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California Agricultural Experiment Station
Giannini Foundation of Agricultural Economics
January 1986

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# MACROECONOMIC LINKAGES, TAXES, AND SUBSIDIES IN THE U. S. AGRICULTURAL SECTOR*

## Introduction

Thus far in the 1980s, the U. S. agricultural sector has been dramatically influenced by macroeconomic policies. In October of 1979, the Federal Reserve adopted a policy of attempting to control the money supply directly, rejecting their previous policy of targeting interest rates. The Reagan Administration has adopted a policy of reducing federal taxes and expenditures, with significantly more success achieved in reducing revenues. Huge federal government deficits have resulted which the Federal Reserve has not monetized.

This combination of policies has driven ex post real interest rates to all-time highs, reversing the decline of the U. S. dollar that occurred throughout the 1970s. These phenomena, along with (a) increased international competition for U. S. agriculture; (b) the reduction of some barriers to trade which enhanced supply response abroad; (c) a significant decline in the rate of export growth that faces the United States; and (d) the record crops of 1981 and 1982 that enhanced the attractiveness of the farmer-held reserve, all combined to cause significant decreases in real agricultural prices during the 1980s.

In the early 1970s, macroeconomic conditions affecting the agricultural sector were almost the exact opposite of those in the 1980s. In 1972-73, the magnitude of increases in real prices of farm products surprised even the most informed people within the public and private sectors. The move to flexible exchange rates, the rapid expansion of international markets, the emergence of a well-integrated international capital market, and the decreasing barriers between the agricultural economy and other domestic economic sectors all

resulted in significant changes in the agricultural sector. During this period, the Federal Reserve expanded the U. S. money supply with the effective objective of accommodating increases in the real price of energy; other countries also attempted to inflate away energy price shocks.

These monetary phenomena, combined with (a) the steadily declining value of the U. S. dollar on international currency markets; (b) the existence of barriers to trade which insulated many countries from international prices; (c) export demand growth from a number of countries; and (d) the elimination of the huge governmental stocks that had accumulated during the 1960s,[1] all pointed in the same direction of rapidly increasing U. S. agricultural commodity prices.

In addition to the external linkages with the domestic and international economies, government commodity policies continue to play a major role. Numerous surveys and evaluations of U. S. agricultural policy have been conducted (Brandow; Gardner; Rausser and Farrell), and many views exist on the formal justification for governmental intervention. For instance, Rausser argues that the only market failure justification for governmental intervention is instability and the absence of markets to insure against risks.

In recent years, less emphasis has been placed on the inherent instability in commodity markets and more emphasis has been placed on external linkages with other markets. The deregulation of the credit and banking system and the shift from fixed exchange rates to flexible rates have increased the exposure of commodity markets to international money markets and real trade among countries. Also, greater dependence on trade since the early 1970s has left U. S. agriculture more exposed to shocks from foreign markets.

The linkages of commodity markets with U. S. money markets are indeed pervasive. Since farming is extremely capital intensive[2] and debt-to-asset

ratios have risen dramatically over the last 10 years, movements in real interest rates have significant effects on the cost structure facing agricultural production. Stock carrying in storable commodity systems is sensitive to changes in interest rates; and for nonstorable commodities (for example, live cattle and live hogs), breeding stocks are interest-rate sensitive. Adding the influence of interest rates on the value of the dollar, fiscal and monetary policies exert pressure on grain products from both the demand side (export demand, domestic livestock grain demand, and stockholding demand) and the cost side.

Along with these interest rate effects, there appear to be differential effects of monetary policy between agricultural and nonagricultural markets. If agricultural commodity markets behave as "flex price" markets while other markets behave as "fixed price," there will be different speeds of adjustment in the two types of prices following changes in monetary policy. This means that real increases in agricultural prices will occur even if expectations are formed rationally (Frankel and Hardouvelis). This is analogous to the exchange rate overshooting first studied by Dornbusch and amounts to either a tax or a subsidy for agriculture (Stamoulis, Chalfant, and Rausser). Overshooting can introduce further instabilities into a sector that is already inherently unstable.

In the United States, high interest rates and a strong dollar work together with corresponding contractions in world income and agricultural export demand to draw resources out of agricultural production. Only in this fashion will the agricultural sector reach an equilibrium with the balance of the U. S. economy. Without governmental intervention, however, farmers are face with an adjustment tax because of agriculture's capital intensity and its dependence on international trade. Over the period from 1980 to 1983, this tax

took the form of higher interest payments and lower commodity prices in cases where the supply of goods was not shrinking fast enough. An additional tax was imposed in the form of a significant drop in farmers' stock of wealth. With government intervention, of course, much of the burden of adjustment appears as increases in the costs of agricultural programs. Precisely the opposite situation occurred from 1973 to 1975. Government policies, the accumulation of wealth through large increases in land values, and increasing productive capacity left the agricultural sector ripe for the shocks of the 1980s.

In this paper, we address a number of issues. First, is the above story consistent with the empirical facts? Second, what are the major linkages between the agricultural sector and the rest of the economy? Third, what is the order of magnitude of external effects in explaining agriculture's behavior in the 1970s and 1980s? A principal constraint facing any empirical attempt to address these issues is the lack of adequate sample data on flexible exchange rates and interest rates facing the U. S. agricultural sector. In the case of flexible exchange rates, approximately 11 years of data are available; in the case of truly flexible nominal interest rates facing agriculture, only five years of data are available. As a result, the empirical work here will be based on a quarterly representation. This frequency is also necessary to capture the effects of instability on stocks and prices. Two major policy simulation experiments are reported. The results demonstrate convincingly the importance of monetary and fiscal policy for the performance of the U. S. agricultural sector. Finally, some concluding remarks are presented which focus on the design of agricultural sector policies for responding to commodity market overshooting.

## Model Structure

The econometric model we constructed is a quarterly, short-run model with three sectors--agricultural, macroeconomic (nonagricultural), and international. The intended use of the model is to evaluate policy impacts; hence, the emphasis is on the inclusion of all policy variables of interest--both macroeconomic and agricultural. Table 1 gives a summary of the policy variables which are included in the model. Figure 1 illustrates the major linkages between equations of the model. A brief discussion of the structure of the estimated model is presented in this section.[3]

The specification of the model follows the fixed-flex price distinction advanced by Hicks and Okun; the agricultural sector is modeled as a set of auction markets while the nonagricultural sector is characterized by gradual adjustment of prices. The major components of the nonagricultural representation are domestic aggregate demand (aggregate consumption, aggregate domestic investment, and a government finance sector); aggregate supply represented by price and wage equations; and a monetary/financial sector. Nonagricultural prices are determined by a markup over wages (adjusted for productivity) and material costs, the gap between potential and actual income, and expected money growth rates as a proxy for inflationary expectations.

The monetary/financial component consists of a money demand equation, a money supply process, and interest rate determination equations. A key element of this sector is that proxies for the excess demand for credit are entered into the short-run interest rate equation. The first variable--to capture public demand for credit--is the ratio of government deficits to nonborrowed reserves, and the private-sector counterpart is the ratio of disposable income to nonborrowed reserves.

TABLE 1

Model Policy Instruments and Selected Endogenous Variables

| Policy instruments | Selected endogenous variables |
|---|---|
| **Macroeconomy** | |
| Fiscal | Consumption |
| 1. Tax rate-government revenue | Investment |
| 2. Government expenditures | Money stock |
| | Nominal interest rates (term structure) |
| Monetary | Real interest rates |
| | Prices |
| 1. Nonborrowed reserves | Inflation rate |
| 2. Reserve requirement ratio | Unemployment |
| 3. Discount rate | |
| 4. Open-market operations | |
| **International** | |
| 1. Fixed exchange rate | Exports (nonfarm) |
| 2. Exchange rate intervention | Exports (farm) |
| | Imports (nonfarm) |
| | Exchange rate |
| **Agricultural sector** | |
| 1. Land diversion | Grains (feed grains and wheat) |
| 2. Additional voluntary land diversion | |
| 3. Target price | Production |
| 4. Support price | Domestic demand |
| 5. Deficiency payment | Export demand |
| 6. Release price (farmer-owned reserve) | Market inventories |
| 7. Commodity Credit Corporation interest rate subsidy | Farmer-owned reserve inventories |
| | Government-owned inventories |
| 8. Import quotas | Prices |
| 9. Export subsidies | |
| | Livestock (beef, pork, and broilers) |
| | Meat demand (domestic) |
| | Animal placements |
| | Meat production |
| | Breeding inventories |
| | Meat prices |
| | Farm income |
| | Market based |
| | Government transfers |
| | Budget cost of agricultural policies |

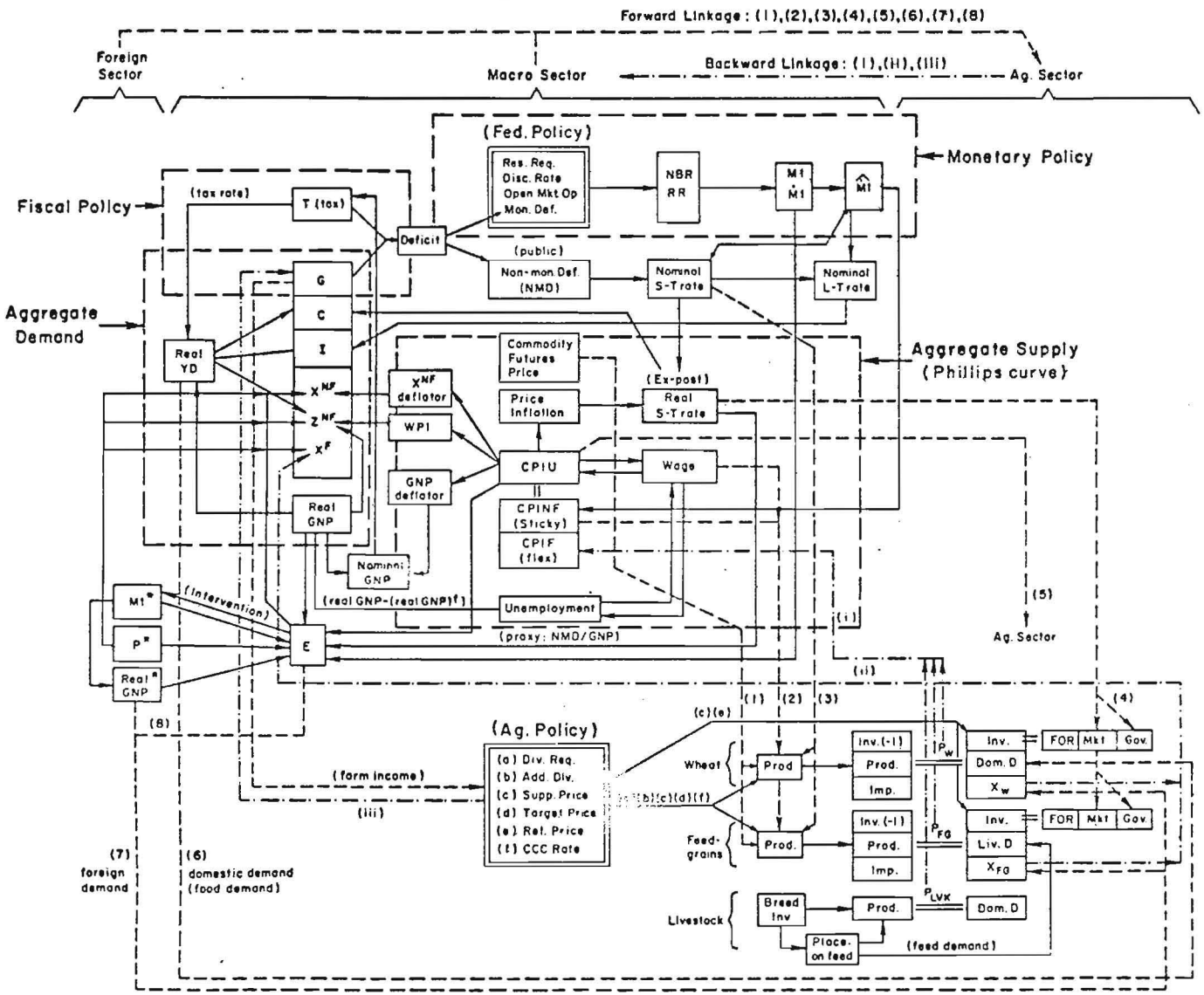


Figure 1. Forward and Backward Linkages Among Model Components.

The nonagricultural portion of the international sector consists of imports and exports of nonagricultural goods and the dollar/rest-of-world exchange rate. Rest-of-world income, prices, and monetary/financial variables are treated as exogenous. The equation for exchange-rate determination follows the asset market framework (Frankel). Similar to the short-term interest rate specification, a proxy for the excess demand for credit arising in the public sector is included as an explanatory variable in the exchange rate equation. It is defined as the ratio of nonmonetized deficits to nonborrowed reserves.

The agricultural sector, aside from the influences of government intervention, is specified as a series of flexible-price markets--wheat, feed grains, beef, poultry, and pork are the sectors included. There are equations for acreage and yields of the crops as well as domestic food and feed demands; private storage demand; government storage demand; the farmer-owned reserve; and export demands. Expected profits from compliance and noncompliance with government programs are the main variables affecting yields and acreages--increases in the former tending toward lower acreages and higher yields, with the opposite effect from the latter variable.

Real interest rates are the important influences in the stockholding equations, with higher rates leading to reduced stockholding. Real interest rates and the levels of stocks are the main determinants of the market price for which a separate equation is estimated. As one might expect, all stocks depress prices, but market stocks have a larger effect than either government-owned stocks or farmer-owned reserves so that there are price effects from moving grain into government storage.

The livestock sector includes a similar set of equations for each of the three products--beef, pork, and poultry. Per capita meat demands are modeled in price-dependent form as functions of own quantity, the price of substitute meats, and income. The supply side of these markets includes inventories, breeding stocks, and placements on feed. The main influences in the livestock markets are the interest rate and the level of income from outside the agricultural sector and the level of feed costs from within.

The model thus incorporates a number of linkages with the rest of the economy. Most of these enter in the usual ways--income and prices in demand curves, the general price level as a deflator, and interest rates as an opportunity cost of holding all stocks. From the international side, rest-of-world income and prices enter agricultural export equations in a similar fashion as does the exchange rate. Following Chambers and Just and Nishiyama and Rausser, the exchange rate is entered as a separate regressor in the export equations. Several reasons have been advanced for such a specification; but, unfortunately, it is difficult to interpret which of these, if any, accounts for its importance in a particular regression.

## Policy Simulation Experiments

The validation exercises for each of the three components (macro, international, and agriculture) have focused on the ex post forecasting properties of the model. To assess the internal consistency of the model, the stability characteristics of the parameters of the model have been examined over some major, distinguishable regimes that define the nature and structure of linkages between the agricultural sector and the macro and international economies. The results of these exercises are outlined in the comprehensive

version of this paper which is available upon request. In general, these results suggest the model is sufficiently accurate for policy impact analysis.

Our simulation experiments evaluate the effects on the agricultural sector of two alternative scenarios, one corresponding to a "tax period" (similar to 1981-1983) and another to a "subsidy period" (featuring the easier money and weaker dollar of 1972-1974). The major endogenous variables that distinguish these scenarios are related to monetary policy. The tax environment is one of tight money, while a subsidy represents an easy money environment. Tightness of monetary policy is determined by the percentage of the federal budget deficit financed by monetization.

The simulation covers the 12 quarters beginning with 1984 and ending in 1986. Hence, actual deficits were available for 1984 while, for 1985 and 1986, the deficit levels projected by the Congressional Budget Office were utilized. After some preliminary simulations, it was decided that the subsidy scenario would consist of an approximately 30 percent monetization, i.e., 30 percent of the deficit would be added to the Federal Reserve's holdings of Treasury securities cumulatively beginning with the last quarter of 1983. The remaining portion of the deficit is presumed to be financed by the sale of government securities to the public. In a couple of periods, a 30 percent figure resulted in extremely high money growth, so these values were replaced with average growth rates. The level of Federal Reserve's holdings of Treasury securities was adjusted downward accordingly.

A cumulative increase in the Federal Reserve's holdings of Treasury securities augments the monetary base and, thus, the stock of money and bank reserves. To derive figures for nonborrowed reserves and the required reserves used in the interest rate equation, the ratio in 1983:4 of these

variables to the Federal Reserve's holdings of government securities was used. This ratio has remained fairly constant over time; the values used were equal to .283 for nonborrowed reserves and .235 for required reserves. These were used to generate reserve figures from the Federal Reserve's government security holdings. For the sake of simplicity, the growth of money and nonborrowed reserves was set equal to the growth rate of the Federal Reserve's holdings of securities.

Deficit monetization affects the nominal short-run interest rate both through the liquidity effect (changes in bank reserves) and through the inflation premium effect (changes in money growth). The part of the deficit that is not monetized enters the model as the capital market pressure variable that directly affects the exchange rate. The nonborrowed reserves grow at an average annual rate of 18 percent in the subsidy period. For the tax scenario, the Federal Reserve is assumed not to monetize any of the federal government deficit. The Federal Reserve follows a tight policy in which money grows at the rate of growth of potential income (or full employment income) and so do the bank reserve variables in the system. Growth in nonborrowed reserves averages 3 percent for the tax period.

The higher level of monetization of the deficit in the subsidy period pushes up nominal interest rates through inflationary expectations. On the other hand, there is greater upward pressure on real rates of interest in the tax period due to lower growth in liquidity combined with the same large deficit as in the subsidy period. Net results are apparent from table 2--the nominal interest rate is lower in the subsidy period after the first quarter, while ex post real rates of interest (nominal rates minus the percentage change in the Consumer Price Index) are substantially lower in all quarters.

TABLE 2

Major Macroeconomic and International Variables
Under Subsidy and Tax Scenarios

| | Short-term nominal interest rates | | Real short-term interest rates | | Nominal exchange rate | | Annual rate of inflation | | Real GNP | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Subsidy scenario | Tax scenario | Subsidy scenario | Tax scenario | Subsidy scenario | Tax scenario | Subsidy period | Tax period | Subsidy period | Tax period |
| 1983 | | | | | | | | | | |
| Quarter 1 | 8.34 | 8.34 | 4.74 | 4.74 | 0.94 | 0.94 | 3.60 | 3.60 | 1,491.00 | 1,491.00 |
| 2 | 8.62 | 8.62 | 5.28 | 5.28 | 0.92 | 0.92 | 3.42 | 3.42 | 1,524.80 | 1,524.80 |
| 3 | 9.34 | 9.34 | 6.77 | 6.77 | 0.89 | 0.89 | 2.57 | 2.57 | 1,550.20 | 1,550.20 |
| 4 | 9.21 | 9.21 | 5.90 | 5.90 | 0.89 | 0.89 | 3.30 | 3.30 | 1,572.70 | 1,572.70 |
| 1984 | | | | | | | | | | |
| Quarter 1 | 11.44 | 10.92 | 6.27 | 6.44 | 0.88 | 0.86 | 5.17 | 4.48 | 1,648.79 | 1,650.20 |
| 2 | 11.77 | 12.71 | 5.57 | 7.92 | 0.88 | 0.86 | 6.20 | 4.79 | 1,715.80 | 1,717.35 |
| 3 | 13.65 | 13.94 | 5.31 | 8.71 | 0.90 | 0.84 | 8.34 | 5.23 | 1,777.29 | 1,779.59 |
| 4 | 14.07 | 14.82 | 4.13 | 9.51 | 0.91 | 0.81 | 9.40 | 5.30 | 1,813.57 | 1,814.76 |
| 1985 | | | | | | | | | | |
| Quarter 1 | 14.02 | 14.83 | 3.23 | 9.73 | 0.99 | 0.80 | 10.79 | 5.10 | 1,818.38 | 1,811.77 |
| 2 | 13.37 | 14.55 | 2.76 | 10.00 | 1.07 | 0.79 | 10.61 | 4.55 | 1,825.34 | 1,816.23 |
| 3 | 14.29 | 15.35 | 4.67 | 11.46 | 1.16 | 0.77 | 9.62 | 3.89 | 1,834.85 | 1,814.35 |
| 4 | 14.70 | 17.78 | 5.52 | 14.37 | 1.23 | 0.74 | 9.20 | 3.41 | 1,841.46 | 1,802.68 |
| 1986 | | | | | | | | | | |
| Quarter 1 | 14.60 | 18.08 | 5.88 | 15.10 | 1.33 | 0.72 | 8.71 | 2.99 | 1,869.09 | 1,805.03 |
| 2 | 14.19 | 19.52 | 5.44 | 16.96 | 1.44 | 0.71 | 8.75 | 2.56 | 1,900.02 | 1,799.95 |
| 3 | 14.65 | 21.77 | 5.91 | 19.68 | 1.66 | 0.70 | 8.74 | 2.11 | 1,943.48 | 1,798.41 |
| 4 | 15.47 | 22.36 | 6.20 | 20.79 | 1.69 | 0.69 | 9.27 | 1.58 | 1,983.62 | 1,790.26 |

Source: Computed.

These interest rates, along with assumed paths for a number of other exogenous variables, were used to generate results for the other variables of the macroeconomy which act upon the agricultural sector. Low real interest rates and easy money have the expected effect on income (real GNP) which is 12.6 percent higher in the subsidy period by the end of the 12 quarters. The trade-weighted index of the dollar's value is higher (a lower value for dollars per rest-of-world currency) by more than 100 percent by 1986:4 for the tax period. This represents an appreciation of nearly 20 percent in the tax period and a near 90 percent devaluation in the subsidy over the dollar's 1983:4 value. Finally, the effects of money growth and income growth on prices are seen in table 2 by the higher rates of inflation in the subsidy period, running from a differential of 0.69 percent in 1984:1 to a near 8 percent differential by the end of the simulations.

It should be noted that the differences reported in table 2 are based on the assumption that foreign variables remain unchanged in the two scenarios. If foreign variables tend to move in the same direction as U. S. variables do, then the differentials reported above will change.

Higher levels of income in the subsidy period increase the price level by increasing excess demand for goods. This effect is then transmitted to the rest of the price variables in the model. Not surprisingly, the nominal nonfood price indexes are higher in the subsidy period. This is due both to the money growth and excess demand for goods impact on the CPINF index. As expected, the nominal wage rate is higher in the subsidy period, but this result is reversed when real wages are evaluated.

For the simulations reported here, the endogenous variables generated by the macro and international components were treated as predetermined and the behavior of the U. S. agricultural sector was simulated. The basic policy

instruments under the 1981 Food and Agriculture Act are incorporated. For 1984 and 1985, we use the actual settings; for 1986, we repeat 1985 values. The simulations for the agricultural sector were also conducted under both a "passive" and an "active" public stock policy. In the case of the passive stock policy, if market prices fell below support prices, the government did not intervene by acquiring additional public stocks to raise market prices to the support level. In the case of the active public stock policy, such actions were undertaken by the government to bring market prices in close proximity to the support levels.[4]

The supply response implications of the two alternative scenarios are not dramatic. This is in large part because of the very favorable settings for target prices. In the case of feed grains, the endogenous expected prices that are generated do not exceed the target prices. In the case of wheat, however, target prices are exceeded for the last year of the horizon during the subsidy scenario. As expected, nonparticipation profits grow during the subsidy period, particularly for wheat. As a result, the acreage allocated to wheat is 5 million acres higher in the last year of the horizon for the subsidy scenario versus the tax scenario. In the case of both feed grains and wheat, the differences in yields are very small. In fact, yields are generally higher in the tax scenario largely because of slippage under program compliance.

Nominal and real prices for feed grains and wheat are reported in table 3. In both cases, rather sizable differences exist in the nominal prices between the two scenarios. In the case of wheat, the nominal differences are substantial. Since cash prices are substantially higher than the support price, the share of wheat stocks held by the public sector is rather minimal during the subsidy scenario. Correspondingly, the governmental costs

TABLE 3

Feed Grain and Wheat Prices Under Subsidy and Tax Scenarios

| | FEED GRAIN | | | | WHEAT | | | |
|---|---|---|---|---|---|---|---|---|
| | Nominal prices[a] | | | Percentage difference between real prices: subsidy vs. tax scenario[b] | Nominal prices[a] | | | Percentage difference between real prices: subsidy vs. tax scenario[b] |
| | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | |
| | dollars per bushel | | | percent | dollars per bushel | | | percent |
| 1983 | | | | | | | | |
| Quarter 1 | | 2.54 | | | | 3.61 | | |
| 2 | | 2.99 | | | | 3.77 | | |
| 3 | | 3.21 | | | | 3.53 | | |
| 4 | | 3.16 | | | | 3.54 | | |
| 1984 | | | | | | | | |
| Quarter 1 | 3.46 (1.12)[c] | | 3.45 (1.12) | 0.00 | 3.55 (1.15) | | 3.55 (1.16) | - 0.86 |
| 2 | 3.68 (1.17) | | 3.58 (1.15) | 1.74 | 3.31 (1.05) | | 3.36 (1.08) | - 2.78 |
| 3 | 3.89 (1.20) | | 3.73 (1.18) | 1.69 | 3.25 (1.00) | | 3.33 (1.06) | - 4.76 |
| 4 | 2.92 (0.88) | | 2.63 (0.82) | 7.32 | 3.60 (1.08) | | 3.63 (1.14) | - 5.26 |
| 1985 | | | | | | | | |
| Quarter 1 | 2.89 (0.85) | | 2.51 (0.78) | 8.97 | 3.64 (1.06) | | 3.53 (1.10) | - 3.63 |
| 2 | 2.86 (0.82) | | 2.53 (0.78) | 5.13 | 3.44 (0.99) | | 3.07 (0.94) | 5.32 |
| 3 | 2.99 (0.84) | | 2.80 (0.86) | - 2.32 | 3.55 (1.00) | | 3.23 (0.98) | 2.04 |
| 4 | 2.65 (0.73) | | 2.45 (0.74) | 1.35 | 4.02 (1.10) | | 3.59 (1.09) | 0.92 |
| 1986 | | | | | | | | |
| Quarter 1 | 2.69 (0.72) | | 2.77 (0.83) | -13.25 | 4.25 (1.14) | | 3.35 (1.01) | 12.87 |
| 2 | 2.77 (0.73) | | 2.80 (0.84) | -12.05 | 4.26 (1.12) | | 2.90 (0.87) | 28.74 |
| 3 | 2.93 (0.76) | | 2.75 (0.82) | - 7.32 | 4.43 (1.14) | | 3.13 (0.93) | 22.58 |
| 4 | 2.60 (0.65) | | 2.32 (0.69) | - 5.80 | 5.24 (1.32) | | 3.28 (0.98) | 34.69 |

[a]Price at farm, U. S. average.

[b]$(P_s - P_t)/P_t$, where $P_s$ = real price under the subsidy scenario and $P_t$ = real price under the tax scenario.

[c]Figures in parentheses are real prices.

Source: Computed.

for the wheat program under the subsidy scenario are relatively small. In the case of the real price differentials between the tax and subsidy scenarios for wheat, they grow dramatically from the second quarter of 1985 through the last quarter of 1986 reaching a difference of almost 35 percent. In the case of corn, the nominal differences are distinctly larger during the subsidy scenario for the four quarters of 1985 but larger for only two quarters of 1986. Real prices for the subsidy scenario are generally higher during 1985 but lower during 1986 for corn. This is in large part due to the active public stock policy which forces the government to enter the market and demand stocks from the private sector. The share of stocks held by the government is dramatically higher under the tax scenario versus the subsidy scenario for corn.[5]

Without the active public stock policy, the depressing effects of the macroeconomic factors would drive corn prices below support levels in the last five quarters of the tax period with real prices also dropping dramatically. At harvest, corn prices fell below support in 1981 and 1982, with the 1982 price falling as low as 39 cents below support. Hence, the model replicates fairly well the effects of a macroeconomic conditions on corn prices.

As can be seen from the results recorded in table 4, exports play a major role in transmitting the effects of macroeconomic monetary/fiscal policy to the agricultural sector. Particularly in the case of wheat, macroeconomic "subsidy type" policies generate values of the exchange rate which dominate the effects of higher wheat prices. Wheat, of course, is far more sensitve to exchange rate movements than feed grains. In the case of wheat, export utilization dominates domestic utilization whereas the opposite situation exists for feed grains.

TABLE 4

Export and Major Domestic Demand Under Subsidy and Tax Scenarios

| | FEED GRAIN | | | | | | WHEAT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Export | | | Domestic demand | | | Export | | | Domestic demand | | |
| | Subsidy scenario | Actual | Tax scenario | Subsidy scenario | Actual | Tax scenario | Subsidy scenario | Actual | Tax scenario | Subsidy scenario | Actual | Tax scenario |
| | million metric tons | | | | | | million bushels | | | | | |
| 1983 | | | | | | | | | | | | |
| Quarter 1 | | 14.77 | | | 40.20 | | | 442.10 | | | 151.40 | |
| 2 | | 8.30 | | | 24.40 | | | 228.30 | | | 96.80 | |
| 3 | | 16.10 | | | 29.50 | | | 475.30 | | | 210.10 | |
| 4 | | 15.70 | | | 49.30 | | | 362.60 | | | 160.70 | |
| 1984 | | | | | | | | | | | | |
| Quarter 1 | 12.34 | | 12.25 | 39.31 | | 39.31 | 346.39 | | 345.54 | 127.30 | | 127.36 |
| 2 | 6.65 | | 6.56 | 23.23 | | 23.19 | 213.59 | | 211.78 | 71.08 | | 71.20 |
| 3 | 14.49 | | 14.12 | 29.87 | | 29.83 | 489.47 | | 482.84 | 191.78 | | 191.97 |
| 4 | 13.64 | | 13.19 | 47.71 | | 47.63 | 343.01 | | 329.00 | 128.62 | | 129.25 |
| 1985 | | | | | | | | | | | | |
| Quarter 1 | 11.37 | | 9.94 | 39.16 | | 39.08 | 346.24 | | 316.41 | 126.06 | | 126.86 |
| 2 | 6.36 | | 4.41 | 23.73 | | 23.63 | 243.44 | | 196.58 | 71.51 | | 72.65 |
| 3 | 15.02 | | 12.59 | 31.68 | | 31.50 | 542.77 | | 471.23 | 193.32 | | 194.05 |
| 4 | 14.05 | | 11.26 | 49.23 | | 48.86 | 401.86 | | 316.07 | 128.40 | | 129.80 |
| 1986 | | | | | | | | | | | | |
| Quarter 1 | 13.98 | | 9.63 | 41.50 | | 40.88 | 410.98 | | 291.96 | 126.37 | | 127.76 |
| 2 | 10.07 | | 5.08 | 26.45 | | 25.54 | 328.91 | | 167.60 | 71.35 | | 72.94 |
| 3 | 19.42 | | 13.10 | 34.82 | | 33.50 | 639.17 | | 448.39 | 195.00 | | 195.57 |
| 4 | 19.33 | | 11.16 | 51.96 | | 50.26 | 504.95 | | 295.97 | 128.80 | | 130.82 |

Source: Computed.

The difference between exports for both wheat and feed grains across the two scenarios increases at an increasing rate over the horizon. This is in large part due to the same behavior in the exchange rate over the subsidy period compared to the tax period (table 2). On the domestic front, food demand for wheat is basically the same under both the tax and subsidy scenarios. It is slightly lower under the subsidy scenario because of the higher level of prices. However, the higher income levels that are generated under the subsidy scenario almost compensate for the higher wheat prices. For domestic feed grain demand, steadily larger disappearance occurs under the subsidy scenario over the three-year horizon. This outcome is explained by the smaller difference between feed grain prices under the tax and subsidy scenarios and the improved profitability of the livestock sector.

According to the estimated equations for prices of wheat and feed grains, movements in inventories are a major determinant of real prices. Higher inventories of any type tend to reduce real prices of both wheat and feed grains. The degree to which the various types of inventory influence real prices should reflect the differentials in the speeds at which different stock types can be supplied to the market. Privately owned inventories and CCC nongovernment-owned inventories (nondefaulted loans) are readily available and can be sold at any time. These two categories of inventories will be referred to as market-oriented inventories. Government-owned stocks and the farmer-owned reserve can only be released when prices exceed certain limits, namely, the release price for the farmer-owned reserve and at least 110 percent of the support price for government-owned stocks. The latter rule, while discretionary, was applied in the active stock policy simulations as long as government-owned stocks were above a negligible amount. Releases from the

farmer-owned reserve, while not imposed on the model, would have occurred only in 1986 and only for wheat.

Inventories of wheat and corn, as one would expect, are higher under the tax scenario. The distribution of stocks across government-owned, farmer-owned reserve, and readily available (market) stocks behaves exactly as theory would suggest. Low prices and high real rates of interest during the tax period (table 2) discourage the holding of market-available stocks, thus indirectly leading to further declines in prices and increases in the share of stocks held in government positions.

The share of market-oriented stocks rises dramatically for wheat under the subsidy scenario. In fact, in the case of wheat, the government-owned level of stocks is approximately zero throughout the last two years of the horizon. Under the tax scenario, as expected, the percentage of stocks held by the public sector increases dramatically over the horizon for both grains, especially feed grains. The latter result reflects, in part, the active public stock policy for corn and the level of subsidization emanating from the agricultural sector policies that hold resources in the production of feed grains as well as wheat.

A major beneficiary of the subsidy macroeconomic policies is the livestock sector. The results show much higher real prices for all three livestock products over the subsidy period. For beef, real prices under the subsidy scenario steadily increase over the horizon as they do for pork and poultry. In the early part of the horizon, real prices of poultry are higher under the tax period. This is in large part due to the rapid adjustment of the poultry sector owing to the shorter biological lags than beef and pork.

Because of the favorable profitability levels under the subsidy scenario, animals are retained for breeding purposes in all three livestock sectors,

especially the hog and poultry systems over the specified horizon. A significant amount of liquidation occurs in all three sectors under the tax scenario due largely to the high levels of real interest rates.

The demand for beef under the subsidy scenario increases due to the higher levels of income generated vis-à-vis the tax scenario. The lower interest rates also enhance profitability to the sector. Also, the high production levels and reasonably stable prices of feed grains under both the tax and subsidy scenarios over the specified horizon (which, in turn, are due in part to the high level of prices represented by the initial conditions at the beginning of 1984) do not adversely affect a number of decisions that are undertaken in the livestock sector. The prices of feed grains under the subsidy scenario relative to the tax scenario are not sufficiently different to lead to perceptible differences in the placements of animals on feed or in the current supply of slaughter animals. The relative feed grain prices between these two scenarios also have little if any impact on the weight at which animals are marketed. The influence of feed grains and the lower real rate of interest are the major determinants explaining the willingness to retain animals for breeding purposes under the subsidy scenario.

The Treasury exposure for agricultural policy, including the active public stock instrument, is reported in table 5. These measures include the direct governmental costs as well as the "off agency" and opportunity cost of governmental intervention. The major components of cost include deficiency payments; carrying costs of government-held inventories, the direct cost associated with the acquisition and release of government-owned inventories; and the opportunity cost of holding governmental stocks. As can be seen from table 5, these costs are significantly higher during the tax scenario in

TABLE 5

Governmental Budget Cost of Feed and Wheat Farm Programs
Under Subsidy and Tax Scenarios

| | FEED GRAIN | | | | WHEAT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total cost under: | | | Ratio of the tax scenario to the subsidy scenario | Total cost under: | | | Ratio of the tax scenario to the subsidy scenario |
| | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | |
| | million dollars | | | | million dollars | | | |
| 1983 | | | | | | | | |
| Quarter 1 | | 606.34<br>(206.52)[a] | | | | 174.66<br>(59.49) | | |
| 2 | | 568.81<br>(191.65) | | | | 204.10<br>(68.77) | | |
| 3 | | 2,492.95<br>(831.54)[b] | | | | 1,505.66<br>(502.22)[b] | | |
| 4 | | 787.16<br>(259.70) | | | | 162.40<br>(53.58) | | |
| 1984 | | | | | | | | |
| Quarter 1 | -4,598.71<br>(-1,489.33) | | -4,583.40<br>(-1,494.23) | 1.00 | 183.35<br>(59.38) | | 182.77<br>(59.58) | 1.00 |
| 2 | 126.75<br>(40.21) | | 133.09<br>(42.79) | 1.06 | 255.11<br>(80.93) | | 911.55<br>(293.07) | 3.62 |
| 3 | 45.13<br>(13.89) | | 60.69<br>(19.24) | 1.39 | 1,516.33<br>(466.83) | | 2,386.38<br>(756.43) | 1.62 |
| 4 | 423.81<br>(127.19) | | 2,614.24<br>(819.05) | 6.44 | -536.83<br>(-161.10) | | -709.30<br>(-222.22) | 1.38 |
| Total | -4,003.02<br>(-1,308.04) | | -1,775.38<br>(-613.15) | | 1,417.96<br>(446.04) | | 2,771.40<br>(886.86) | |

(Continued on next page.)

TABLE 5--continued.

| | FEED GRAIN | | | | WHEAT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total cost under: | | | Ratio of the tax scenario to the subsidy scenario | Total cost under: | | | Ratio of the tax scenario to the subsidy scenario |
| | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | |
| | million dollars | | | | million dollars | | | |
| 1985 | | | | | | | | |
| Quarter 1 | 44.55<br>(13.02) | | 196.04<br>(60.81) | 4.67 | -13.15<br>(-3.84) | | 163.71<br>(50.78) | -13.22 |
| 2 | 87.68<br>(25.15) | | 290.84<br>(89.44) | 3.56 | 176.29<br>(50.56) | | 235.53<br>(72.43) | 1.43 |
| 3 | 93.42<br>(26.24) | | 40.05<br>(12.22) | 0.47 | 1,148.83<br>(322.65) | | 2,437.82<br>(743.80) | 2.31 |
| 4 | 8,894.43<br>(2,444.39) | | 14,357.10<br>(4,349.86) | 1.78 | -10.82<br>(-2.97) | | 203.06<br>(61.52) | -20.71 |
| Total | 9,120.08<br>(2,508.80) | | 14,884.03<br>(4,512.33) | | 1,301.15<br>(366.40) | | 3,040.12<br>(928.53) | |
| 1986 | | | | | | | | |
| Quarter 1 | 4,193.80<br>(-1,127.63) | | 1,363.03<br>(410.55) | -0.36 | 80.32<br>(21.60) | | 193.37<br>(58.25) | 2.70 |
| 2 | -715.62<br>(-188.73) | | -3,601.78<br>(-1,080.06) | 5.72 | 74.96<br>(19.77) | | 1,871.41<br>(561.18) | 28.39 |
| 3 | -1,592.27<br>(-411.26) | | -2,007.21<br>(-599.76) | 1.46 | 65.89<br>(17.02) | | 2,615.73<br>(781.59) | 45.92 |
| 4 | 8,805.08<br>(2,214.58) | | 18,294.10<br>(5,456.85) | 2.46 | 53.15<br>(13.37) | | -616.65<br>(-183.94) | -13.76 |
| Total | 2,303.39<br>(486.96) | | 14,048.14<br>(4,187.58) | | 274.32<br>(71.76) | | 4,063.86<br>(1,217.08) | |

[a]Figures in parentheses are real costs.

[b]Assume the participation rate = 100 percent.

Source: Computed.

nominal terms. They are also generally higher during the tax period in real terms, but the differences are less dramatic. Even so, the real cost of governmental intervention is as much as 45 times larger under the tax scenario for some quarters than under the subsidy scenario (see table 5).

For all years of the horizon under the tax scenario, governmental costs of the wheat program rise steadily and exceed the current 1983 costs by almost 100 percent in 1986. In contrast, governmental costs under the subsidy scenario steadily declined over the horizon amounting to only 10 percent in 1986 of the governmental costs that were actually experienced in 1983.[6] In the case of wheat, the major component of governmental costs is the deficiency payments that are incurred especially under the tax scenario.

For corn, the results show little difference during the first year of the horizon due to the favorable prices that occur at the beginning of the horizon. However, for the latter two years, 1985 and 1986, the results are indeed dramatic. In real terms, the cost of the corn program under the tax scenario exceeds the cost under the subsidy scenario by almost 100 percent in 1985 and by 10 times in 1986. These large differences are due to the deficiency payments that are incurred in the program under the tax scenario as well as the active public stock acquisition policy that must be implemented for this scenario.

For the last two years of 1985 and 1986 in the tax scenario, the governmental costs of the corn program in nominal terms exceed by three times the governmental cost experienced in 1983. In the case of the subsidy scenario, the government runs a surplus in the first year of the horizon due to an increase in the value of the inventories owned by the government and/or sold, expenditures jump significantly in 1985 to almost twice the cost experience of

1983; and falls to almost one-half of the cost incurred in 1983 in the final year of the horizon in 1986.

Neglecting the time value of money, governmental costs for the wheat program over the three-year horizon sum to $9.8 billion under the tax scenario and $2.99 billion under the subsidy scenario. In the case of corn, these same numbers are $27 billion versus $7.4 billion. The total of the two costs, i.e., governmental costs for feed grains and wheat under the tax scenario, run in the neighborhood of $37 billion; and, under the subsidy scenario, the same total cost is slightly more than $10 billion. These differences reflect the large transfer payments made under the deficiency scheme and the government's role in supporting market prices at or above the loan rate. The magnitudes of these numbers also reflect the impact of overshooting on the public sector when commodity prices are inflexible downward due to an active stock policy.

Net farm incomes for feed grains and wheat are reported in table 6 along with an approximate income measure for livestock. In computing these measures, no storage activity was considered; instead, total production is sold in the quarter in which it is produced at the market price or the support price depending on which is applicable. Government transfer payments are included in gross income for both feed grains and wheat. The cost measure is simply the variable cost times the number of planted acres plus storage costs of the farmer-owned reserve. Under the tax scenario, all computations presume a 100 percent participation rate while, under the subsidy scenario, a 60 percent participation rate is imposed. For the income measures from livestock operations, the retail price of meats rather than the farm level price is employed. As a result, gross income is overstated by the difference between retail and farm level prices for each of the respective meats. Since the

TABLE 6

Net Farm Income for Feed Grains, Wheat, and Livestock Under Subsidy and Tax Scenarios

| | FEED GRAIN | | | | WHEAT | | | | LIVESTOCK | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax scenario[a] | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax scenario[a] | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax scenario[a] |
| | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | |
| | million dollars | | | percent | million dollars | | | percent | million dollars | | | percent |
| 1983 | | | | | | | | | | | | |
| Quarter 1 | | -151.80 (-51.70)[b] | | | | -79.52 (-27.08) | | | | 19,196.90 (6,538.50) | | |
| 2 | | -209.67 (-70.64) | | | | -87.56 (-29.50) | | | | 20,934.70 (7,053.50) | | |
| 3 | | 3,747.04 (1,249.85)[c] | | | | 7,214.67 (2,406.50)[c] | | | | 20,545.30 (6,853.00) | | |
| 4 | | 3,579.74 (1,181.04) | | | | -61.87 (-20.41) | | | | 17,460.10 (5,760.50) | | |
| 1984 | | | | | | | | | | | | |
| Quarter 1 | -140.43 (-45.48) | | -134.11 (-43.72) | -4.03 | -73.74 (-23.88) | | -70.39 (-22.95) | -4.05 | 21,235.20 (6,877.20) | | 20,882.40 (6,807.90) | 1.02 |
| 2 | -105.40 (-33.44) | | -115.87 (-37.25) | 10.23 | -74.79 (-23.73) | | -81.72 (-26.27) | 9.67 | 26,869.00 (8,524.20) | | 26,183.60 (8,418.40) | 1.26 |
| 3 | -48.76 (-15.01) | | -63.65 (-20.18) | 25.62 | 5,309.56 (1,634.64) | | 7,086.85 (2,246.37) | -27.23 | 30,528.00 (9,398.60) | | 29,098.50 (9,223.60) | 1.90 |
| 4 | 11,898.20 (3,570.59) | | 11,320.80 (3,546.83) | 0.01 | -95.17 (-28.56) | | -99.20 (-31.08) | 8.11 | 31,790.30 (9,540.10) | | 29,603.60 (9,274.90) | 2.86 |

(Continued on next page.)

TABLE 6--continued.

| | FEED GRAIN | | | | WHEAT | | | | LIVESTOCK | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax[a] scenario | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax[a] scenario | Net farm income under: | | | Percentage difference in real income: subsidy vs. tax[a] scenario |
| | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | | Subsidy scenario | Actual | Tax scenario | |
| | million dollars | | | percent | million dollars | | | percent | million dollars | | | percent |
| 1985 | | | | | | | | | | | | |
| Quarter 1 | -36.81 (-10.76) | | -80.90 (-25.10) | 57.13 | -93.91 (-27.45) | | -95.42 (-29.60) | 7.26 | 34,298.60 (10,025.70) | | 30,921.30 (9,591.60) | 4.53 |
| 2 | -63.07 (-18.09) | | -126.32 (-38.85) | 53.44 | -84.64 (-24.27) | | -83.98 (-25.83) | 6.04 | 37,235.80 (10,679.80) | | 32,729.00 (10,064.90) | 6.11 |
| 3 | -77.00 (-21.62) | | -161.05 (-49.14) | 56.00 | 5,128.05 (1,440.22) | | 6,029.14 (1,839.55) | -21.71 | 39,171.50 (11,001.40) | | 33,229.50 (10,138.70) | 8.51 |
| 4 | 10,754.00 (2,955.43) | | 11,541.20 (3,496.68) | -15.48 | -97.70 (-26.85) | | -117.57 (-35.62) | 24.62 | 38,709.80 (10,638.30) | | 31,229.70 (4,461.80) | 12.43 |
| 1986 | | | | | | | | | | | | |
| Quarter 1 | -106.99 (-28.77) | | -215.62 (-64.95) | 55.70 | -95.87 (-25.78) | | -111.91 (-33.71) | 23.52 | 40,187.90 (10,805.70) | | 31,043.00 (9,350.30) | 15.57 |
| 2 | -131.29 (-34.63) | | -240.91 (-72.24) | 52.06 | -87.10 (-22.97) | | -110.45 (-33.12) | 30.65 | 42,330.90 (11,164.10) | | 31,659.40 (9,493.70) | 17.60 |
| 3 | -138.64 (-35.81) | | -252.75 (-75.52) | 52.58 | 5,900.07 (1,523.90) | | 5,546.38 (1,657.27) | -8.05 | 44,846.20 (11,583.10) | | 31,937.80 (9,543.10) | 21.38 |
| 4 | 8,927.52 (2,245.38) | | 9,169.19 (2,735.03) | -17.90 | -82.74 (-20.81) | | -144.34 (-43.05) | 51.66 | 45,438.00 (11,428.20) | | 30,027.60 (8,956.80) | 27.59 |

[a]Calculated by $(I_s - I_t)/I_t$ for $I_s$, $I_t > 0$ and $-(I_s - I_t)/I_t$ for $I_s$, $I_t < 0$.

[b]Figures in parentheses are real income.

[c]Assume the participation rate = 100 percent.

Source: Computed.

margins between the retail and farm level are fairly stable, the directional changes over time and between the tax and subsidy scenarios will be directly associated with the actual measures. In the results reported in table 5, the only cost measure that is included for each livestock operation is the feed cost.

As can be seen from table 6, income is generated during the harvest quarter; and, in the remaining quarters, carrying cost charges on the farmer-owned reserve are incurred for both wheat and feed grains. For the first two years of the horizon, wheat growers prefer a tax scenario combined with the sector policies. In the last year of the horizon, they prefer the subsidy scenario in nominal terms but, once again, the tax scenario in real terms. In the case of corn growers, a clear preference for the tax scenario, along with the sector policies, is preferred to the subsidy scenario. These results reflect in large part the huge transfer payments that are made by the government for both programs and the assumption of 100 percent participation under the tax scenario relative to a 60 percent participation rate under the subsidy scenario.

The major beneficiaries of the subsidy scenario are the livestock producers. They benefit in real terms from the expansionary monetary policies. In the case of the tax scenario, they bear much of the brunt of feed grain prices being kept at the support level, and these producers suffer immensely from the high real rates of interest that are generated under the tax scenario. The real differences between the subsidy and tax scenarios for all three groups of livestock producers steadily increase from the first quarter of 1984 to the last quarter of 1986 where the real percentage difference in income is almost 30 percent.

## Conclusions

Analysis of agricultural market dynamics must take into account not only real demand and supply forces directly related to the sector but also the effects of monetary and fiscal policies operating through these forces. To the extent that these polices are able to effect real changes in the short run, the agricultural sector will experience some instability in addition to that caused by the traditionally emphasized sources within the sector. The long-run effects of these external shocks can be argued to be neutral; but, to date, no conclusive evidence has been presented using a structural model of the agricultural sector. The practical length of the short run, which one might define as the time period during which the external shocks examined above are of concern to agricultural policymakers, remains an open question.

A fair characterization of the monetary and fiscal policies of the early 1970s and the early 1980s is that the first period represented a subsidy period for agriculture, while the latter regime taxed the sector. Certainly, a number of events, such as weather shocks, also differed between the two time periods. Our simulation results hold these constant and indicate that substantial effects on prices and incomes in the agricultural sector emanate from macroeconomic policies.

Due to the nature of current agricultural polices, which support prices in the face of downward pressure but do little or nothing to prevent increases, there is an asymmetry in the effects of monetary policy. Much, if not all, of the benefits during a subsidy scenario accrue to the private sector. However, the downside risk tends to be borne much more by the public sector, to the point that, in our simulation results, a comparison of incomes shows that the grain sector has a slight preference for a tax period since the entire burden

is shifted to government expenditures to support prices. This is not the case, of course, if a passive stock policy is followed and program participation is less than 100 percent. However, these results are conditional upon the starting inventory levels which were very high. Had the initial positions been more like those of 1973-74, for instance, producers would likely have preferred the subsidy period even with an active stock policy.

In the long run, if money is neutral, agricultural sector policies are likely to have a more significant influence on resource allocation to the U. S. agricultural sector than do macroeconomic policies and external events. The sector policies that provide incentives for overallocation of resources to agricultural production, however, leave the sector especially vulnerable to macroeconomic policies that impose adjustment costs on it. Such policies must, almost by definition, lead to a financial crisis and the current problems of farms, rural banks, and the government agencies which support the system.

The implications of this study for the 1985 Food and Agriculture Act, therefore, must focus on this phenomenon of protracted periods of adjustment to changes in macroeconomic policies--overshooting periods, if you will. If macroeconomic policies were appropriately designed, there would be no need for sector-specific policies to address this problem. Experience in controlling business cycles, however, suggests that this is not likely to occur soon. If the normative justification for governmental intervention in agricultural markets is to reduce instability, then instability from outside the sector due to monetary and fiscal policy suggests that agricultural policies may be appropriate to insulate the sector.

However, if agricultural programs are to play this role, there is a need to make them more flexible. Selecting policies which presumed a continuation

of an inflationary environment was clearly inappropriate, just as would be the case if the new bill assumed that inflation was once and for all conquered. Instead, the augmentation of the degree of inherent instability of the agricultural sector by shocks generated from outside should be recognized and taken into account in setting storage, price support, and target price policies. This is in addition to the flexible policies advocated by Just and Rausser.

The above recommendations are prescriptive and contain several normative judgments, including the desirability of reducing instability in the agricultural sector. We have not addressed the other objectives of agricultural policy which have been reported and debated many times (Rausser and Foster). The advocate of these objectives is free to place greater weight on farm program benefits and less on the adverse effects on government outlays that tax scenarios such as ours can bring; however, even the most ardent critic of agricultural programs will agree that the failure to adapt to new macroeconomic developments is an additional shortcoming of the agricultural policy process. The degree to which agricultural polices should and can be adjusted, as well as the least-cost manner for doing so, remains an important and unanswered research and policy issue.

Footnotes

*Giannini Foundation Paper No. 772 (for identification only). We wish to thank Yasuo Nishiyama for his valuable comments and assistance and Amor Nolan for her efforts in preparing the manuscript. We also acknowledge the help of Gertrude Halpern, Marjorie Teach, and Ikuko Takeshita.

[1]These huge stocks resulted from the U. S. governmental holding price supports above market equilibrium prices throughout much of the 1950s and 1960s.

[2]Accounting only for physical capital, not land, the U. S. agricultural sector is more than twice as capitalized as manufacturing on a per worker basis.

[3]A full description is contained in an extended version of this paper which is available on request (Rausser et al.).

[4]For the active stock policy simulations, the estimated equations for government stocks of feed grains and wheat were used unless market prices were more than 10 percent above or below support prices. When price in a particular period fell below 90 percent of support, the simulation was repeated with 15 percent of market stocks flowing into government-held stocks. This process was repeated until price rose to 90 percent of the support level or market stocks became exhausted. The latter possibility could occur only with all remaining stocks being held in the farmer-owned reserve. When prices rose above 110 percent of support, government-owned stocks were liquidated moving to market stocks or directly into consumption. This process was continued until either government-owned stocks were exhausted or the price fell below 110 percent of support. As a result, many simulations generated prices well above 110 percent of support and zero levels of government-owned stocks.

[5]Table 3 also shows for both the tax and subsidy periods that nominal prices began at high levels for feed grains. These prices are partly the result of conditions prevailing in the agricultural sector at the end of 1983 following the PIK program and the 1983 summer drought. These conditions carry over to the first few quarters of 1984 prior to the actual harvest of feed grains during 1984. These phenomena were not nearly as important in the case of wheat because the summer drought had no real effect on wheat production, and the PIK program was not nearly as effective in reducing wheat output as it was in the case of corn.

[6]Please note that the actual governmental costs reported for 1983 do not reflect fully the costs associated with the PIK program. The quantities released from government stocks under the PIK program were valued at support prices rather than market prices.

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