of adjustment to the policies of other countries and world market conditions. In general, both the current farm program and the FFPA are dependent upon the same set of circumstances in international agricultural trade for their success. As described in the Economic Report of the President 1987:

> The effectiveness of the new policy [1985 Farm Bill] in enhancing exports of U.S. agriculture depends critically upon the responsiveness of export demand to price. The evidence shows that the short-run responsiveness of export demand for many commodities from the United States is relatively weak. As a result, the increases in export volume will lead to lower total values of exports in the short run because the fall in prices will be sharp enough to offset the increase in volume sold. Over the longer run, 3 to 5 years in the case of many commodities, lower prices can be expected to drive inefficient producers out of the market, force some government policy changes, and stimulate greater consumption, thereby increasing export sales at higher prices (Economic Report of the President 1987, p. 170).

Production and Crop Diversification

Production distortion under current price support policies occurs due to the discouragement of complementary crop rotations such as corn-soybean-oats and the rewarding of continuous corn or corn-soybean crop rotations (Duffy and Chase 1989). The production of continuous corn requires higher

level of fertilizer and pesticide inputs to maintain yields, and subjects land to a higher level of erosion than a more mixed cropping pattern, but current programs provide the economic incentive to follow continuous corn or corn-soybean rotations.

In a decoupled policy environment, the goal is to allow producers complete freedom to choose crops and crop rotations without policy restriction. Producers would use all of their land and other production resources according to market price signals, not government target prices and supply control restrictions. In this policy environment, market prices, not policies, would determine the emerging pattern of agricultural production, as producers would mix program and nonprogram crops in combinations that netted them the highest rates of return.

While no one knows what a decoupled environment in the United States would look like, the expectation is that farms would be more diversified to reduce price risk in a single commodity, and to take advantage of the complementarity of certain crop rotations. Greater farm cropping diversity and/or livestock production diversity are the centerpiece of many of the claims of proponents of decoupling about the advantages of decoupling. Opportunities for diversification differ for different types of farms and farming regions. The kind of flexibility that Boschwitz envisions in statements about decoupling may not be realistic over a five-year transition period. For farms without livestock, it makes little sense to grow forage crops unless there is the potential to incorporate livestock into the operation.

The high degree of specialization in agricultural production today -

the high costs of specialized and efficient production equipment - may conflict with the expectation that diversified family farms can and will be the most efficient producers of agricultural commodities - able to respond readily to market signals and change their production patterns. An Office of Technology Assessment (1986) analysis finds that very large enterprises in corn, soybean, and wheat production have 11%, 1%, and 3% cost advantages over medium-size enterprises (Chapter 8, pp. 161-186). If it turns out that a market-oriented policy rewards production efficiency and economies of scale, the FFPA may accelerate the concentration of agricultural operations into very large enterprises.

Farm Income

The calculation of the equity payment in the FFPA uses the familiar concepts of program yield and acreage base. The acreage base and the program yield for each crop on a farm are determined according to the provisions of the Agricultural Adjustment Act of 1949. In terms of the specific implementation plan for decoupling production and income supports, the FFPA seems to be an evolution of present programs, in which deficiency payments are based on a similar calculation of base acreage and program yields. However, unlike the deficiency payment, which varies depending on the difference between the target price and the higher of the market price or the loan rate, the equity payment rate is fixed per unit of yield per crop (as shown in Tables 1 and 2, respectively for corn and soybeans).

Also as proposed, the FFPA's equity payments, which "replace" the deficiency payments, are steadily reduced by increments of 10 percent over

a period of five years. Thus the FFPA intends that these payments only cover a transition to a market-oriented agriculture. Without any experience with such a policy transition, a more flexible schedule for determining equity payments may provide more protection to farm income during this period of uncertainty.

Whether deficiency or equity payments, it is clear from statements by the Secretary of Agriculture that annual commodity program expenditures exceeding $25 billion will not continue. One question for decoupling is whether it will cost the government and the taxpayer more than current price support programs to maintain the same level of farm income. The formula for calculating equity payments outlined in the FFPA, suggests that the answer is a definite, "yes." Government ability and commitment to maintaining farm income at levels comparable to current programs is an important criteria for support of decoupling.

How to distribute farm payments equitably is not specifically addressed by either the FSA or the FFPA. Van Chantfort (1987) shows that mid-size farms (by value of sales) receive a disproportionate share of payments with regard to its percentage of total sales. Both the FSA and the FFPA put a cap on per farm deficiency or equity payments, respectively, but neither of these measures specifically relates payment levels to farm size or output. What the distribution of payments will be under the FFPA and whether it constitutes an improvement over current farm programs is another empirical question. Since the FFPA focuses attention on producers currently involved in commodity programs and relies on base acreage formula for determining payments, it is unclear how the distribution of payments to

farmers will be much different than that under current programs.

It is important to note, however, that producer incomes under decoupling may be comparable to incomes under current programs, particularly in the context of international trade liberalization. Schmitz (1988) argues that theoretically, producer income (measured as producer surplus) could be maintained under international trade liberalization at levels comparable to current policies if price increases are sufficiently large or if government savings from the elimination of price supports are sufficient to compensate producers. For example, Figure 4 shows supply and demand curves under current price support programs in the United States. P_T is the target price and P is the market price for the commodity, such that the producers are receiving area P_TagP in the form of government deficiency payments. Production is limited to quantity, Q_0, by acreage limitation programs indicated by the dashed line, C_0S_0, and in this hypothetical example, acreage restrictions are such that Q_0 is also the amount that would have been produced without price supports and acreage controls as well, i.e., point g.

If trade liberalization results in increased demand to FT_1, then production is Q_1 and producer surplus equals area, P_TbC, since acreage programs no longer apply. Producer surplus is therefore larger than producer surplus under current programs, P_TagC, by triangle, abg, and no compensation of producers is needed. In addition, government savings equals area, P_TagP. However, if trade liberalization results in a smaller increase in demand to FT_2, then production is Q_2 and producer surplus declines by the loss of government deficiency payments, P_TadP_*, minus the

gain in producer rent from increased production, deg. But even in this case there is a net gain from the trade liberalization - the cross hatched area, cegf. The cross-hatched area is the sum of government savings, P_*dgP, minus the loss of consumer surplus, P_*cfP, plus the increase in producer surplus from expanded production, area deg. In both cases, the compensation principle - gainers from a change in policy have enough to hypothetically compensate losers - is met. Schmitz concludes, "In this case, the motivation for free trade would have to come from the government because producers would be unenthusiastic knowing that there are no net gains for them -- there exists only a trade-off between government transfers and private rents" (Schmitz 1988, p. 998).

However, Schmitz's theoretical analysis considers the aggregate market without taking into account changes in producer behavior. Farm-level analysis takes into account the potential cropping choices that farmers may make in response to decoupling and international trade liberalization. What is missing from Schmitz's analysis is a perspective on the responsiveness of farms facing prices of different commodities moving in opposite directions under trade liberalization. Then producers' incomes will depend on their ability to anticipate and adjust to different market signals. Farmers may be able to maintain their farm income in different policy environments by employing alternative cropping patterns, input use levels, and changing investment and marketing behavior.

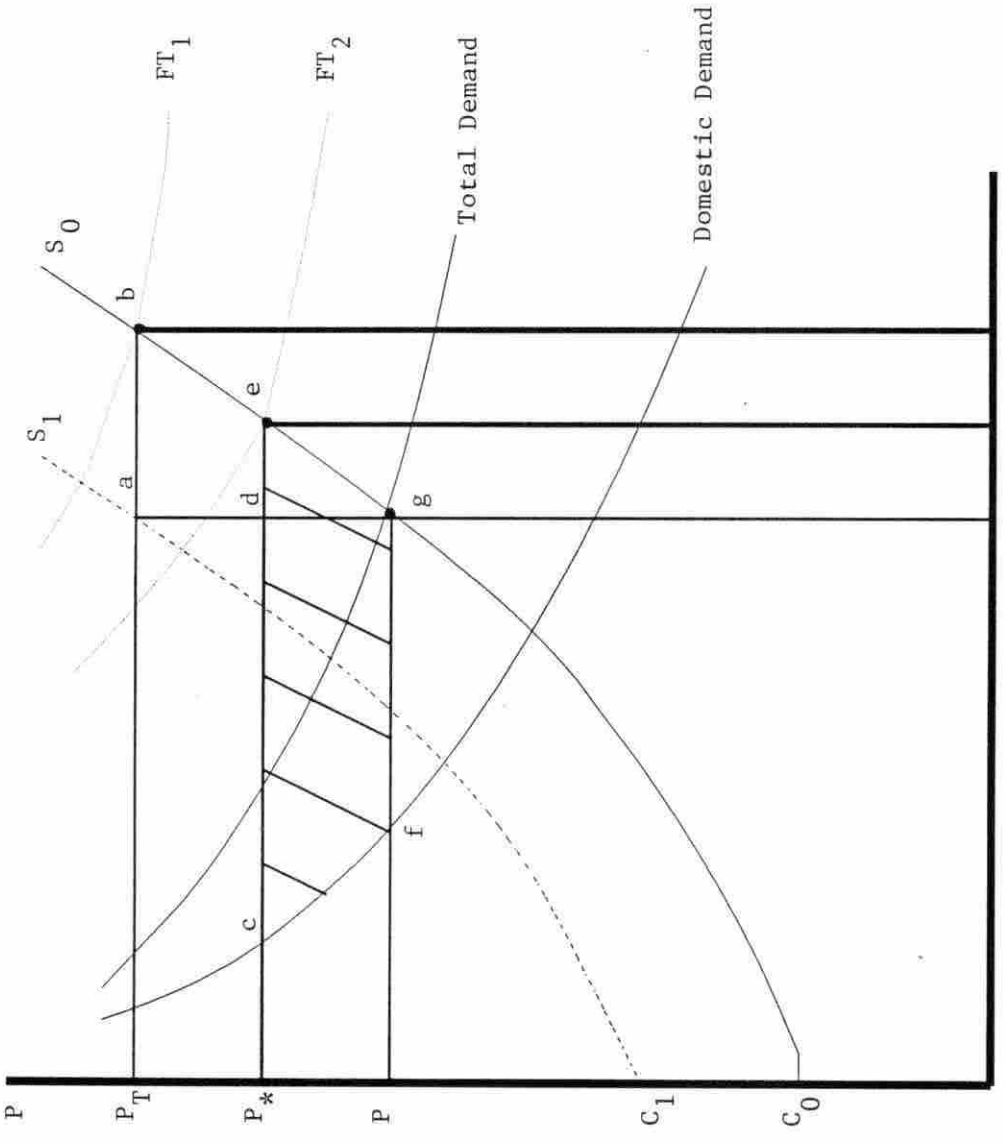

Figure 4. Farm income gains/losses from agricultural trade reform (Schmitz 1988. p. 998)

Summary

Ultimately, a whole farm perspective is required to evaluate the impact of the government programs. The combination and management of agricultural policy instruments under the FSA as described above, address some of the concerns raised by proponents of decoupling. Nevertheless, the FSA, as an example of the evolution of the price support approach, provides evidence of the limits of and/or trade-offs involved in attempts to reduce distortions. Some critics would maintain that distortions are merely shifted by adjustments to current farm programs, not reduced. Maintaining international market competitiveness (lower loan rates) and farm income (stable, high target prices) dramatically increased the government cost of the program in the mid-1980s. Program acreage and fixed yields reduces production distortion somewhat related to the level of input use, but farmers remain locked in to producing program crops in rotations that rely more heavily on input use than alternative rotations.

U.S. price supports and supply control programs involve trade-offs between production and supply control, government cost, and international competitiveness. Policies that alter price levels and returns for specific commodities alter producers' incentives with respect to those commodities, affecting production patterns, input use, and comparative advantage of production versus other countries' producers.

Overall, decoupling as defined in the FFPA seems familiar because of the borrowing of the concepts of loan rates, acreage diversion, program acreage, etc. However, the management of these provisions and phasing out of decoupled or equity payments creates an agricultural policy far

different than the FSA. Compared with the FSA, the FFPA increases the downside price risk that farmers face - unless it can be shown that greater crop diversification or other strategies can compensate for this risk. Other decoupling ideas involving expanded crop or income insurance schemes may provide greater price protection to balance the price risk implied by the reduction of the loan rate. The FFPA puts its faith in the farmer's ability to remain profitable given complete flexibility to adjust his cropping pattern and mix according to market signals. The equity payment is only meant to provide support during a transition between policies. The implications of decoupling (involving free markets and transfer payments) for farm sector structure, cropping patterns, risk and farm income may in fact be quite different from the expectations of Senator Boschwitz:

> . . . a good case could be made that our approach [FFPA] will bring about a revival of the small family farm. Diversity, low input costs, risk management, and environmental quality will be the emphasis of farm families rather than 'farming the government' (Boschwitz 1987, unpublished analysis of Family Farm Protection Act, p. 7).

CHAPTER IV.

FARM SIMULATION

Simulation of all aspects of a farm over a number of years under current and free trade policy environments gives insight into the various claims of decoupling's proponents and detractors, and provides a level of detail unattainable in aggregate agricultural production and trade analyses. Simulating corn-belt farms under current and free trade policy environments allows the testing of claims that farmers will be better off financially given greater opportunity to adjust their production decisions to market prices. Further, simulating the total financial and production environment on corn-belt farms allows analysis of net farm income, ending net worth and/or farm financial survival given different levels of transfer payments to decoupled farms.

This chapter describes the model used for farm simulation (FLIPSIM V), the alternative policy and market environments in which the farm was simulated (FAPRI projections), and the characteristics of the simulated farm.

FLIPSIM V

FLIPSIM V is a firm level policy simulation model which was developed "to allow analysis of the probable tax consequences of alternative farm policies and income tax developments on typical or representative farms" (Richardson and Nixon 1986, p. 1). The model is described by Richardson

and Nixon, its developers, as follows:

> FLIPSIM V is a firm level, recursive, simulation model which simulates the annual production, farm policy, marketing, financial management, growth, and income tax aspects of a farm over a multiple-year planning horizon. . . . The model recursively simulates a typical farm by using the ending financial position for year 1 as the beginning position for the second year, and so on. The model, however, is a simulation model as opposed to a programming model. This is because FLIPSIM V does not include an overall objective function to be optimized but rather analyzes the outcome of a given set of input data and assumptions for a typical farm. Accounting equations and identities constitute almost all of the computational components of the model. Virtually no econometric relationships with fixed parameters are included (Richardson and Nixon 1986, p. 2).

An advantage of computer simulation is that it "allows one to incorporate the interaction between production, marketing, and financial activities at the farm level without specifying an explicit objective function" (Helms, Bailey, and Glover 1987, p. 787). The model simulates the farm without specifying one particular objective such as maximizing profit or minimizing risk.

In this study the model incorporates a number of diverse assumptions or decision frameworks which determine farmer behavior. Crop area planted is based on a profit maximizing linear programming matrix. Crop marketing decisions are based on keeping taxable income below a certain level. Family consumption is based on a simple consumption function: average consumption plus the marginal propensity to consume times disposable income minus average consumption. Simulated farms experiencing financial difficulty may refinance their long term loans in order to cover their cash-flow needs. Similarly, farms with disposable income can accelerate loan repayments and further improve their financial position. Taken

together these behaviors or decision frameworks define the farm's behavior and performance in the simulation.

Many studies employing the FLIPSIM model can be found in the agricultural economics literature, including studies of the impact of alternative farm policies on farm survival on Texas cotton farms (Duffy, Richardson, Smith 1984), of producers preferences for alternative marketing strategies (Bailey and Richardson 1985), of the impact of farm size on farm survival (Richardson and Condra 1981), and of producer preferences for adoption of alternative practices under the 1981 and 1985 farm bills (Helms, Bailey, and Glover 1987). A particular advantage of the FLIPSIM V model is its extensive capabilities or applicability, as evidenced by the wide range of topics it has been used to study. This study takes advantage of FLIPSIM V's capacity to incorporate a high degree of policy detail, and to calculate a wide range of financial indicators.

Specifically with regard to policy, FLIPSIM V includes all aspects of the current farm policy price support mechanism - target prices, loan rates, program yields and base acreage, set aside and diversion programs, Farmer-owned Reserve - making it ideal for agricultural policy comparisons at the farm level. The decoupling alternative was modeled by turning off or adjusting these policies instruments, for example, deficiency payments and set aside programs are "turned off."

FAPRI Policy Scenarios

Alternative agricultural policies imply different commodity market equilibriums and commodity prices. In order to simulate farm financial

status and production responses under alternative agricultural policy environments it is desireable to work with projections of commodity prices consistent with the alternative policy environments. Farm simulation of alternative policies without corresponding commodity price adjustments would yield distorted results. On the other hand, analyses of the impact of alternative policy scenarios on commodity market prices are not always available to the researcher, particularly the specific policies of interest.

For the purposes of this study, a set of policy scenarios conducted with world agricultural commodity trade models provides a consistent set of commodity prices corresponding with current and decoupled agricultural policies. The Food and Agricultural Policy Research Institute (FAPRI) maintains world agricultural commodity production and trade models with which it forecasts agricultural prices, production, consumption, and trade for a variety of countries and regions of the world.

> Ten-year projections for the U.S. agricultural sector and international agricultural commodity markets are produced biannually by the Food and Agricultural Policy Institute (FAPRI). These projections incorporate macroeconomic and financial forecasts from the WEFA Group (Bala Cynwyd, Pennsylvania) and domestic and trade policy assumptions for major participants in world markets for feed grains, soybeans, wheat, cotton, and rice. The purpose of the FAPRI ten-year exercise is to evaluate the implications of current and projected policies of the United States and other countries in the context of likely world macroeconomic and financial environment (Food and Agricultural Policy Research Institute 1988b, p. 1).

March 1988 FAPRI alternative policy projections were made for the ten-year period, 1987/88 to 1996/97 (each year designates a crop year). The macroeconomic environment for the commodity market projections is based

largely on projections of macro-economic variables made by Wharton Econometric Forecasting Associates (WEFA). International income growth, inflation and interest rates, and other macro-economic variables are important determinants of demand for and supply of agricultural commodities. With regard to income or gross domestic product (GDP) growth rates and commodity trade the general picture is as follows:

> The macroeconomic environment over the ten-year projection period contrasts sharply with that of the early 1980s. Then, low or negative real GDP growth was experienced in many countries. This low-growth period followed the high-growth rates of the late 1970s. Although still sluggish, the recovery of the world economies from the performance in the early 1980s has a significant impact on the level of demand and trade in the ten-year projection period. The rate of real growth, while substantially improved, is not as high as during the 1970s. Demand and trade recover from levels of the early 1980s but do not approach the levels of the boom years of the 1970s (Food and Agricultural Policy Research Institute 1988b, p. 5).

In addition, "the purchasing power of the dollar relative to many developed country currencies is projected to continue declining, but at a lower rate through 1989 and then recover marginally thereafter" (Food and Agricultural Policy Research Institute 1988b, p. 5). The result is an improvement in the competitive position of the United States in its export markets.

In the FAPRI baseline or reference projection, agricultural policy is assumed to be a continuation of the Food Security Act of 1985: "It is assumed that current programs will continue and will be operated with the objective of reducing stocks, remaining competitive in world markets, and reducing government program costs" (Food and Agricultural Policy Research Institute 1988b, p. 5). Specifically, during the projection period it is assumed that target prices will be reduced by 2 percent per year after

1990/91, and that the Secretary of Agriculture will not use his authority to set loan rates at higher levels than those established by the decision rule of setting loan rates equal to 75 percent of a five-year moving average of the market price, excluding the years with the highest and lowest prices. In addition, the annual acreage reduction program for corn is reduced over time (from 20 percent in 1990, to 10 percent in 1991-92, and to 5 percent in 1993-96). Paid diversion is eliminated altogether as additional acres are enrolled in the CRP. As intended by these policies, FAPRI results show declines in government commodity program costs.

The motivation for the FAPRI alternative policy scenarios was to analyze policy reforms being considered in the GATT Multilateral Trade Negotiations (MTN). The two policy scenarios are unilateral free trade and global free trade. In the unilateral free trade scenario, the United States eliminates all price support and income support programs, while other nations continue their agricultural policies. In the global free trade scenario, all nations phase out programs which alter the level of agricultural prices within their borders, whether the policies favor the farm sector or the consumer. In both policy scenarios, U.S. commodity programs - target prices, loan rates, annual acreage reduction programs, government stock programs, even ethanol subsidies - are phased out over the three-year period, 1989-1992. In the global free trade scenario, protectionist policies are phased-out in other countries over the same period as well, by equating their domestic prices with border prices, as a result, "the level and fluctuations of world market prices are directly transmitted to these markets" (Food and Agricultural Policy Research

Institute 1988b, p. 12). In each of these free trade scenarios, U.S. farms receive no income support.

Selected results of the FAPRI alternative projections provide context for evaluating the results of the cash-grain farm simulation. Figures 5 and 6, respectively, compare corn and soybean market prices under current price support programs and unilateral and global free trade scenarios. With unilateral free trade, corn and soybean prices are lower than under current farm programs. With elimination of annual acreage programs and the release of stocks held by the CCC and in the farmer-owned reserve, production increases and increased supplies exert a downward pressure on prices. Increased soybean production and consequent lower soybean prices are also related to the elimination of corn and wheat target price-deficiency payment programs. Under global free trade corn prices are higher and soybean prices are lower than under current farm programs. In the global free trade projection, increased demand from other countries provides a market for the increased U.S. supply and prices do not fall as low and recover faster than unilateral free trade. Lower soybean prices still occur, largely because of substitution of feed grains for soybean meal in the European Community after the removal of price distorting policies. In keeping with price movements, U.S. corn production tends to be higher and U.S. soybean production tends to be lower under global free trade compared with current farm programs, and the reverse for unilateral free trade (Figures 7 and 8).

The FAPRI free trade results are comparable with the results of other similar analyses. A number of agricultural trade analyses indicate that

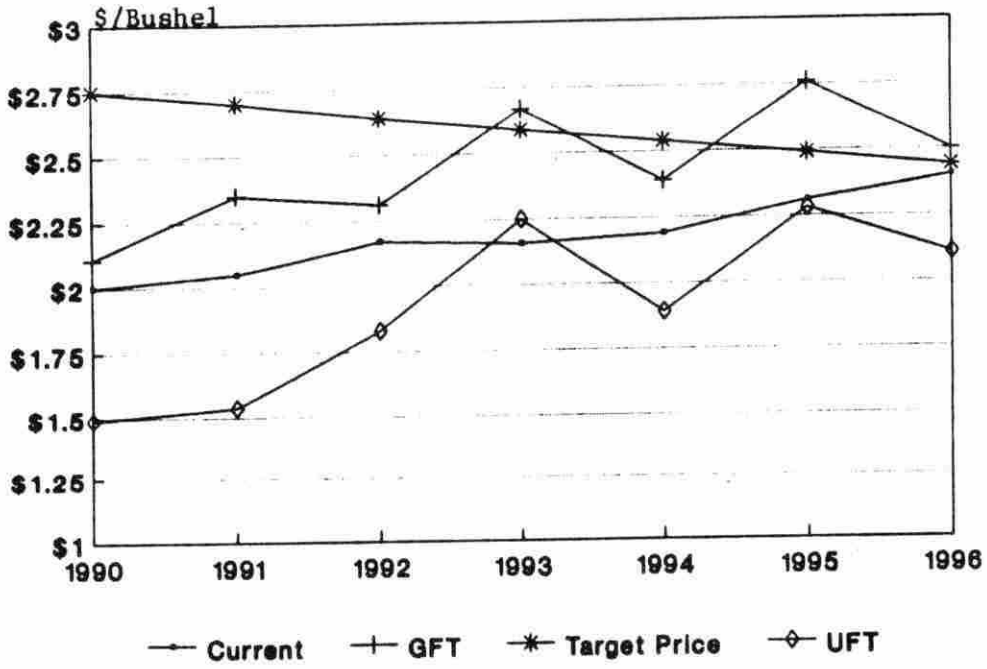

Figure 5. FAPRI corn price projections for current policy, unilateral (UFT) and global (GFT) free trade, 1990-96

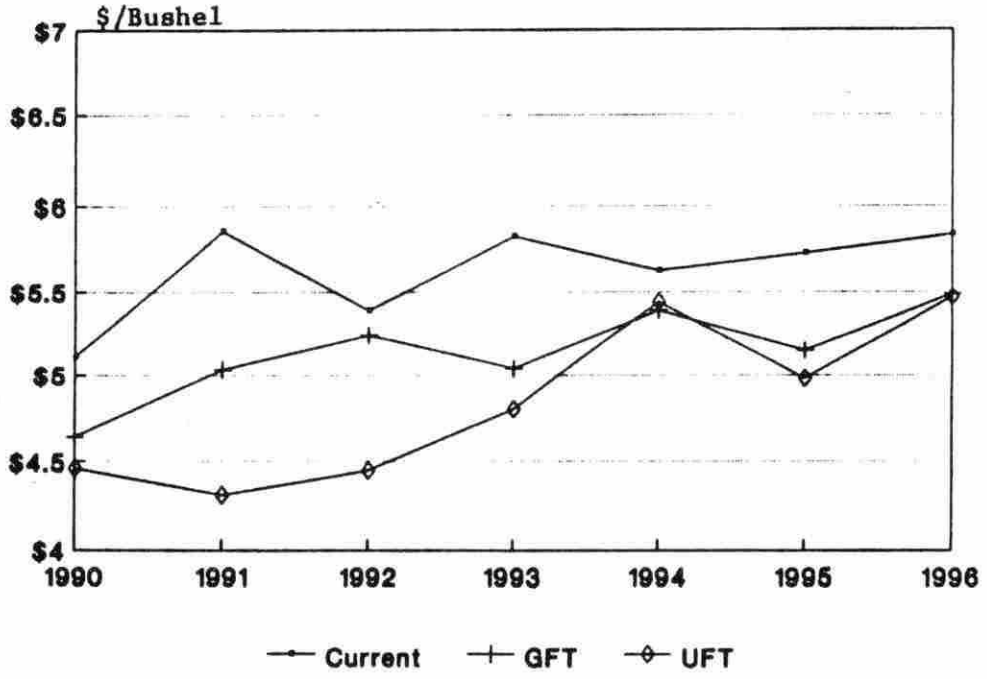

Figure 6. FAPRI soybean price projections for current policy, unilateral (UFT) and global (GFT) free trade, 1990-96

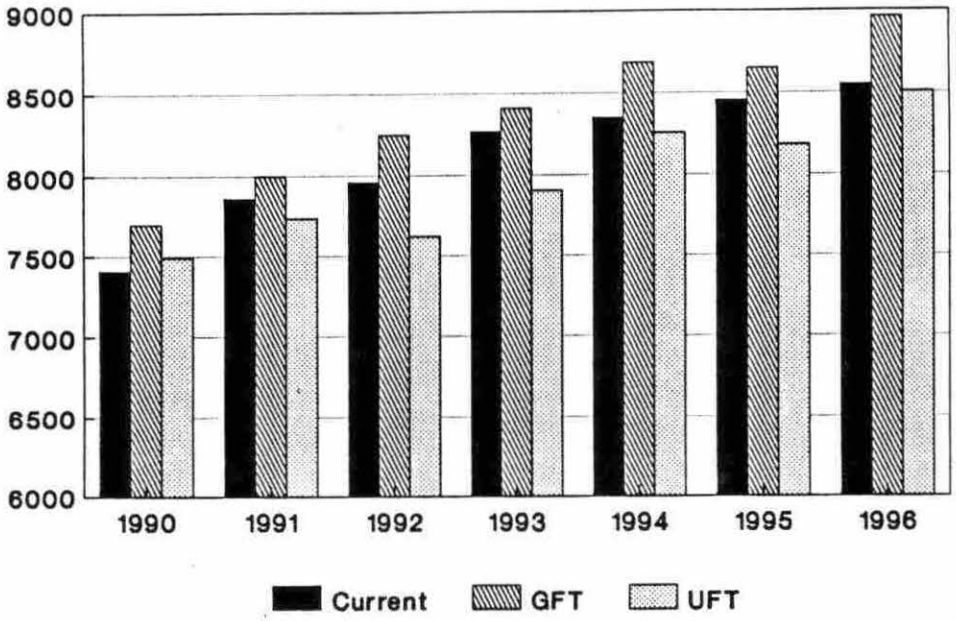

Figure 7. FAPRI corn production projections for current policy, unilateral (UFT) and global (GFT) free trade, 1990-96

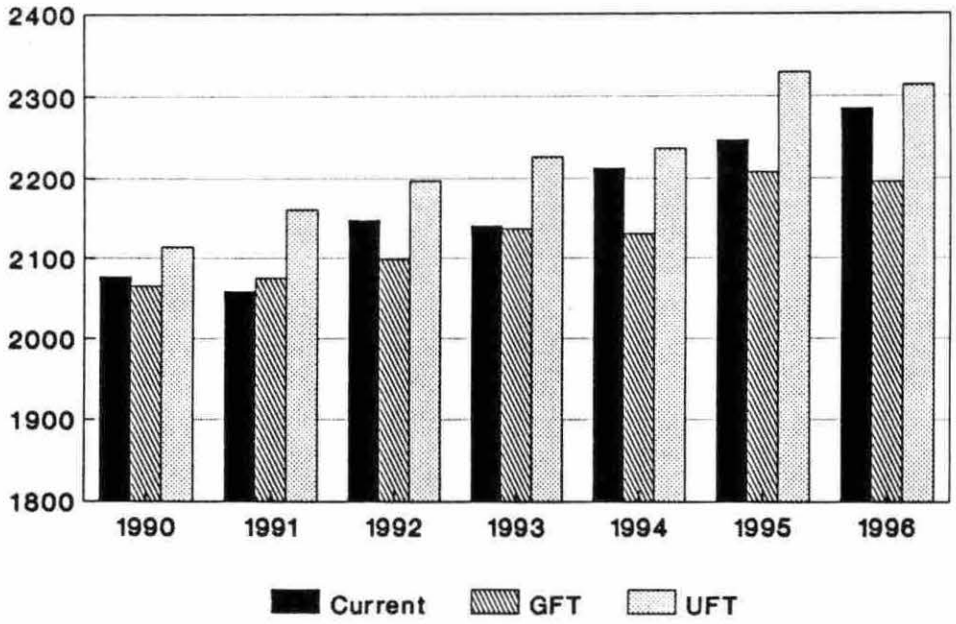

Figure 8. FAPRI soybean production projections for current policy, unilateral (UFT) and global (GFT) free trade, 1990-96

commodity prices would be higher under trade liberalization compared to a continuation of current U.S. farm programs and trade relations (Krissoff and Ballenger 1987, Tyers and Anderson 1986, Zeitz and Valdez 1986, and Food and Agricultural Policy Research Institute 1988a). Although, rice and sugar prices change the most, analyses estimate corn price increases of 4 percent to 12 percent. Soybean price is estimated to decline by 2 percent to 8 percent.

An important caveat to these projections is that they were done before the 1988 drought. The impact of the drought on U.S. stocks, management of agricultural programs, and prices, is therefore not taken into account. More recent 1989 FAPRI projections indicate higher price levels for corn and soybeans, in part based on lower stocks-use ratios of corn. In terms of agricultural policy, the reduction of stocks and the higher prices may reduce the costs of government programs and make it easier to justify the continuation of current programs. Lowering the acreage reserve program in 1989/90, however, will have the effect of rebuilding stocks and lowering prices from the high drought levels. Reductions in government program costs may not be realized if lower ARP rates are continued because of the associated expansion of program production and deficiency payments (Food and Agricultural Policy Research Institute 1989). In addition, these more recent projections assume that target prices are frozen at 1990/91 levels in the 1990 farm bill, rather than reduced by 2 percent per year as assumed in the 1988 FAPRI projections. Higher target prices provide a higher level of income support and have the potential for higher government costs.

A second caveat is that the transition period in the FAPRI study from current to global free trade occurs over a short three-year period. In contrast, Boschwitz and Boren's current proposal for decoupling proposes a five-year transition period stipulating a gradual transfer of program or base acres to nonprogram crops. The latest U.S. submission to the GATT calls for a phasing out of undesirable policies over a ten-year period (Submission of the United States 1989). Compromise in the MTN of the GATT may involve incremental changes in international agricultural policy where some trade distorting programs are allowed to continue. Such changes also would not occur over a short three-year period. The implications for price changes and commodity market behavior of these alternative paths of change in U.S. and international policy may be quite different than the results presented in the FAPRI projections.

Description of the Simulated Farm

The corn-belt farm simulated is a medium-size Iowa cash grain farm. The farm owns 150 acres and leases 280 acres for a total size of 430 acres. Of these 430 acres, 95 percent or 408 acres are cropland, the rest of the land is occupied by the farmstead, other buildings, and borders to the fields. The farm has 204 acres of corn base and grows corn and soybeans in a corn-soybean rotation. The initial debt-asset ratio of 0.30 is representative of cash grain farms according to U.S. Department of Agriculture Cost and Returns Surveys (USDA, 1987). Off-farm income of $18,000/year is the equivalent of a teachers salary in rural Iowa. The simulated farm does not represent any particular Iowa farm. Rather,

specific characteristics of the farm were gleaned from a variety of sources based on initial decisions about farm type and size.

Cash grain farming represents a significant proportion of farm operations in the corn-belt. The 1987 Agricultural Census of Iowa indicates that farms classified as corn or soybean farms (according to Standard Industrial Classification) account for 34 percent of all Iowa farms (see Figure 9). Farms classified as corn farms occupy 7.3 million acres or 23 percent of the 31.6 million acres in farms in Iowa according to the 1987 Agricultural Census (see Figure 10).

The farm size was chosen based on a review of Iowa agricultural censuses. Although the number of acres in cropland has changed relatively little (3.5 percent) in 33 years, the total number of Iowa farms has declined a more substantial 34 percent (Figure 11).

Figure 12 shows how the distribution of Iowa farms of all types has changed from 1959 to 1987. The most dramatic change is the shrinking of the 100-199 acre farms, followed by the loss of 50-99 acre farms and the growth of 500-999 acre and >1000 acre farms. The census data show a clear trend toward larger farms in Iowa over the 28-year period. (It is interesting to note that the smallest size category (1-49) has not decreased as fast as the 50-99 category, giving the size distribution in 1987 a bi-modal shape). Figure 13 shows that cash grain farms from 260-499 acres are the most prevalent.

Farm size of 430 acres was chosen to be representative of Iowa farms and to meet two additional general criteria: that the farm would be (1) large enough to support a farmer without greater than 50 percent reliance

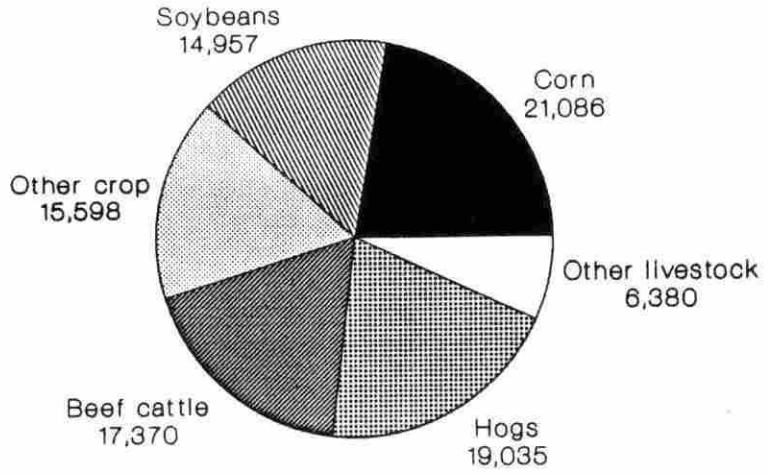

Figure 9. Number of Iowa farms by enterprise type, 1987 (Iowa Agricultural Census 1987, according to Standard Industrial Classification)

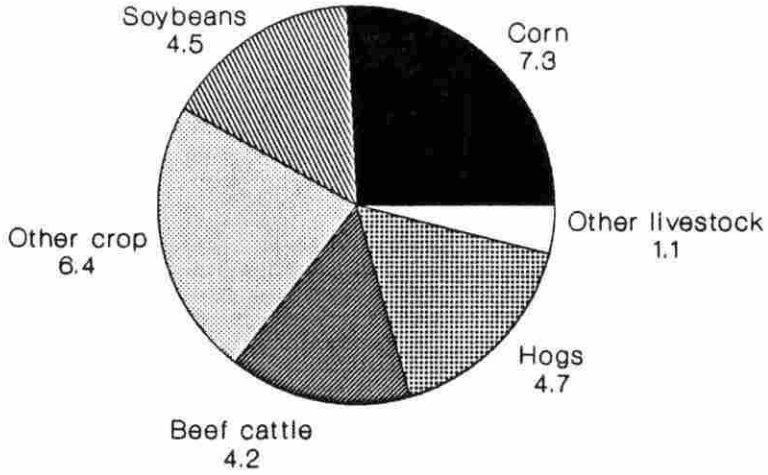

Figure 10. Land (million acres) in Iowa farms by enterprise type (Iowa Agricultural Census 1987, according to Standard Industrial Classification)

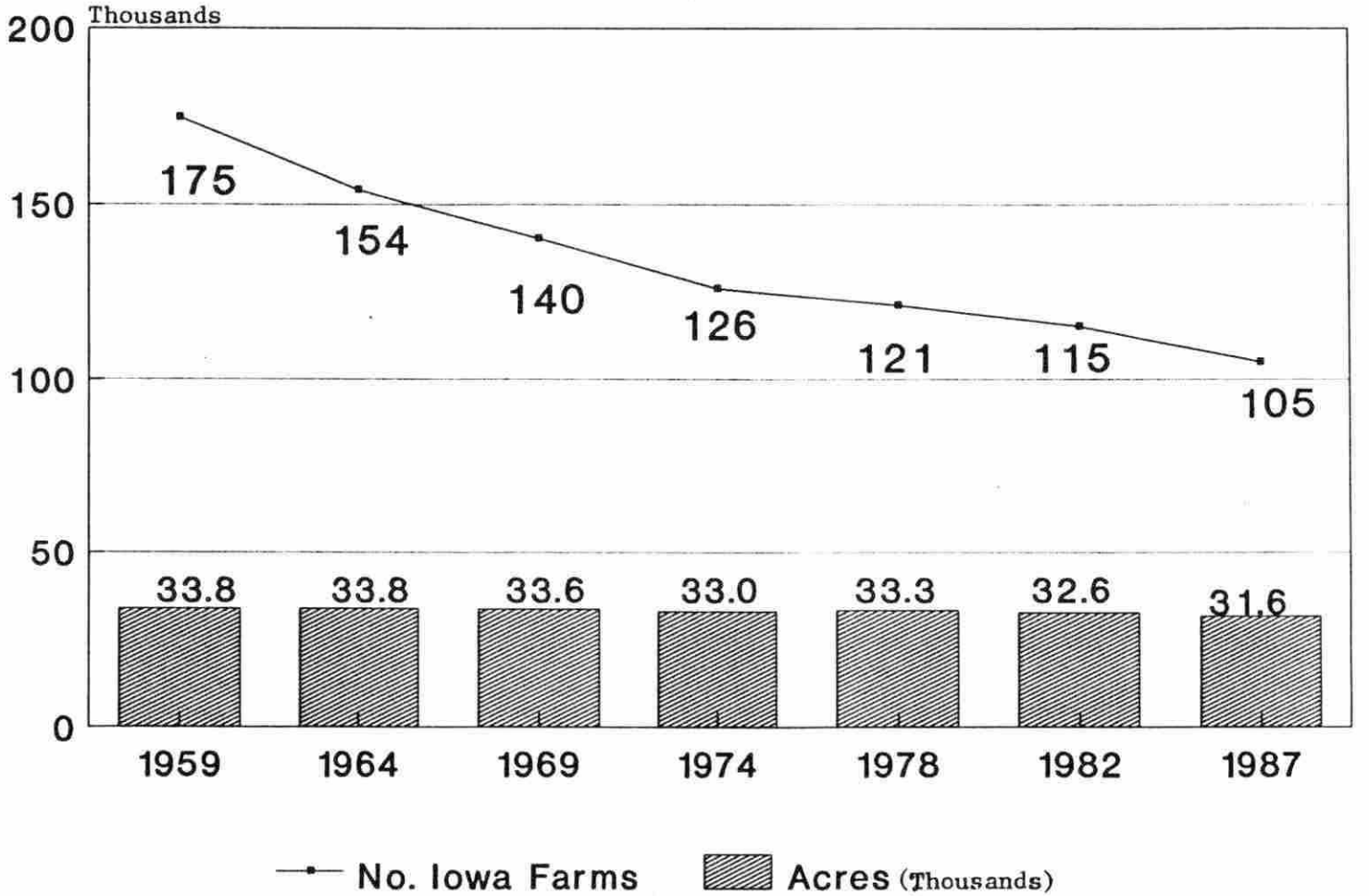

Figure 11. Number of Iowa farms and total land in farms, 1959-87 (Iowa Agricultural Census 1987)

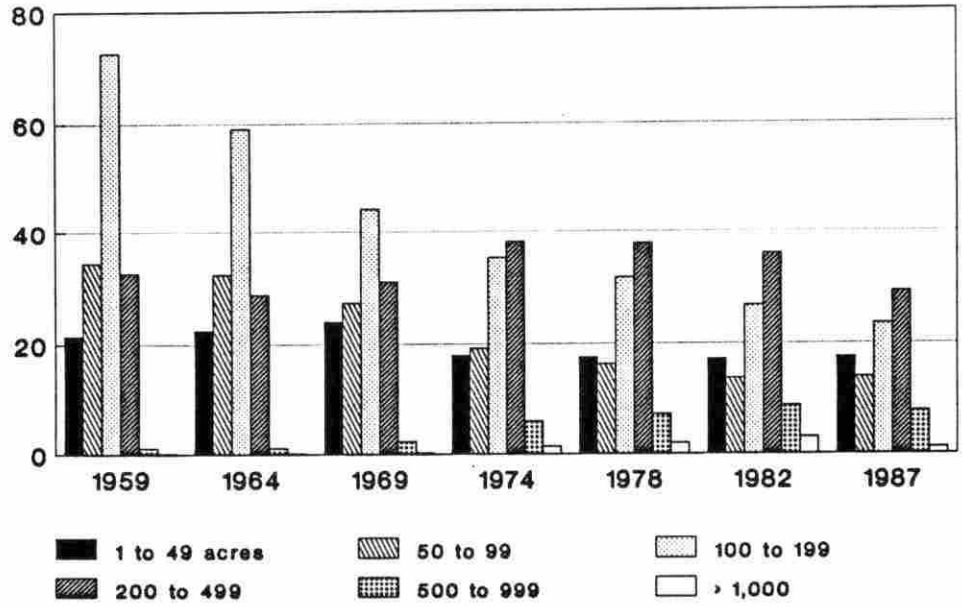

Figure 12. Distribution of Iowa farms by size (harvested acres), 1959-87 (Iowa Agricultural Census 1987)

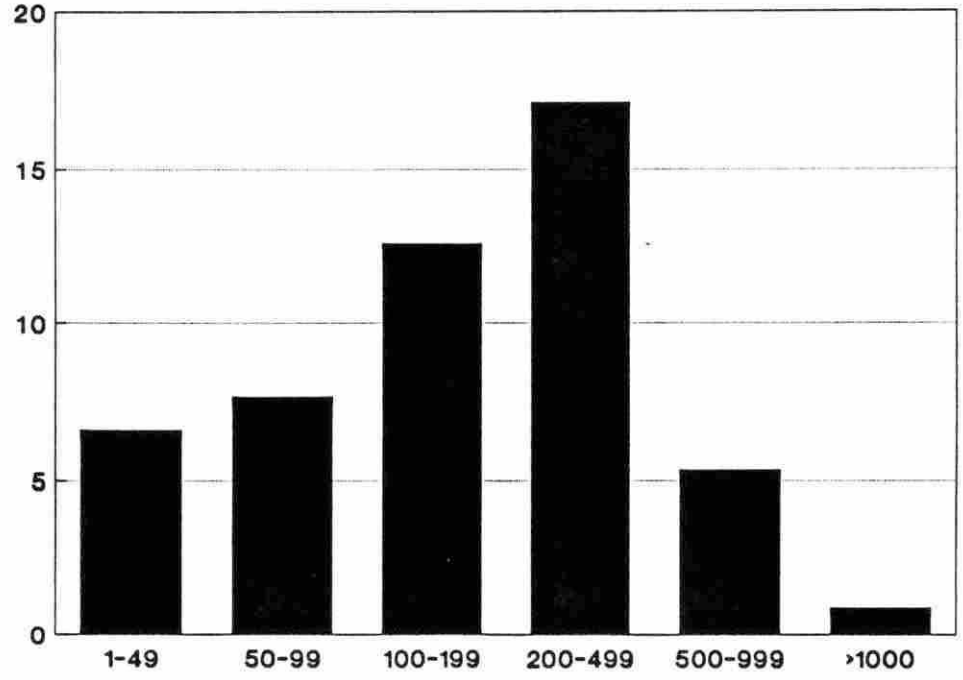

Figure 13. Distribution of Iowa cash grain farms by size, 1987 (Iowa Agricultural Census 1987)

on outside or off-farm income; and (2) small enough so that a farmer and his or her family account for upwards of 80 percent of the labor applied to the farm (thus representing a "family" farming unit). It is intended that the results of the farm simulation would be relevant for addressing questions about the well-being of the family or average-sized farmer.

After determining the farm type and size, the remaining characteristics of the farms were developed from a variety of sources: Iowa Farm Business Association summary reports and staff, Iowa State University Cooperative Extension Service staff and reports, Story County (Iowa) Assessor, local farm equipment and farm chemical dealers, and the Farm Tractor and Implement Blue Book (various editions).

Because of the extensive crop budget, equipment, and other information requirements of FLIPSIM V, a detailed farm budget for the specific farm simulated was prepared using a program called Budget Planner, developed at North Carolina State University (Hoag, et al., date unknown). Farm operations, associated equipment, and seed, fertilizer, and chemical inputs, were identified for each crop in consultation with a representative of the Iowa Farm Business Association to match the size and type of the farm. The Budget Planner was used to calculate crop budgets from these outlines of cropping operations, equipment use, and inputs. For example, given the power, size, speed of operation, and types of equipment required, the Budget Planner provided estimates of the aggregate fuel and lube and machine repair costs, and hours of labor per acre per crop.

Table 3 presents the variable costs of production calculated for the simulated farm using Budget Planner and compares them with Iowa State

University Cooperative Extension estimates (Duffy, 1989). The simulated farm crop budgets are less than those estimated by Extension, by about 10 percent for corn and 5 percent for soybeans. Accounting for most of the difference between the two budgets are lower fertilizer (nitrogen) costs for corn and lower harvesting costs for corn and soybeans on the simulated farm. The comparable corn yield for the simulated farm is 6 bushels/acre less than the yield used in the Extension estimate.

Table 4 presents the machinery complement of the simulated farm. It was assumed that equipment purchases were spread over the years 1976 to 1989. Similarly, the economic life of the equipment was adjusted so that equipment replacement would be spread over a number of years in a manner reflecting the farmer's ability to finance equipment purchases.

Farm Simulation Approach

Current farm programs and four alternative policy and trade scenarios are considered in the farm simulation. The four alternative scenarios are described by the following matrix.

	No program	Decoupled payments
Global free trade:	NPM	DPM
Unilateral free trade:	NPU	DPU

NP and DP stand for no program and decoupled payment, respectively, and M and U stand for multilateral or global free trade and unilateral free trade, respectively.

Decoupled payments in this farm simulation are lump-sum transfers to the farmer with no strings attached. The payments are intended to

Table 3. Variable cost of production estimates for corn and soybeans, Budget Planner and Iowa State University Cooperative Extension Service (Duffy 1989)

	Corn		Soybeans	
Input	Budget Planner	Extension	Budget Planner	Extension
	($/acre)	($/acre)	($/acre)	($/acre)
Seed	$21.06	22.10	18.40	13.00
Fert/Lime	45.90	50.80	25.05	27.90
Chemical	17.80	18.20	15.02	16.40
Preharvest	9.19	10.20	7.49	9.50
Fuel/Lube	5.42	-	3.97	-
Repair	3.78	-	3.51	-
Crop Insurance	5.72	6.05	5.80	7.50
Other	10.00	10.00	10.00	10.00
Harvest	21.60	30.11	7.10	11.44
($/bu)	0.16	0.21	0.15	0.25
(bu/acre)	139	145	46	46
Labor (@$5	15.40	15.00	14.90	13.00
(hours/acre)	3.08	3.00	2.98	2.60
Total Variable Costs	146.67	162.46	103.76	108.74

Table 4. Financial information for machinery complement for corn-soybean farms (National Market Reports, Inc. 1987)

Equipment	Purchase Year	Purchase Price	Current Mkt Val	Salvage Value	Replacemt Price	Replacement Year
1/2 ton pickup	1984	$8,550[a]	$3,947	$1,283[b]	$9,489[c]	1994
Tractors						
130 hp diesel	1989	37,675	35,540	5,651	37,675	2004
90 hp diesel	1980	22,550	17,575	3,383	32,025	1996
41 hp diesel	1976	6,250	1,000	938	10,400	1991
Tillage[d]						
MB plow (5 bottom)	1981	4,000	2,000	600	5,500	1993
Tandem disc	1981	9,500	5,000	1,425	13,000	1994
Field cultivator	1981	7,500	4,500	1,125	11,000	1996
Row cultivator	1981	2,500	1,500	375	3,800	1997
Rotary hoe	1981	2,000	1,000	300	3,000	1991
Harrow spike	1981	1,500	1,000	225	2,500	1991
Plant/Fertilize						
Planter/disc opener (6 row)	1985	9,924	6,500	1,489	13,000	1995
Saddle tanks (2 @220 gal each)	1977	1,500	850	225	2,000	1994
Harvest						
Combine (100hp)	1982	36,950	28,825	5,543	46,100	1992
Corn header	1982	8,225	6,425	1,234	9,575	1992
Flex platform & ree	1982	5,875	4,575	881	7,000	1992
Barge (400 bushel)	1980	3,500	2,500	525	5,000	1995
Barge (400 bushel)	1980	3,500	2,500	525	5,000	1995
Total		171,499	125,237	25,725	216,064	

[a] Average retail price of equipment at year of purchase.
[b] Salvage value is equal to 15 percent of purchase price.
[c] Replacement prices for equipment are 1986 average retail prices for newer (larger) models of tractors or combine.
[d] Purchase price and replacement price obtained from Iowa implement dealer.

supplement farm cash income, in particular as price support policies are phased out. This type of decoupling policy maintains the concept of entitlement - that producers are entitled to a certain level of income which the government helps to ensure. This is the approach proposed in the FFPA and probably the most widely known type of decoupling because of the efforts of Boschwitz and Boren to promote their proposal.

In the farm simulation, decoupled payments are not tied to production in any manner, and are set at a level equal to the deficiency payment received by the current-program farm during each year of the simulation period as calculated by FLIPSIM (Table 5). Making the decoupled payment equal to the deficiency payment provides a means of comparing the relative farm income for the same level of government expenditure. For the sake of comparison, the decoupled payment calculated according to the formula in the FFPA is shown also in Table 5. The equity payment of the FFPA is considerably larger than the deficiency payment received by the current-program farm. Decoupled payments calculated according to the FFPA imply a much higher level of government expenditure than under current programs for corn and soybean crops.

The current-program farm receives a total of $43,408 in deficiency payments over the period. According to the payment scheme set forth in the FFPA, the decoupled farm would receive a total of $71,823 for the five years, 1990-94, for its corn crop alone, an amount which is 65 percent higher than the deficiency payment under the current program for the seven year period, 1990-96. The difference is due to the policy assumption in the FAPRI forecast that target prices would decline by two percent per year

during the projection period, and, more significantly, the generous formula in the FFPA as described in Tables 1 and 2.

In this farm simulation, the farm changes the crop pattern but not the crop mix, an important and limiting assumption as compared to the flexibility assumed in the FFPA and for decoupling in general. In addition, the cropping mix is constrained in the linear program by maximum and minimum acres of corn and soybeans allowed. The maximum allowed acres for corn in any year is 306 or 75 percent of total acres, and for soybeans, 273 acres or 67 percent of total acres. These constraints were imposed to prevent the farm from shifting abruptly from a corn-soybean rotation one year to continuous corn the next and back again, and to prevent the farm from planting only soybeans. These restrictions on the linear programming model are intended to impose greater realism to the cropping patterns in the absence of program planting restrictions on the simulated farm. Since the model cannot take factors into account such as price and production risk associated with reliance on one crop, the degree to which the farm is allowed to specialize in corn or soybeans is restricted by these external constraints.

Table 5. Deficiency and Equity Payments, 1990-96

Year	Deficiency Payment	Equity Payment	Equity - Deficiency	Equity as % of Deficiency
1990	$10,144	17,956	7,812	177%
1991	9,897	16,160	6,263	163%
1992	7,170	14,365	7,195	200%
1993	6,928	12,569	5,641	181%
1994	5,648	10,773	5,125	191%
1995	2,930	ND		
1996	691	ND		
Average	6,201	14,365	8,163	232%
Total	43,408	71,823	28,415	165%

Equity payment as calculated in the FFPA declines ten percent each year. The Equity payment shown is for corn only.

Realistically, farmers' ability to add a variety of crops in small increments is unlikely given the large incremental expenditures for purchases of specialized equipment, for example for planting or harvesting, that would be used for a small number of acres. However, cash grain farms could add wheat or other feed grains such as oats, barley, and sorghum, relatively easily. But the introduction of such feed crops, hay or other forage would most likely occur in conjunction with a shift to livestock production, not considered in this analysis, which would require a large capital investment, and significant change in farm operations and management. Such a transition to livestock that would take time to institute and may be considered risky in a changing and uncertain policy environment.

In order to take account of the fact that farmers tend to set aside their least productive land, the FLIPSIM model allows the specification of a slippage factor. The net effect of this adjustment is a 4 percent higher yield on the current-program farm in 1990, a 2 percent higher yield in 1991-2, and a one percent higher yield in 1993-97, compared with the yield per acre on the decoupled farms.

If the farm simulation mirrors the aggregate government cost and net farm income results of the FAPRI global free trade projections, the decoupled farm's income should be as high or higher than the current-program farm's income when decoupled payments equal to deficiency payments are included. If the decoupled farm's income is higher than that of the current-program farm, it implies that the cost *for this particular farm* of maintaining farm income under global free trade through transfer payments

is less than through the price support program. Making the same comparison for unilateral free trade, the opposite should be the case: decoupled payments equal to the deficiency payment should not be enough to equalize the incomes of decoupled and current-program farms.

In the FAPRI free trade projections, U.S. net farm income declines due to the loss of government payments. For midwestern cash grain farmers, lower corn and soybean prices imply lower sales receipts and lower net farm incomes, despite the freedom to plant additional acres. With corn prices strengthening and soybean price erosion in the global free trade scenario, the effect on the net farm income of cash grain corn-belt farmers is uncertain and may differ from the overall U.S. net farm income result. In either case, it is expected that net farm income and other financial indicators will show a poorer performance for the free trade scenarios if the farms receive no payments.

Overall, it must be recognized that farm simulation in this case tests a specific farm on the basis of a particular projection of commodity prices. The commodity price projections in turn are the results from a set of commodity models derived from agricultural and economic historical data from the last two decades. Therefore these farm simulation results are presented as one picture of decoupling at the farm level. Simulation results presented here are subject to debate given the relative merits of the two sets of models (FAPRI commodity models and FLIPSIM V) and, more importantly, the assumptions upon which they are based.

CHAPTER V.

RESULTS OF FARM SIMULATION

Net Farm Cash Income

Table 6 presents a comparison of net farm income for the simulated farm under different policy environments. On average for the period, farms without transfer payments or no program farms, have net farm cash incomes far lower than the current-program farm. Under global free trade, net farm cash income is an average of 72 percent of the current-program farm net income, and falls as low as 41 percent. Under unilateral free trade, net farm cash income is negative for six of the seven years of the simulation period, and is as low as -$8,513 in 1996. The only instance of positive net farm cash income under unilateral free trade and no program occurs in 1993, when corn prices recover boosting receipts and interest expenses associated with debts remain at manageable levels.

As prices improve in the FAPRI global free trade projection, the no program farm has higher net farm cash income than the current-program farm in 1995 by 14 percent. However, a higher level of debt interest payments and lower cash receipts reduces its net income the following year to only 41 percent of the net farm cash income of the current-program farm. These adjustments in receipts and cash expenses are discussed in the following sections.

The farms receiving decoupled payments have quite different levels of net farm cash incomes with respect to the current-program farm. In the global free trade scenario, net farm cash income is consistently higher for

Table 6. Net farm Income for Simulated Farms, 1990-96

Policy	1990	1991	1992	1993	1994	1995	1996	Average
CP	18,456	25,033	18,805	21,133	16,793	13,661	7,246	17,304
NPM	8,263	15,712	12,024	19,725	10,256	15,545	2,939	12,066
	45%	63%	64%	93%	61%	114%	41%	70%
DPM	18,407	26,428	20,751	25,258	23,397	23,493	9,582	21,045
	100%	106%	110%	120%	139%	172%	132%	122%
NPU	(3,342)	(1,543)	(1,089)	5,869	(4,513)	(2,631)	(8,513)	(2,252)
	-	-	-	28%	-	-	-	-
DPU	6,802	8,898	6,888	13,417	1,096	3,985	(4,527)	5,223
	37%	36%	37%	63%	7%	29%	-	30%

CP - Current price support programs.
NPM - No programs under multilateral trade liberalization.
DPM - Decoupled payment under multilateral trade liberalization.
NPU - No programs under unilateral trade liberalization.
DPU - Decoupled payment under unilateral trade liberalization.

Percentages represent ratio of alternative policy to current program.

the farm receiving decoupled payments. On average its net income is 22 percent higher than that of the current-program farm, and as high as 72 percent higher in 1995, given the recovery of prices in the FAPRI global free trade projection. In contrast, in the unilateral free trade projection, net farm cash income for the farm receiving decoupled payments is on average only 31 percent of that of the current-program farm.

Comparing the unilateral and global free trade projections, the no program farm under global free trade fares better than the farm receiving decoupled payments under unilateral free trade. On average these farms respective incomes are $12,066 versus $5,223, and both income levels are less than that of the current-program farm, $16,875. These results support the conclusions of aggregate trade studies, that under global free trade government savings would be enough to compensate income losses of producers, but under unilateral free trade government savings would not be adequate to compensate income losses.

Cash Receipts from Sales

Average cash receipts from sales (total production for each crop times market price) were 14 percent higher for the farms under global free trade than for the current-program farm, but 11 percent lower for the farms under unilateral free trade (Table 7). That there is no difference in production behavior between farms receiving decoupled payments and no program farms is due to the fact that decoupled payments do not affect production decisions. In the unilateral and global free trade farm simulations, planting decisions are determined by expectations of relative

crop prices based on a weighted average of the past three years as described in the preceding chapter.

Differences in the levels of cash receipts from sales are due to differences in the price levels and relative prices of corn and soybeans between the policy environments. As shown in Figures 5 and 6, prices are projected to be lower under unilateral free trade than for the other policy projections, and the corn/soybean price ratio is lower. As a result, under unilateral free trade, farms plant a higher proportion of soybeans to corn than under global free trade. Different corn-soybean crop patterns are shown in Table 8. The relative proportions of corn and soybeans reflects a corn-corn-corn-soybeans rotation versus a corn-soybean rotation represented on the current-program farm.

Another difference is the absence of acreage reduction programs for the no program and decoupled farms. In the free trade policy environments and in the absence of acreage reduction programs, farms plant all 408 of their cropland acres, on average 17 acres more than the current-program farm. As a result, even when the deficiency payment is added to the cash receipts from sales on the current-program farm, the no program farm under global free trade has a higher level of cash receipts (by 5 percent on average).

Table 7. Cash receipts from Sales for Simulated Farms, 1990-96

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Cash receipts from sales								
CP	59,840	68,870	68,645	73,712	73,772	77,327	80,472	71,805
NPM	63,521	77,390	77,890	88,000	82,493	93,019	87,904	81,460
	106%	112%	113%	119%	112%	120%	109%	113%
DPM	63,521	77,390	77,890	84,335	86,929	93,019	87,904	81,570
	106%	112%	113%	114%	118%	120%	109%	114%
NPU	51,916	53,337	58,429	67,054	68,948	70,340	74,046	63,439
	87%	77%	85%	91%	93%	91%	92%	88%
DPU	51,916	53,337	58,429	67,054	68,948	70,340	74,046	63,439
	87%	77%	85%	91%	93%	91%	92%	88%
Sales receipts plus deficiency/decoupled payment								
CP	69,984	78,767	75,815	80,640	79,420	80,257	81,163	78,007
NPM	63,521	77,390	77,890	88,000	82,493	93,019	87,904	81,460
	91%	98%	103%	109%	104%	116%	108%	104%
DPM	73,665	87,287	85,060	91,263	92,577	95,949	88,595	87,771
	105%	111%	112%	113%	117%	120%	109%	113%
NPU	51,916	53,337	58,429	67,054	68,948	70,340	74,046	63,439
	74%	68%	77%	83%	87%	88%	91%	81%
DPU	62,060	63,234	65,599	73,982	74,596	73,270	74,737	69,640
	89%	80%	87%	92%	94%	91%	92%	89%

CP - Current price support programs.
NPM - No programs under multilateral trade liberalization.
DPM - Decoupled payment under multilateral trade liberalization.
NPU - No programs under unilateral trade liberalization.
DPU - Decoupled payment under unilateral trade liberalization.

Percentages represent ratio of alternative policy to current program.

Table 8. Corn-Soybean Cropping Pattern for Simulated Farms, 1990-96

Policy/ Crop	1990	1991	1992	1993	1994	1995	1996	Average
				(acres)				
CP								
Corn	163	184	184	194	194	194	194	187
Soybean	204	204	204	204	204	204	204	204
MTL								
Corn	204	306	306	306	306	306	306	291
Soybean	204	102	102	102	102	102	102	117
UTL								
Corn	204	135	135	135	306	135	176	175
Soybean	204	273	273	273	102	273	232	233

Since decoupled payments do not affect production decisions, the relevant comparison is between the different trade scenarios. The total cropped acreage of the farm is 408, the maximum allowed for corn is 306, and for soybeans, 273, as described in the text.

Cash Expense

The greater number of acres cultivated on the decoupled farm on average also have implications for cash expense, including production and harvesting costs (including labor) and operating interest. Table 9 presents the cash expense record for the farms for each year of the period.

Production and harvesting costs are an average of 15 percent higher under global free trade, but only 2 percent higher under unilateral free trade, than on the current-program farm. These higher costs are due to the larger number of acres planted and differences in the crop mix under free trade. Specifically, under global free trade, the farms shift acres to more expensive to plant and harvest corn at $126 per acre. Under unilateral free trade, the farms shift to relatively less expensive to plant and harvest soybeans at $83 per acre, and thus the production cost is approximately equal to or lower than the current-program farm which plants fewer acres but more corn acres.

A second category of expense, long, intermediate term and operating debt interest vary widely depending on the type of trade liberalization and receipt of decoupled payments. The higher these interest payments are, the higher the debt on the farm and the lower the farm net cash income. Farms which receive decoupled payments have lower average total long, intermediate, and operating interest payments. And farms under global free trade have lower average total long, intermediate, and operating interest payments.

Overall, lower interest payments are an indirect indication that the farm receiving a decoupled payment under global free trade is in better

Table 9. Farm Cash Expense for Simulated Farms, 1990-96

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Production and harvesting (includes labor)								
CP	28,857	31,908	33,174	35,906	37,691	39,809	42,252	35,657
NPM	32,014	37,639	39,154	41,132	43,202	45,652	48,484	41,040
	111%	118%	118%	115%	115%	115%	115%	115%
DPM	32,014	37,639	39,154	41,132	43,202	45,652	48,484	41,040
	111%	118%	118%	115%	115%	115%	115%	115%
NPU	32,014	31,392	32,625	34,238	43,202	37,929	42,212	36,230
	111%	98%	98%	95%	115%	95%	100%	102%
DPU	32,014	31,392	32,625	34,238	43,202	37,929	42,212	36,230
	111%	98%	98%	95%	115%	95%	100%	102%
Long, intermediate, and operating interest								
CP	12,322	11,029	12,721	11,982	12,876	14,227	18,553	13,387
NPM	12,601	12,393	14,709	14,687	16,091	18,327	22,377	15,884
	102%	112%	116%	123%	125%	129%	121%	119%
DPM	12,601	11,574	13,152	12,176	12,678	13,309	16,425	13,131
	102%	105%	103%	102%	98%	94%	89%	98%
NPU	12,601	12,482	15,562	15,200	17,316	22,344	27,208	17,530
	102%	113%	122%	127%	134%	157%	147%	131%
DPU	12,601	11,938	14,755	14,580	17,355	18,659	23,912	16,257
	102%	108%	116%	122%	135%	131%	129%	121%

Table 9. continued

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Other								
CP	10,349	10,797	11,115	11,619	12,060	12,560	13,112	11,659
NPM	10,643	11,646	12,003	12,456	12,944	13,495	14,104	12,470
	103%	108%	108%	107%	107%	107%	108%	107%
DPM	10,643	11,646	12,003	12,697	13,300	13,495	14,104	12,556
	103%	108%	108%	109%	110%	107%	108%	108%
NPU	10,643	11,006	11,331	11,747	12,943	12,698	13,140	11,930
	103%	102%	102%	101%	107%	101%	100%	102%
DPU	10,643	11,006	11,331	11,747	12,943	12,698	13,140	11,930
	103%	102%	102%	101%	107%	101%	100%	102%
Total cash expense								
CP	51,528	53,734	57,010	59,507	62,627	66,596	73,917	60,703
NPM	55,258	61,678	65,866	68,275	72,237	77,474	84,965	69,393
	107%	115%	116%	115%	115%	116%	115%	114%
DPM	55,258	60,859	64,309	66,005	69,180	72,456	79,013	66,726
	107%	113%	113%	111%	110%	109%	107%	110%
NPU	55,258	54,880	59,518	61,185	73,461	72,971	82,559	65,690
	107%	102%	104%	103%	117%	110%	112%	108%
DPU	55,258	54,336	58,711	60,565	73,500	69,286	79,264	64,417
	107%	101%	103%	102%	117%	104%	107%	106%

CP - Current price support programs.
NPM - No programs under multilateral trade liberalization.
DPM - Decoupled payment under multilateral trade liberalization.
NPU - No programs under unilateral trade liberalization.
DPU - Decoupled payment under unilateral trade liberalization.

Percentages represent ratio of alternative policy to current program.

financial shape than the current-program farm. All other simulated farms appear to be in worse financial shape according to this indicator. Direct evidence of the relative financial position of simulated farms is provided by relative levels of debt, debt/asset ratios, and amount of principal paid on long and intermediate term debt.

Other farm cash expense includes property taxes, other fixed costs, FCIC crop insurance premiums, and interest and storage costs. Differences in other farm cash expense are due to higher crop insurance premiums and interest and/or storage costs from the harvesting of more acres. Under unilateral free trade projections, the simulated farms pay little or no taxes because their incomes are small or negative.

As shown in Table 9, the total cash expense is highest under global free trade projections primarily due to the higher production and harvesting costs. These farms have total cash expenses on average 14 and 10 percent higher than on the current-program farm. Under unilateral free trade projections, total cash expenses are 6 and 8 percent higher than on the current-program farm, primarily due to the higher total interest costs associated with the higher debt on these farms.

Operator Withdrawals

Operator withdrawals include family living expenses, personal income and self-employment tax payments, and principal payments on long and intermediate term debt as shown in Table 11. The amount the family spends each year is determined using the following consumption function: average consumption + marginal propensity to consume * (disposable income - average

consumption). In addition the simulation model allows the farm to use any extra income each year to accelerate payments of principal on its debts, starting with intermediate term debt. Thus level of family consumption and ending debt position are related to and/or indicative of relative income received by the farms over the simulation period.

Family consumption is highest for the farm receiving decoupled payments under global free trade. Its total family consumption over the simulation period is $147,678 or 6 percent higher than total family consumption on the current-program farm, $139,044. This same farm without decoupled payments maintains a similar level of total family consumption, $134,886. On average under unilateral free trade, farms' total family consumption levels are substantially less than that of the current-program farm. However, it can be seen that the decoupled payment boosts family consumption above that of the no program farm.

In keeping with their respective levels of net farm cash income, personal income and self-employment taxes are highest under global free trade and lowest under unilateral free trade. In particular, the farm receiving decoupled payments under global free trade pays higher taxes than the current-program farm.

Similarly, total payment of principal on long and intermediate term debt is highest under global free trade and lowest under unilateral free trade. A farm's ability to accelerate principal payments is related to its level of income. Again, the farm receiving decoupled payments under global free trade makes larger payments of principal than the current-program farm, and has a lower level of debt at the end of the simulation period.

Table 10. Operator Withdrawals for Simulated Farms, 1990-96

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Family consumption								
CP	21,164	23,202	23,171	24,509	24,935	25,570	19,668	23,174
NPM	19,635	21,804	22,154	24,298	23,955	25,852	19,668	22,481
	93%	94%	96%	99%	96%	101%	100%	97%
DPM	21,156	23,411	23,463	25,128	25,926	27,044	26,160	24,613
	100%	101%	101%	103%	104%	106%	133%	106%
NPU	15,000	15,696	16,381	17,124	17,922	18,769	19,668	17,223
	71%	68%	71%	70%	72%	73%	100%	74%
DPU	19,416	20,782	16,381	23,351	17,922	18,769	19,668	19,470
	92%	90%	71%	95%	72%	73%	100%	84%
Personal income and self-employment tax								
CP	1,500	2,587	3,012	2,009	2,891	2,734	1,190	2,275
NPM	1,500	726	1,255	1,124	1,528	943	1,142	1,174
	100%	28%	42%	56%	53%	34%	96%	52%
DPM	1,500	2,571	3,255	2,376	3,397	3,167	1,830	2,585
	100%	99%	108%	118%	118%	116%	154%	114%
NPU	1,500	0	0	230	716	0	0	349
	100%	0%	0%	11%	25%	0%	0%	15%
DPU	1,500	0	0	230	716	0	0	349
	100%	0%	0%	11%	25%	0%	0%	15%

Table 10. continued

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Principal paid on long and intermediate term debt								
CP	20,963	19,464	13,726	16,765	12,275	9,866	12,161	15,031
NPM	12,299	13,401	9,720	16,454	7,752	13,259	10,312	11,885
	59%	69%	71%	98%	63%	134%	85%	79%
DPM	20,921	20,560	14,899	19,559	16,900	17,156	6,563	16,651
	100%	106%	109%	117%	138%	174%	54%	111%
NPU	5,329	4,928	6,863	7,545	8,927	11,466	14,351	8,487
	25%	25%	50%	45%	73%	116%	118%	56%
DPU	11,057	7,698	10,766	11,400	10,716	6,362	8,777	9,539
	53%	40%	78%	68%	87%	64%	72%	63%
Total withdrawal								
CP	43,627	45,253	39,909	43,283	40,101	38,170	33,019	40,480
NPM	33,434	35,931	33,130	41,876	33,235	40,054	31,122	35,540
	77%	79%	83%	97%	83%	105%	94%	88%
DPM	43,577	46,541	41,617	47,062	46,223	47,367	34,552	43,848
	100%	103%	104%	109%	115%	124%	105%	108%
NPU	21,829	20,624	23,244	24,899	27,565	30,235	34,019	26,059
	50%	46%	58%	58%	69%	79%	103%	64%
DPU	31,973	28,479	27,147	34,981	29,354	25,131	28,445	29,358
	73%	63%	68%	81%	73%	66%	86%	73%

CP - Current price support programs.
NPM - No programs under multilateral trade liberalization.
DPM - Decoupled payment under multilateral trade liberalization.
NPU - No programs under unilateral trade liberalization.
DPU - Decoupled payment under unilateral trade liberalization.

Percentages represent ratio of alternative policy to current program.

Total withdrawal -- for consumption, taxes, and principal payments on debt -- reflects the level of income of the respective farms. The farm receiving decoupled payments under global free trade has the highest income and the highest total withdrawal, higher even than the current-program farm.

Long and Intermediate Term Debt

Table 11 shows the relative levels of long and intermediate term debt on the simulated farms. Under unilateral free trade, the long term debt of the simulated farms increases. Because of low income, the no program farm is forced to refinance its long term debt in 1994 and 1996, and the farm receiving decoupled payments refinances its long term debt in 1996.

With respect to intermediate term debt, each farm's intermediate term debt increases due to predetermined equipment purchases occurring over the simulation period. Only the farm receiving decoupled payments under global free trade can afford to make principal payments such that its intermediate term debt is consistently lower than that of the current-program farm. Of note, ratios of intermediate term debt of no program farms and current-program farm are highest during the years 1991-94, or the years in which the transition between policies occurs.

Debt-Asset Ratios and Ending Net Worth

Debt-asset ratios at the end of the period are highest for the no program farm under unilateral free trade (Figure 15). Reflecting the rise in debt over the simulation period, unilateral free trade farms have higher

debt-asset ratios than at the beginning of the period. The farm receiving decoupled payments under global free trade has a slightly lower debt-asset ratio than the current-program farm. Ending net worth, unadjusted for capital gains, follows the same pattern as shown for debt-asset ratios (Figure 15).

Table 11. Long and Intermediate Term Debt for Simulated Farms, 1990-96

Variable/ Policy	1990	1991	1992	1993	1994	1995	1996	Average
Long term debt								
CP	65,590	64,378	63,051	61,598	60,007	58,265	56,357	61,321
NPM	65,590	64,378	63,051	61,598	60,007	58,265	56,357	61,321
	100%	100%	100%	100%	100%	100%	100%	100%
DPM	65,590	64,378	63,051	61,598	60,007	58,265	56,357	61,321
	100%	100%	100%	100%	100%	100%	100%	100%
NPU	65,590	64,378	63,051	61,598	71,971	70,106	94,414	70,158
	100%	100%	100%	100%	120%	120%	168%	114%
DPU	65,590	64,378	63,051	61,598	60,007	58,265	67,448	62,905
	100%	100%	100%	100%	100%	100%	120%	103%
Intermediate term debt								
CP	21,404	29,720	21,577	25,535	31,608	56,654	50,206	33,815
NPM	30,068	44,447	40,310	44,578	55,175	76,828	72,230	51,948
	140%	150%	187%	175%	175%	136%	144%	154%
DPM	21,445	28,560	19,025	19,841	20,806	37,927	36,276	26,269
	100%	96%	88%	78%	66%	67%	72%	78%
NPU	37,038	59,890	54,354	60,239	82,445	106,014	93,702	70,526
	173%	202%	252%	236%	261%	187%	187%	209%
DPU	31,310	51,392	46,210	55,532	63,166	91,716	84,847	60,596
	146%	173%	214%	217%	200%	162%	169%	179%

CP - Current price support programs.
NPM - No programs under multilateral trade liberalization.
DPM - Decoupled payment under multilateral trade liberalization.
NPU - No programs under unilateral trade liberalization.
DPU - Decoupled payment under unilateral trade liberalization.

Percentages represent ratio of alternative policy to current program.

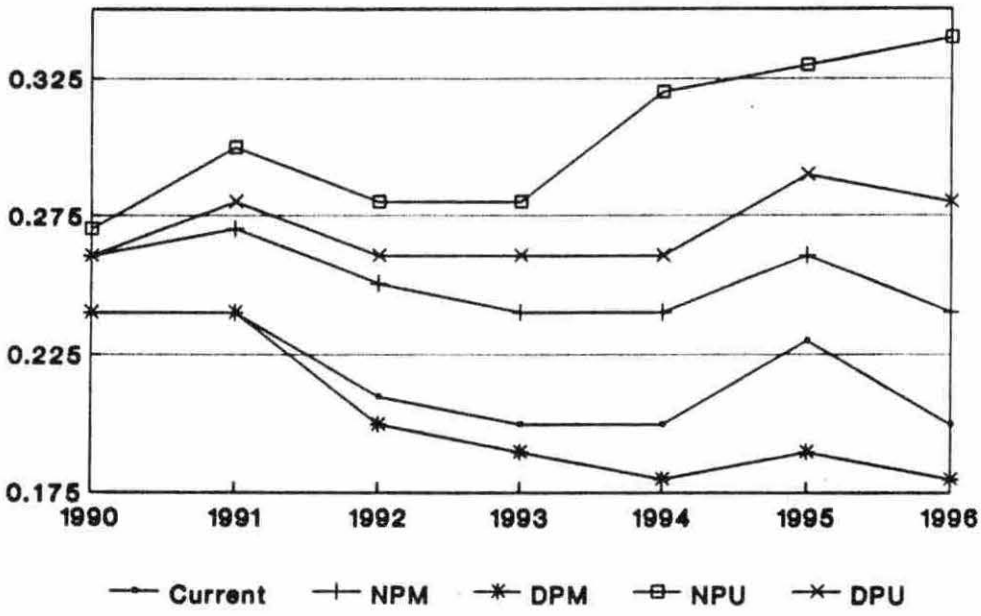

Figure 15. Debt-Asset Ratios for Simulated Farms, 1990-96

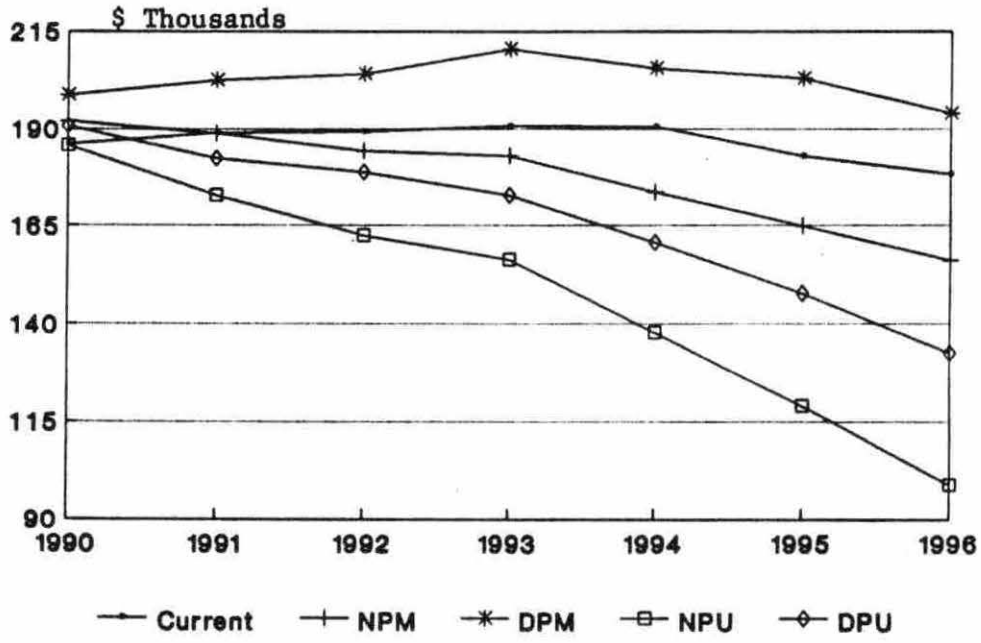

Figure 16. Ending Net Worth for Simulated Farms, 1990-96

CHAPTER VI.

DISCUSSION OF RESULTS

The following discussion of results focuses only on comparison of the global free trade scenario (with and without decoupled payments) and the current policy scenario. For the sake of clarity and simplicity, the global free trade farm without payments will be referred to as the no-program farm and the farm receiving decoupled payments will be referred to as the decoupled farm.

That the total cash receipts from sales of the no program farm are higher than the current-program farm (even when deficiency and diversion payments are included) is due to: (1) utilization of all cultivatable acres on the farm; (2) shift of two-thirds of its acreage into corn production; (3) recovery of the corn price in the FAPRI global free trade scenario; and (4) declining target price level assumed as the policy for the current-program over the period 1990-96. Increasing the current-program target price could equalize the cash receipts of the farms, but only at a higher cost to the government. For example, if the target price was assumed to be a constant $2.75 throughout the period, the total value of deficiency payments would be $60,880, or 40 percent higher than the total with declining target prices. Nevertheless, as prices recover in the mid-1990s in the FAPRI global free trade projection, even this higher level of support for the current-program farm is only just enough to equalize its total cash receipts with cash receipts from sales only of the no-program and decoupled farms.

Harvesting more acres, the no-program and decoupled farms' production costs total more than the current-program farm. The result for the no-program farm is lower net farm cash income, but for the decoupled farm, higher net farm cash income than the current-program farm. That the net farm cash income on the current-program farm is higher than on the no-program farm reflects the balance between policies and price projections for the current farm program and global free trade. These results suggest that market prices higher than those in the FAPRI global free trade projections are necessary for the no-program cash grain farm to attain income parity with the current-program farm.

In addition, without transfer payments or a higher market price, the no-program farm accumulates a substantially higher level of debt than the current-program farm: 44 percent higher at the end of the simulation period in 1996. As a result, the no-program farm has the added financial burden of higher annual interest costs: on average 19 percent higher than on the current-program farm. These interest costs further reduce the no-program farm's net farm income relative to the current-program farm.

In contrast, receiving a transfer payment clearly increases the simulated farm's net cash income. The increase is greater than one dollar of net income per dollar of transfer payment. If the decoupled payment were subtracted from the net cash income of the decoupled farm, its resulting farm income would be slightly higher on average than that of the no-program farm, and yet be lower on average than the income of the current-program farm.

The reason that the transfer payment can be more than merely an

addition to net income is due to differences in behavior between the decoupled farm and the no-program farm. Specifically, the decoupled farm in this case obtains a slight net gain in cash receipts from shifting the sale of a higher proportion of crop production to the next tax year for which, in this simulation, it receives a more favorable price. That the transfer payments may result in the decoupled farms obtaining additional income through more flexible marketing decisions is overlooked in simple comparisons of decoupled and current programs.

Theoretical analyses such as Schmitz show that it may be possible to compensate producers under international trade liberalization from the savings accruing to (1) the government from the elimination of commodity programs, and (2) consumers from lower market prices. Aggregate analyses of world agricultural commodity markets, such as the FAPRI evaluation of global free trade, provide some empirical support for this theoretical hypothesis. The results of this farm simulation also provide support at the farm level for Schmitz's theoretical analysis.

Referring again to the example where target prices are increased to the $2.75 level throughout the simulation period, average net farm cash incomes are about equal for the current program ($20,266) and the decoupled farm ($21,045). This comparison suggests the robustness of the relative results to assumptions about changes in policy. Thus while it is extremely unlikely that transfers of income the size of those suggested by the FFPA will be politically feasible or affordable, this study indicates that payments of a lesser magnitude may provide adequate income protection relative to current program projected net farm cash income.

Farm level simulation allows a closer look at the impact of the decoupled payment on the farm's financial condition. In this case, a decoupled payment equal to the deficiency payment received by the current-program farm enables the decoupled farm to end in better financial condition than the current-program farm. The specific implication is that a smaller government outlay is needed in a decoupled policy environment under global free trade to achieve the same level of financial well-being *for this particular type and size of farm* as under current price support programs.

Of course, numerous caveats must be considered regarding these simulation results:

(1) uncertainty about reductions in yields on the decoupled farm associated with planting the formerly set aside acreage;

(2) impact on producer behavior of greater downside price risk in the decoupled policy environment;

(3) speculation about the level of price instability under global free trade;

(4) commodity price levels may differ from the FAPRI projections (higher or lower), particularly regarding the assumption about the speed of transition (three years) to free trade; and

(5) the results for a specific size and type of farm are not representative of other types of farms or possible to aggregate due to the different farm types, farmer responses to policy change, and different price movements associated with other commodities in the FAPRI projections.

Lower average farm yields for decoupled farms, e.g. the planting of formerly idled and less productive acres, would of course reduce cash receipts from sales and income. On the other hand, adding nitrogen fixing crops to the rotation could have the effect of boosting corn yields on the decoupled farm. Greater price instability and the greater downside price

risk will have uncertain implications for behavior: to what extent can and will farmers change input use patterns, cropping patterns, and alter marketing strategies? A slower transition (a ten-year phase out period has been proposed by the United States in the GATT negotiations) implies a smoother adjustment in international markets and perhaps higher average price levels throughout. This would indicate that relatively lower levels of decoupled payments may provide adequate income protection/support during this period, if the same assumptions about the macro-economy hold as in the FAPRI projections. Finally, these results should be considered a point of comparison for other cash grain, corn-soybean farms, requiring adjustments for size of operation and associated economies of scale, etc. A valuable extension of these results would be the inclusion of livestock activities and the associated expansion of cropping activities to include forages, oats, and barley, for on-farm feeding.

Overall, the farm simulation approach represented in this study offers a more comprehensive look at the relative financial condition of price support and decoupled farms in their respective policy and market environments over a multi-year time horizon. Included are important behavioral and financial variables left out of more simplistic, single-year comparisons of decoupled and price support policies: changes in production patterns, marketing behavior, taxes, level of debt and interest payments, prepayment of debt, family consumption (marginal propensity to consume additional disposable income), and ending farm net worth.

The farm simulation results are not optimistic for unilateral free trade scenarios, even including decoupled payments. Global free trade in

agriculture may be achieved through agreements in the GATT negotiations. Success in these negotiations would begin a new era for agricultural trade and direct unprecedented changes in U.S. and other countries' agricultural policies. Of primary interest in this study is the confirmation of the potential for attaining/maintaining comparable levels of farm income with reasonable (by 1980 standards) levels of government outlays, in this case in the form of decoupled payments to certain producers. Thus the farm simulation analysis conducted in this study provides an additional and unique perspective in the debate about the relative merits of decoupling and its presumed impacts on agriculture.

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