Impact Multipliers of the Crops: An Application for Corn, Soybeans, and Wheat

by

Abner Womack, Stanley R. Johnson, William H. Meyers,

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Although a considerable amount of research has focused on the development of econometric models to support outlook responsibilities in the government, private sector, and land grant colleges, little progress has been made in this development process that can be easily communicated to the nonmodeler. This generally results in a source of consternation between researchers that build econometric systems and policy analysts and outlook specialists that are in the line of fire and are certainly prime customers or users for these systems.

*Abner W. Womack is associate professor, Department of Agricultural Economics, and Stanley R. Johnson is professor, with a joint apointment in the Departments of Economics and Agricultural Economics, University of Missouri-Columbia; William H. Meyers is assistant professor, Economics Department, Iowa State University; Jim L. Matthews is Chairman, Fats and Oils Sector of the World Food Board, U.S. Department of Agriculture, Washington, D.C.; and Robert E. Young is a research analyst in the Department of Agricultural Economics, University of Missouri-Columbia.

The views in this paper reflect those of the authors and in no way imply the positions of the respective agencies of employment.

The purpose of this paper is to focus on a direction that may be taken to alleviate this problem. Specifically, we maintain that (1) strong quantitative representations of the U.S. agriculture industry are necessary in satisfying outlook responsibilities and policy responsibilities, and (2) these structural quantifications can best be communicated through the use of the reduced system or first round impact multipliers.

The notion of, or argument for, communication of econometric systems via reduced form equations is contained in the following sections where (1) a flow chart of the crops sector of the Missouri agricultural econometric model is discussed; (2) a graphical procedure for obtaining impact multipliers from an econometric system is reviewed; (3) a key set of selected multipliers are included for the corn, soybeans, and wheat industries; and (4) these multipliers are applied for the 1980-81 and 1981-82 crop years for each of these commodities.

Crops Model Flow Chart

In general terms, the basic structure of econometric models that have been and currently are being developed to quantify the U.S. agricultural industry follow a long tradition of research that began with a simultaneous investigation of the grains and livestock industries in the early 1950s.[1] Prior to this period, most analysis was conducted via single equations with primary focus on variables likely to have greatest influence on prices. Economists tend to refer to these equation specifications as direct estimation of the "reduced form system." While these equations were useful in outlook and policy analysis, they were severely constrained to micro components of the industry. For example, estimated equations that depicted coarse grain prices were found to be strongly correlated to own production, high protein feed prices, livestock prices, and livestock numbers. Recognition that livestock prices and quantities were dependent on grain prices and vice versa led to models that attempted to estimate simultaneously grain prices, livestock quantities, and livestock prices.[2] As a result of this activity, both in the agricultural sector and the general economy, a rather large body of literature has developed that examines properties of estimators in simultaneous systems and, likewise, a large number of modeling activities have evolved that are aimed at quantifying either specific industries or integrated sectors of the U.S. feedgrain-livestock economy.[3]

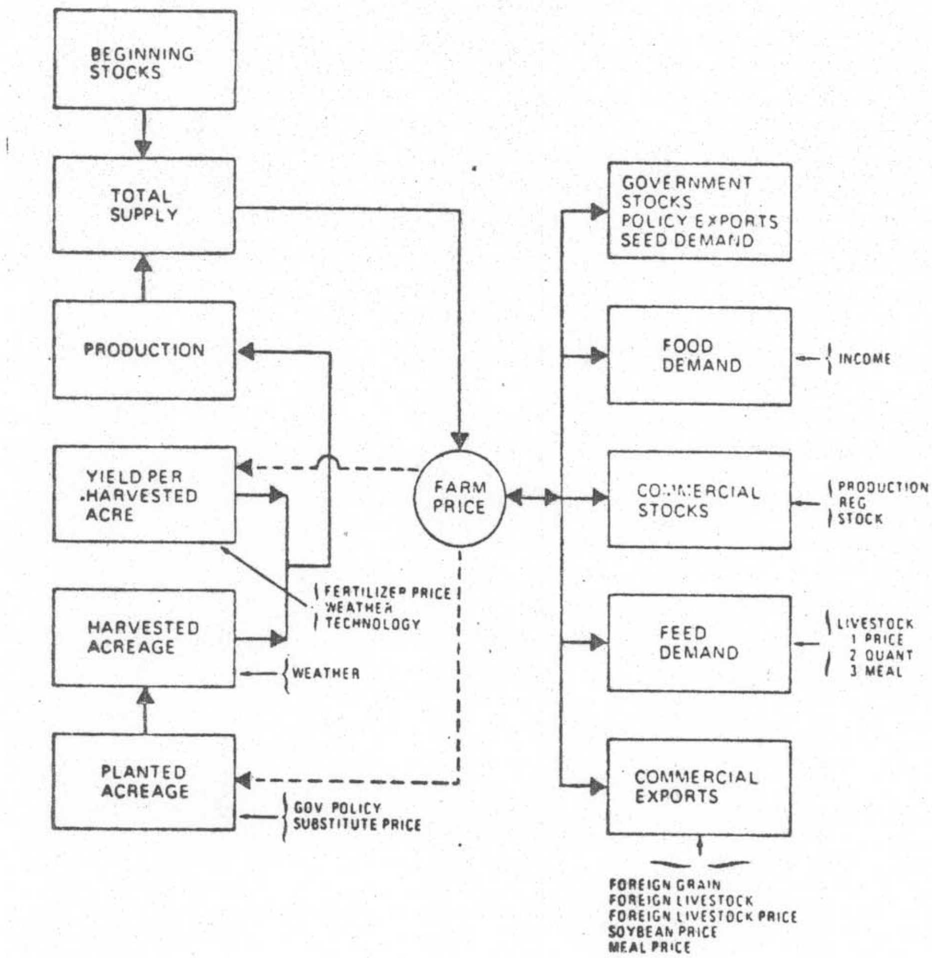
Most of the above research, including work at Missouri, indicates that structural quantification is dependent upon capturing economic incentives in the market place that are made from the farm to the retail market. Also, necessary feedback linkages must be included to produce profitability signals that produce and simultaneously allow consumers with a budget constraint to select commodities according to direct and cross substitution price patterns. Therefore, shifts in income patterns due to inflation, recession, etc., that impact consumer demand must be captured such that an eventual price signal is received not only in the retail market, but in the production sector as well. Likewise, shifts in production levels associated with higher energy costs, extreme weather conditions, etc., that impact supply must also produce price signals that run from the farm to the retail level. Thus, economic forces operating in the U.S. agricultural industry are a complex set of interactions that may evolve from within an industry or from forces outside.

The majority of basic agricultural commodities flow into the food-feed chain and the associated markets tend to interact in a competitive fashion. A livestock producer makes a feed decision by considering various grain and protein prices. The feed mix will likely reflect the most economic, efficient combination of inputs available. Also, as consumers in the retail market, we are as likely to examine the relative prices of meats in determining the total bundle of products that comprise our food purchases. These decisions reflect demand and supply interactions in the market place and provide a corresponding price signal that is necessary for the producer to gauge the amount of a commodity that will be profitable as it moves from the farm through wholesale to retail markets. Examination of these price patterns and corresponding relative changes in the agricultural industry is a primary focal point for the design of a quantitative system that does, in fact, contain the major commodity, direct and indirect interactions.

The feedgrain industry is characterized by the flow chart given in Figure 1. The left column reflects the supply and production sector.

Figure 1

FEED GRAINS (ANNUAL MODEL)
CORN, SORGHUM, OATS AND BARLEY



ENDOGENOUS VARIABLES

1 CORN PRICE	7 OATS FED	13 OAT FOOD	PLANTED ACRES	HARVESTED ACRES	YIELD
2 SORGHUM PRICE	8 BARLEY FED	14 CORN FOOD	18 CORN	21 CORN	25 CORN
3 OAT PRICE	9 CORN STOCKS	15 BARLEY FOOD	19 SORGHUM	22 SORGHUM	26 SORGHUM
4 BARLEY PRICE	10 SORGHUM STOCKS	16 CORN EXPORTS	20 OATS	23 OATS	27 OATS
5 CORN FED	11 OAT STOCKS	17 SORGHUM EXPORTS	21 BARLEY	24 BARLEY	28 BARLEY
6 SORGHUM FED	12 BARLEY STOCKS				

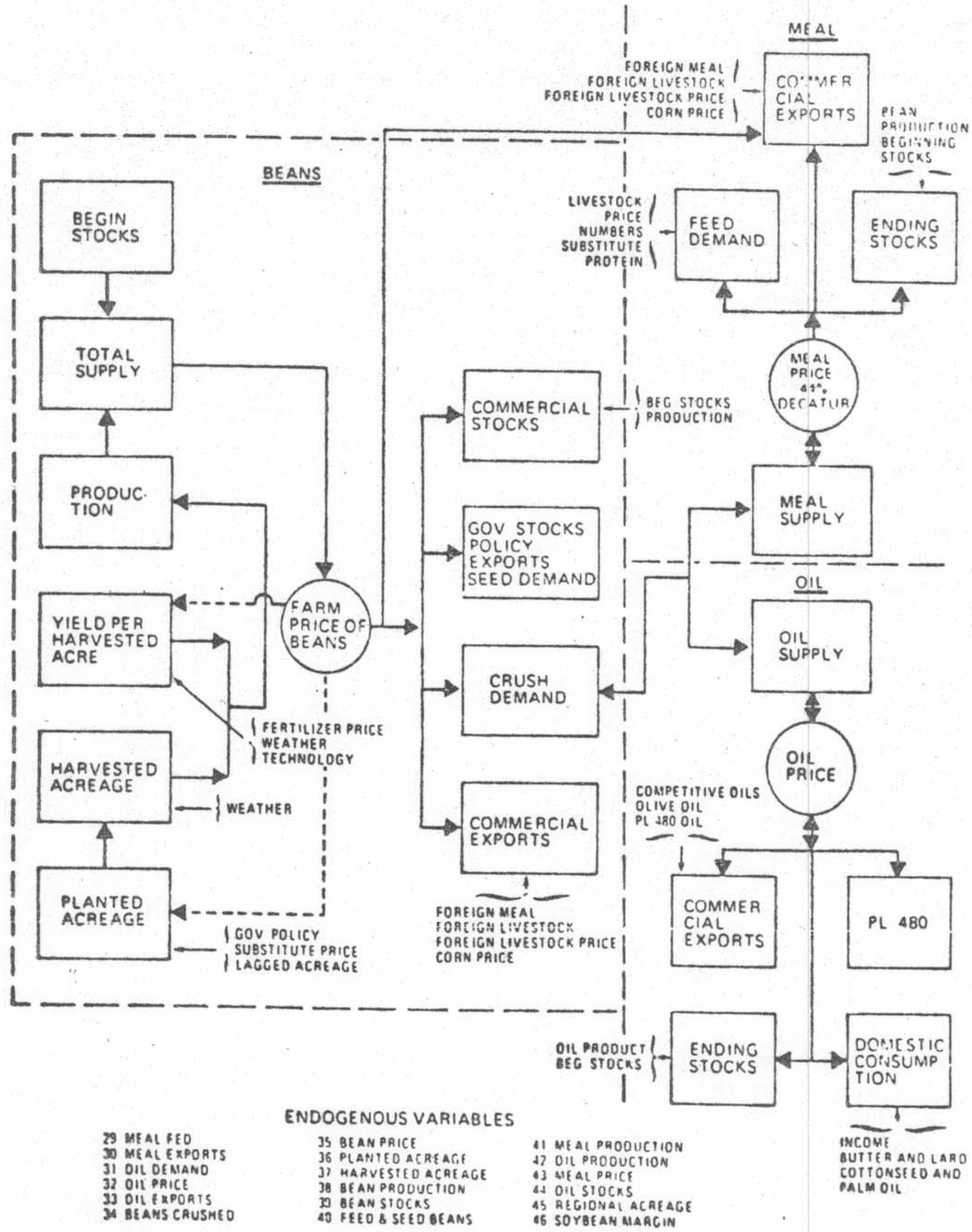
The right column represents components in aggregate demand. The lower block in the supply column indicates major variables associated with estimation of total planted acreage. Planted acreage is a function of lagged market price, substitute prices, government policy variables, and input costs. Harvested acreage is conditioned on planted acreage and weather. Yield is dependent on fertilizer prices, weather conditions, and technology.

On the demand side, commercial exports are linked to the livestock sector in importing regions, foreign or competitive grain production, competitive crop prices, exchange ratios, and barriers to entry, including variable levies used by members of the European Economic Community. Feed demand is linked directly to the U.S. livestock industry and high proteins meal from the soybean industry. Commercial stocks are functionally related to own price, current supply, expected future production, wholesale price index, and lagged commercial stocks. Farmer-owned and commodity credit reserves are treated as separate exogenous variables to the system. Food demand as a minor component of the feedgrain industry is dependent on own price, consumer expenditures as an income proxy, and the index price of nondurable goods and services as a deflator and proxy for the overall rate of inflation outside the crop sector.

Although this model, maintained at the University of Missouri, is based on annual data or one reference point per year, Figure 2 indicates the degree of complexity that can be encountered in producing a simultaneous modeling system for the total agricultural economy. Three

Figure 2

SOYBEAN-MEAL AND OIL (ANNUAL MODEL)



interactive supply and utilization blocks, soybeans, meal, and oil, in the bean industry react simultaneously with the livestock and feed-grain sectors. These three major sectors in the bean industry imply a supply system, left-hand column, similar to feedgrains where planted acreage is derived from lagged direct and substitute prices, government program variables, production costs, and lagged acreage.

The demand component for beans links the United States to the world markets via commercial exports and to the domestic livestock sector through the crush equation that is conditioned on price signals received from the meal and oil sectors. Meal demand is directly related to livestock prices and numbers plus substitute prices of feedgrains and other high proteins in the U.S. market. Export meal demand moves with the exchange rate, livestock industries in importing regions, competitive prices, and competitive production of soy products in the rest of the world.

Domestic utilization of soy oil is functionally related to consumer demand for products that contain a high percentage of vegetable oils, primarily margarine, cooking oil, and salad oils. Therefore, the most significant variables in moving this demand are consumer consumption expenditures, substituted animal and vegetable oils, and the consumer price index for nondurableless foods.

Foreign oil demand is conditioned primarily by the amount of PL-480 oil in the aid program and world production of competitive oils.

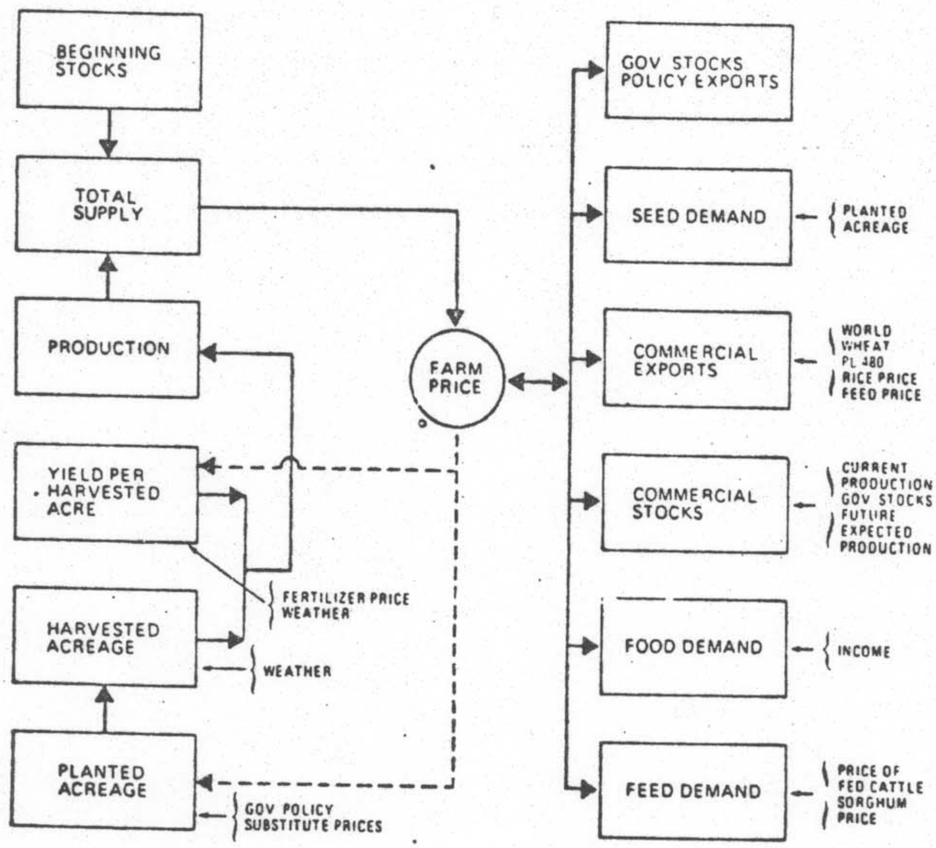
Thus, the soybean model contains three simultaneous components each of which is utilized in the domestic market, foreign market, and subject to some administration manipulations. These management variables by the USDA can take the form of acreage inducement via support prices or demand variables, including negotiated exports outside the commercial channels and direct government stock purchases.

It is evident from this general flow chart description of the crops industry that policy and outlook analysis is contingent on several interacting forces. The forces may take the form of general economy activity within and across industries to include linkage with the general economy. Also, random exogenous events characterized by weather activity both in the domestic and foreign markets have a significant impact on the direction of price equilibrium. Government policy plays a major force in the form of a managed reserve program where economic incentives are utilized to control some desired average stock level around price objectives. As levels of stocks move above these objectives, economic incentives are used to direct or remove "excess" acreage from production.

An econometric model of the crops industry must contain these interactive forces before any degree of reliability can be placed on the use of the system in answering the mirage of impacts associated with the movement of price in the market place. But, very often the combination of equations and magnitude of a system becomes complex and cumbersome of equations and magnitude of a system becomes complex and cumbersome resulting in communication between a select group of econometricians

Figure 3

WHEAT SECTOR (ANNUAL MODEL)



ENDOGENOUS VARIABLES

47 WHEAT FOOD
48 WHEAT FED
49 WHEAT SEED
50 COMMER EXPORTS
51 COMMER STOCKS
52 WINTER WHEAT ACRES
53 SPRING WHEAT ACRES
54 WHEAT PRODUCTION
55 WHEAT FARM PRICE

and quantitative analysts with little chance of communication to the layman.

The most frequent vehicle for communiation is model forecasts for some selected scenarios of exogenous variables. While this is an obvious purpose of building a quantitative model, it is a very poor communicator of the iterative structure of the system. Also, errors become extremely dependent on some form of linkage to the model via a computer software package, data systems, and model builder for use. This combination contains enough interdependence that a breakdown in any one component renders the total system useless.

The contention of this paper is that, first, strong structural systems should be developed, but, second, the primary vehicle for policy and outlook supports stems from the implied reduced form coefficients of the exogenous variables that set in motion the movement of prices and quantities from one equilibrium to another. These variables are easily derived and once determined, imply a snapshot reflection of the equilibriums generated.

Impact Multipliers

One of the advantages of constructing a simultaneous model of an industry is to be able to trace the equilibrium path of a policy or exogenous change. In the case of the livestock industry, these initial shocks may take several periods to work through the system because of the process conditioned by the biological nature of production. This is an industry characterized by a substantial dynamic component.

Another way to think about the magnitude of this component is to examine livestock cycles. If exogenous variables do not change or remain at the same level from one year to the next, it is entirely possible that the industry will remain on the same phase of the cycle. In this case, the dynamics of the industry or the momentum already built into the cycle will be a strong force in determining the equilibrium for any point in time.

On the other hand, the crops industry is characterized by substantially less dynamics. Most quantitative research indicates dynamics (in an annual model) entering through ending stocks and acreage response. Therefore, if production is given in any one year, then it is likely that the initial or first round impact multipliers will reflect the majority of movement toward a total equilibrium in any one year. It is for this reason that most of the discussion in this paper centers around the first round multipliers. An additional caveat relates to simultaneous systems that may not be linear in specification. In this event, multipliers reflect some linear estimate of the system conditioned at the point of impact evaluation. If linear multipliers are used to reflect key components or exogenous shifts, then some care must be used to ensure that they are evaluated or localized around current levels of exogenous variables.

Impact multipliers - mathematical representations

Mathematically, the concept of impact multipliers for a linear system of equations is represented by

$$(1) \quad AY(t) + BY(t-1) + CX(t) = U(t),$$

where A and B are nxm matrices, C is an nxm matrix, Y is a vector of endogenous variables, and X is a vector of m exogenous variables. The reduced form system is given by

$$(2) \quad Y(t) = D_1Y(t-1) + D_2X(t) + V(t),$$

where

$$D_1 = -A^{-1}B,\ D_2 = -A^{-1}C, \text{ and } V(t) = -A^{-1}U(t).$$

The short-run or initial impact multiplier is defined as the impact of a unit change in the j^{th} exogenous variable in time period (t) on the i^{th} endogenous variable for the same time (t).

Thus, the reduced coefficient D_2 is the short-run impact multiplier matrix for the system given in (1).

$$(3) \quad \frac{\partial Y(t)}{\partial X(t)} = D_2 = [d_{2ij}].$$

The long-run multiplier is defined as the impact of a unit change in the j^{th} exogenous variable, sustained at this level in successive time periods, on the j^{th} endogenous variable for the same period. In order to derive the long-run multipliers, it is necessary to examine the time path of the system given in (1). The time path becomes

$$Y(t+1) = D_1 Y(t) + D_2 X(t+1)$$

$$Y(t+2) = D_1^2 Y(t) + D_2 X(t+2) + D_1 D_2 X(t+1)$$

$$\vdots$$

(4) $$Y(t+k) = D_1^k Y(t) + D_2 X(t+k) + D_1 D_2 X(t+k-1) + \ldots + D_1^{k-1} D_2 X(t+1).$$

If appropriate conditions prevail in the D_1 matrix, then the dynamic system will be stable or

$$D_1^k \rightarrow 0 \quad \text{as} \quad k \rightarrow \infty.$$

Also, from the implied condition of the long-run multipliers, the exogenous variables remain constant over time such that

$$X(t+1) = X(t+2) = \ldots = X(t+k) = X^*.$$

This implies that

(5) $$Y(t+k) = (I + D_1 + D_1^2 + \ldots + D_1^{k-1}) D_2 X^*$$

and interim multipliers for the k^{th} period impacts are given by

(6) $\partial Y/\partial X^* = D_2,$ for $k = 1,$

(7) $\partial Y/\partial X^* = (I+D_1)D_2,$ for $k = 2,$

(8) $\partial Y/\partial X^* = (I+D_1+D_1^2)D_2,$ for $k = 3,$

$$\vdots$$

The long-run multiplier is given by

(9) $$\partial Y(t+k)/\partial X^* = (I-D_1)^{-1} D_2.$$

Obviously, for a given system of equations, any number of options are available in selecting multipliers for communication purposes. In this discussion, we are focusing on the first round multipliers D_2 and will ignore residual effects. It is implied that (1) a simultaneous system is necessary for the development of these multipliers and (2) the subset of impacts selected do not contain all information in the total model. For these reasons, continuous research is necessary to modify and update models and the full system of equations can be utilized to focus on an issue that requires information beyond the set of multipliers selected.

Impact multipliers - graphical representation

Figure 4 is a graphical representation of the U.S. soybean industry. The first row reflects an equilibrium solution of the bean industry in the price-quantity space. This equilibrium produces prices and quantities that exactly allocate the total supply. Bean crush provides meal and oil productions, in this case in bean equivalents. Total supply of these products interact simultaneously to produce equilibriums in each of these markets.

An isolated impact or first round impact is given by Figure 5. In this case the model is solved for a reduction in supply, all other exogenous variables held constant. The resulting equilibrium implies higher bean prices and, hence, less demand in all markets. The reduced crush demand implies less production of meal and oil, hence, less supply in these markets and therefore, correspondingly higher

Figure 4

Graphical representation of the soybean demand model (all quantities in bean equivalents)

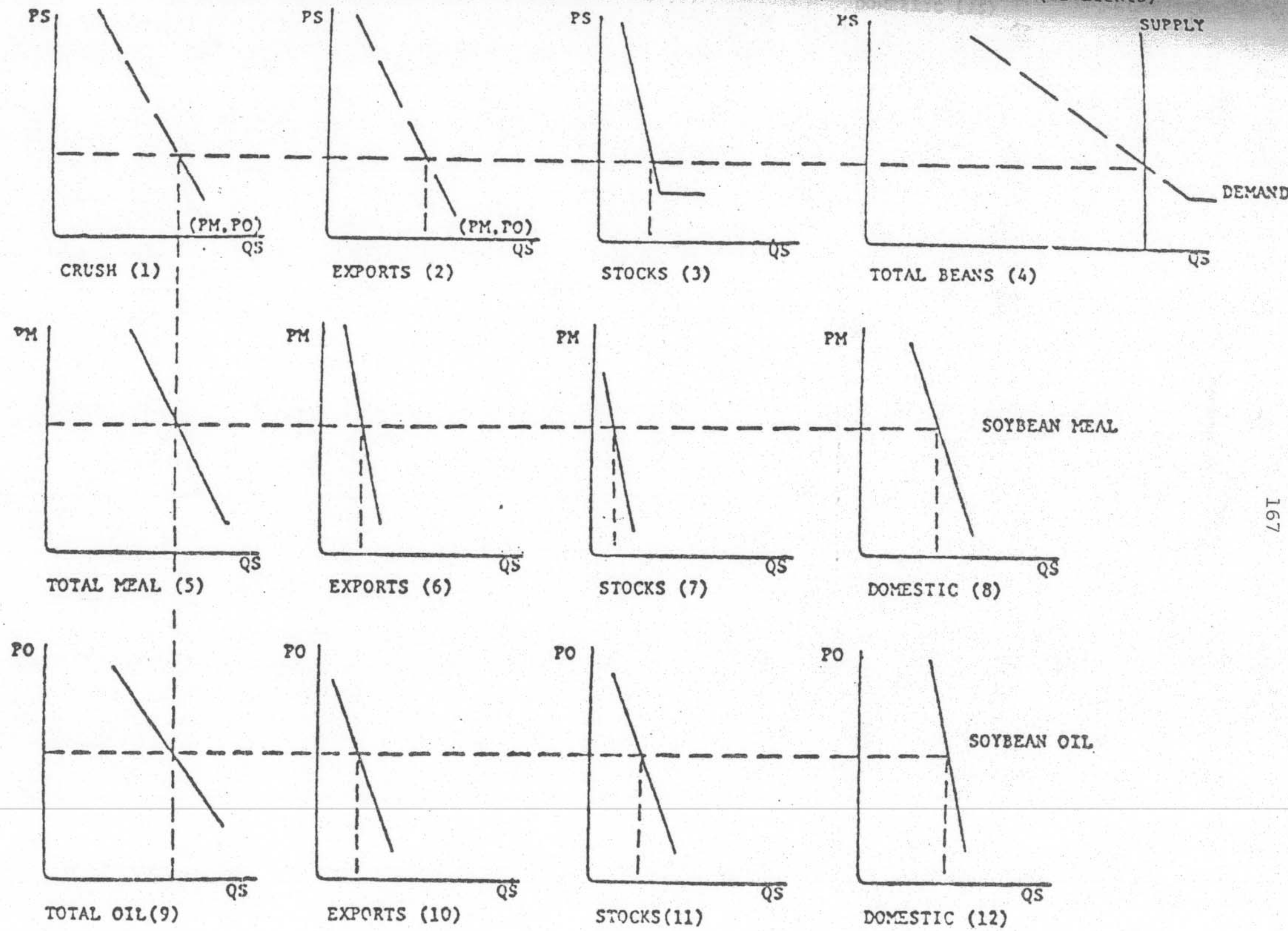
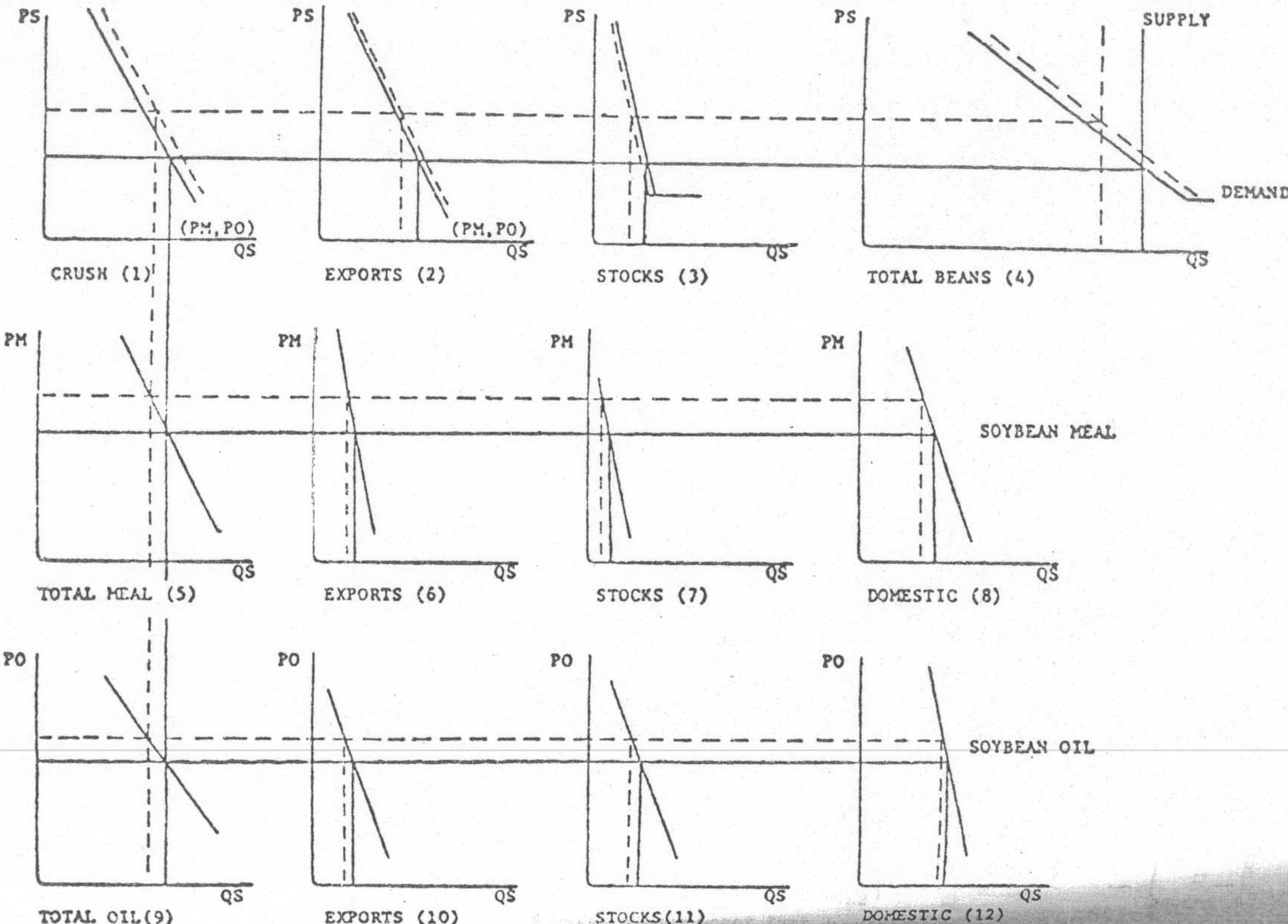


Figure 5
Illustration of soybean model response to supply shift



prices. A second round adjustment is implied since the crusher faces increased prices of meal and oil resulting in a slight outward adjustment for total crush demand. The export market reacts similarly since importers are likewise producing oil and meal products. Commercial stockholders of loans will be less inclined to hold the first equilibrium level since higher prices will imply greater production in the following year. Thus, some slight leftward adjustment in this equation.

After the system has reached a new equilibrium relative to this supply shock, the difference implies the first round impact. If the system is linear, then the results should be identical to coefficients contained in D_2 or Equation (3). If the system is nonlinear, then a localized impact has been obtained. Although this is a proxy for the implied nonlinear system, these coefficients can easily be deduced by maintaining solutions at current exogenous levels and solving for several level changes.

Measured impacts - the corn industry

Table 1 reflects estimates of corn prices based on selected variables as indicated in the left column. Unit changes from baseline solutions are 100 million bushels for quantities and 10 percent for livestock prices and numbers. Price impacts from the model are given in column 1. Column 2 contains estimated changes of these selected variables for 1980-81 over 1979-80. The net change is given in column 3.

Table 1. Corn Price Model[a]

Variable/year	Multiplier	79/80-80/81		80/81-81/82		81/82-82/83	
		Change	Effect	Change	Effect	Change	Effect
Corn							
Supply	-0.16	-974	1.56	716	-1.15	-236	0.38
Farmer held reserves	0.15	-486	-0.73	50	0.08	-100	-0.15
Government purchases	0.15	-16	-0.02	0	0.00	-90	-0.14
Exports	0.17	-108	-0.18	275	0.47	100	0.17
Gasohol	0.16	38	0.06	80	0.13	40	0.06
Future supply	-0.03	716	-0.21	-236	0.07	100	-0.03
Soybeans							
Supply	-0.20	-266	0.53	258	-0.52	69	-0.14
Exports	0.22	-155	-0.34	105	0.23	30	0.07
Future supply	-0.01	258	-0.03	69	-0.01	100	-0.01
Livestock numbers	0.76	-0.70	-0.05	2.00	0.15	2.30	0.17
Livestock prices	0.06	9.70	0.06	8.00	0.05	8.00	0.05
Net effect			0.64		-0.50		0.44
Last year's price			2.52		3.16		2.66
Annual average price		80/81 =	3.16	81/82 =	2.66	82/83 =	3.10

[a]Unit changes for multiplier impacts are in 100 million bushels for grains and 10 percent for livestock prices and quantities.

This subset indicates a net price impact of 64 cents above the 1979 price of $2.52 per bushel or $3.16. The current USDA estimate for 1980-81 is $3.15 per bushel. Table 1 also contains estimated price changes for corn for the 1981-82 crop year over 1980-81. These impacts indicate that price of corn will fall back to 1979-80 levels. The prime force driving both years has been the relatively large changes in supplies, manipulation of the farmer-held reserves, and strength in the export market. Given these interactive forces, the corn price is estimated to decline by 50 cents over the 1980-81 year to $2.66 per bushel for the new crop. Projections are also included for 1982-83.

The balance sheet corresponding to these estimates is given in Table 2. Multipliers for the soybean industry for the same three-year period are given in Table 3. Table 4 contains the estimated balance sheet for each of the years. Multipliers for wheat are contained in Table 5 and supply utilization estimates in Table 6.

Summary

Similar sets of multipliers can be derived for other components of the livestock-feedgrain-food grain industry. Given that a reasonable structure of the industry is reflected in the simultaneous system, then selected reduced form multipliers should provide additional valuable insight into marketing, production, and policy decisions. This paper indicates that (1) industry specific outlook and policy

Table 2. Corn Balance Sheet[a]

Variable/year	79/80	80/81	81/82	82/83
Planted	81.4	84.1	84.4	82
Harvested	72.4	73.1	74.10	72
Yield	109.7	91	107.15	104
Supply				
Beginning stocks	1301	1617	1045	1261
Production	7942	6652	7940	7488
Imports	1	1	1	1
TOTAL supply	9244	8270	8986	8750
Disappearance				
Feed	4519	4150	4300	4300
Food and seed	653	690	685	720
Gasohol	22	60	140	180
TOTAL domestic	5194	4900	5125	5200
Exports	2433	2325	2600	2700
TOTAL disappearance	7627	7225	7725	7900
Ending stocks	1617	1045	1261	850
Farmer held reserves	636	150	200	100
CCC	256	240	240	150
"Free stocks"	725	655	821	600
Annual avg. price	2.52	3.16	2.66	3.10

[a]Estimates for model impact multipliers.

Table 3. Soybean Price Model[a]

Variable/year	Multiplier	79/80-80/81		80/81-81/82		81/82-82/83	
		Change	Effect	Change	Effect	Change	Effect
Corn							
Supply	-0.15	-974	1.46	716	-1.07	-236	0.35
Farmer held rsrvs.	0.13	-486	-0.63	50	0.07	-100	-0.13
Government purchs.	0.13	-16	-0.02	0	0.00	-90	-0.12
Exports	0.14	-108	-0.15	275	0.39	100	0.14
Gasohol	0.15	38	0.06	80	0.12	40	0.06
Future supply	-0.02	716	-0.14	-236	0.05	100	-0.02
Soybeans							
Supply	0.68	-266	1.81	258	-1.76	69	-0.47
Exports	0.81	-155	-1.26	105	0.85	30	0.24
Future supply	-0.06	258	-0.15	69	-0.04	100	-0.06
Livestock numbers	1.00	-0.70	-0.07	2.00	0.20	2.30	0.23
Livestock prices	0.13	9.70	0.13	8.00	0.10	8.00	0.10
Net effect			1.02		-1.10		0.34
Last years price			6.28		7.55		6.45
Annual average price	80/81 =		7.55	81/82 =	6.45	82/83 =	6.79

[a]Unit changes for multiplier impacts are in 100 million bushels for grains and 10 percent for livestock prices and quantities.

Table 4. Soybean Balance Sheet

Variable/year	79/80	80/81	81/82[a]	82/83[a]
Planted	71.6	70.1	68.7	68
Harvested	70.6	67.9	66.89	67
Yield	32.1	26.77	31.23	30.8
Supply				
Beginning stocks	174	357	344	438
Production	2266	1818	2089	2064
Imports	0	0	0	0
Total supply	2440	2175	2433	2501
Disappearance				
Crush	1123	1020	1080	1134
Seed, ind., residual	85	91	90	90
TOTAL domestic	1208	1111	1170	1224
Exports	875	720	825	855
TOTAL disappearance	2083	1831	1995	2079
Ending stocks	357	344	438	422
Annual avg. price	6.28	7.55	6.45	6.79

[a]Estimates for model impact multipliers.

Table 5. Wheat Price Model[a]

Variable/year	Multiplier	79/80-80/81		80/81-81/82		81/82-82/83	
		Change	Effect	Change	Effect	Change	Effect
Wheat							
Supply	-0.20	214	-0.43	470	-0.94	-266	0.53
Farmer reserve	0.26	110	0.29	40	0.10	0	0.00
CCC	0.31	-4	-0.01	-11	-0.03	0	0.00
Exports	0.37	135	0.50	215	0.80	-125	-0.46
Future supply	-0.07	470	-0.33	-266	0.19	100	-0.07
Corn							
Supply	-0.07	-974	0.68	716	-0.50	-236	0.17
Farmer held rsrvs.	0.07	-486	-0.34	50	0.04	-100	-0.07
Government purchs.	0.07	-16	-0.01	0	0.00	-90	-0.06
Exports	0.07	-108	-0.08	275	0.19	100	0.07
Gasohol	0.07	38	0.03	80	0.06	40	0.03
Future supply	-0.03	716	-0.21	-236	0.07	100	-0.03
Soybeans							
Supply	-0.09	-266	0.24	258	-0.23	69	-0.06
Exports	0.09	-155	-0.14	105	0.09	30	0.03
Future supply	-0.01	258	-0.03	69	-0.01	100	-0.01
Livestock numbers	0.30	-0.70	-0.02	2.00	0.06	2.30	0.07
Livestock prices	0.03	9.70	0.03	8.00	0.02	8.00	0.02
Net effect			0.16		-0.10		0.15
Last years price			3.78		3.94		3.85
Annual avg. price	80/81 =		3.94	81/82 =	3.85	82/83 =	4.00

[a]Unit changes for multiplier impacts are in 100 million bushels for grains and 10 percent for livestock prices and quantities.

Table 6. Wheat Balance Sheet

Variable/year	79/80	80/81	81/82[a]	82/83[a]
Planted	71.4	80.4	88.8	81.5
Harvested	62.5	70.9	80.69	71.5
Yield	34.2	33.4	34.1	35.6
Supply				
Beginning stocks	924	902	991	1037
Production	2134	2370	2751	2439
Imports	2	2	2	2
TOTAL supply	3060	3274	3744	3478
Disappearance				
Feed	87	45	250	125
Food	595	614	625	640
Industry, seed	101	114	107	105
TOTAL domestic	783	773	982	870
Exports	1375	1510	1725	1600
TOTAL disappearance	2158	2283	2707	2470
Ending stocks	902	991	1037	1008
Farmer held reserves	250	360	400	400
OCC	200	196	185	185
"Free stocks"	452	435	452	423
Annual avg. price	3.78	3.94	3.85	4.00

[a]Estimates for model impact multipliers.

analysis is critically dependent on clear quantification of direct and cross interaction of major commodities, and (2) farm groups, industry, and policy analysts can easily use and apply these coefficients. Thus, some benchmark estimates are possible without direct dependence on a large econometric model. In lieu of running a total modeling system, scenarios can easily be examined via the multipliers and evaluated allowing decision-makers to concentrate on the most relevant set of events. At this juncture, it may be feasible to turn to the complete system of equations. Also, these impacts are useful in making marketing decisions because a risk path can be selected according to variance expected around those selected variables.

Also, the interactions measured in this model give a clear indication of the interdependence of commodity markets conditioned by manipulation in the farm program. The strength and significance of movements in one sector that impacts another, for example, bean on corn and vice versa, implies that outlook and policy analysis is dependent on very strong systems that quantify these economic forces.

The major obstacle in producing this system is the amount of resources required. Adding specialists outside the econometric profession is necessary as the degree of complexity of a system increases. For example, databank specialists, computer programmers, and systems analysts must eventually become part of a team. Also, a sophisticated software system that interfaces databanks, econometric routines, and modeled equations is a critical and necessary package. Research assistance and direct input by commodity specialists and econometricians are also implied.

Adding up these components easily implies annual expenditures in the $200,000 to $300,000 range. This amount exceeds resources in most agricultural economics departments. However, it does imply that as agricultural economists, we as a profession are fast approaching the laboratory environment of agronomy and other related areas, and that a major issue in the 1980s will be to find the resources and staff for these economic laboratories to support the critical areas of outlook, policy, and research responsibilities. Operating in isolation or examining one market with other areas treated as exogenous will not suffice in an environment with very high price variability and strong interaction among agricultural models.

Footnotes

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