Working Paper WP95-1
January 1995
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Transfers to Agriculture: Links to Lobbying

by

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This work was supported by the Minnesota Agricultural Experiment Station, University of Minnesota.

Agricultural Commodity Lobbying and Transfers to Agriculture

It is commonly observed that economic agents spend time and money to secure advantageous governmental policies. It is estimated, for example, that during the 88/89 political year, the agricultural sector spent close to $18 million in political contributions in the United States. Specific segments of agriculture such as poultry and livestock contributed $1.8 million; crop production and processing contributed $4.2 million; tobacco and dairy products contributed $2.1 million and $1.9 million respectively. Despite the widely known facts that agricultural commodity groups spend substantial amounts of money on lobbying, and that contributors' behavior is consistent with rational behavior (Stratman, 1992), lobbying has not been incorporated into economic models of producer behavior in a consistent manner.

The objective of this paper is to systematically incorporate lobbying in a microeconomic model of the profit maximizing farmer, derive testable implications of the model and apply it to establish the link, or lack thereof, between policy benefits transferred to farmers and their lobbying expenditures. Policy transfers will be measured by the Producer Subsidy Equivalent (PSE), a comprehensive annual dollar measure of transfers to producers that results from government intervention in agriculture (Josling and Tangerman, 1988).

The Political Market and the Lobbying Function.

This research proceeds from the premise that farmers are part of an important class of active political supporters who view their political contributions as a kind of investment, expecting some benefit in return (Snyder, 1990; Ben-Zion and Eytan, 1974). Farms' lobbying is incorporated into the profit maximization framework leading to a model of transfers to

agriculture.

Following Welliz and Wilson (1986) and Coggins, et al., (1991), an endogenous political process is introduced into the profit maximization model. Prices paid and received by profit maximizing economic agents are a function of their lobbying expenditures. This lobbying relation is called a pricing function. It is known as a tariff formation function in the trade literature.

The farm sector spends resources to inform and influence the government. In return, the government designs policies to enhance output price and reduce input price and promulgates regulations to benefit the farm sector. Specifically, the government announces policies that result in pricing functions (1) by which the regulated prices received (p_k) and paid (w_h) by farmers are determined.

$$(1) \qquad p_k = g_k(n_{ok}, n_{ak}) \quad ; \quad w_h = g_h(n_{ah})$$

where n_{ok} is the total lobbying expenditure of all other economic agents with stakes in product k. This includes lobbying by food processors, retailers, consumers and foreign buyers. The farmer's lobbying expenditure for product k is n_{ak}; n_{ah} is the lobbying expenditure in the input market (x_h). The lobbying functions for the output and input markets are $g_k()$ and g_h (). The lobbying functions are assumed to be twice, continuously differentiable and display positive but decreasing returns to lobbying. In addition, lobbying expenditures are bounded from above. If agents choose not to lobby, prices (p_k, w_h) are set by the market mechanism. These assumptions where (p_0, w_0) is the output and input price vector in the absence of lobbying and $\bar{n}_a$ is the upper on the lobbying function are formally summarized as:
bound lobbying expenditure for the farm. This notation will be maintained throughout.

Underlying the lobbying function is the view that public policy is the outcome of political

$$(2) \qquad \frac{\delta g_k()}{\delta n_{ak}} \geq 0 \ , \ \frac{\delta^2 g_k()}{\delta n_{ak}^2} \leq 0 \ ; \ \frac{\delta g_h()}{\delta n_{ah}} \leq 0 \ , \ \frac{\delta^2 g_h()}{\delta n_{ah}^2} \geq 0$$

$$g_h(0,0) = w_0 \ , \ g_k(0,0) = p_o$$

$$n_{ak} + n_{ah} \in [0 \ , \ \bar{n}_a]$$

pressures exerted by members of the domestic economy seeking their own interests and that policy impacts manifest themselves in price variables. This is not

unlike Becker's (1983) approach which views lobbying resources as inputs in the production of influence. He postulates that taxes (subsidies) are a function of pressures produced by influence and exerted by the taxed (subsidized) group. Thus, transfers depend rather directly on the lobbying expenditures of the various interest groups. In this sense, the lobbying function is similar to the influence function. However, the lobbying function is defined in directly observable variables.

Profit Maximization with Lobbying and Transfer Constraints.

In a standard profit maximization model with parametric prices, the farmer solves the following decision problem:

$$(3) \qquad \Pi(p,w) = Max_y \quad py - C(w,y)$$

where C(w,y) is the multioutput cost function for the farm; y is the output vector; p is the output price vector and w is the input price vector. The corresponding multioutput profit function for the competitive farm is

(4) $\Pi(p,w) = py(p,w) - C(w, y(p,w))$

Lobbying is introduced in this benchmark model by way of the lobbying function. Let the farm use technology $y_k = f(x_h, x_u)$ where (x_h, x_u) are inputs with prices (w_h, w_u) to produce one commodity (y_k), priced at (p_k). Suppose that the farmer lobbies in markets (y_k, x_h). With lobbying, the price vector (p_k, w_h) is endogenous. The farmer chooses inputs and lobbying expenditures to maximize profits and faces a budget constraint in lobbying activities. The benefits from lobbying are externally constrained by government regulations and budget allocations (B_r). This leads to the decision problem (5)-(7) where the symbols are as previously defined.

(5) $Max_{n_{ak}, n_{ah}, x_k, x_u} \ \pi = p_k y_k - w_h x_h - w_u x_u - n_{ak} - n_{ah}$

(6) $s.t. \quad (i) \quad (p_k - p_0) y_k + (w_0 - w_h) x_h \leq B_r$

(7) $(ii) \quad n_{ak} + n_{ah} \leq \bar{n}_a$

The objective function (5) is assumed continuous and concave. The constraint set ((6),(7)) is assumed nonempty, closed and bounded. The transfer constraint (6) results from participation in political markets and requires payments to commodity k producers not to exceed some upper bound (B_r). The flexibility of this constraint depends on the range of policy choices open to legislators and the amount of government expenditures allocated for such purposes. A policy that dictates transfers from the treasury is more constraining than a policy that transfers resources directly from consumers to producers.

The lobbying constraint (7) originates from restrictions imposed by the Federal Election Commission on the maximum allowable contributions by economic agents to the political process. Alternatively, the constraint may be internal to the firm because access to lobbying

benefits are generally conditional on ownership of productive assets, and a firm that spends all its resources on lobbying and none on productive investments would be unable to collect lobbying benefits. The introduction of lobbying expenditures into the profit maximizing decision model is an explicit recognition of the farmer's participation in political markets. Model (5)-(7) represents the choices faced by the farmer in a lobbying economy. The Lagrangean for this problem is given by:

$$(8) \qquad \mathcal{L}(.) = p_k f(.) - w_h x_h - w_u x_u - n_{ak} - n_{ah} + \lambda_1 [B_r - (p_k - p_0) f() - (w_0 - w_h) x_h] + \lambda_2 (\bar{n}_a - n_{ak} - n_{ah})$$

$$with \quad \lambda_1 \geq 0 \ , \ \lambda_2 \geq 0$$

Assuming an interior solution, the first order necessary conditions evaluated at the optimum are:

$$(9) \qquad \frac{\delta \mathcal{L}()}{\delta x_h} = 0 \Rightarrow p_k f_h - w_h = \lambda_1 [(p_k - p_0) f_h + (w_0 - w_h)]$$

$$(10) \qquad \frac{\delta \mathcal{L}()}{\delta x_u} = 0 \Rightarrow p_k f_u - w_u = \lambda_1 (p_k - p_0) f_u$$

$$(11) \qquad \frac{\delta \mathcal{L}()}{\delta n_{ak}} = \frac{\delta \mathcal{L}}{\delta n_{ah}} = 0 \quad \Rightarrow \ -\frac{g_{k_{nak}} y_k}{g_{h_{nah}} x_h} = 1$$

$$(12) \qquad \frac{\delta \mathcal{L}}{\delta \lambda_1} = 0 \quad , \quad \frac{\delta \mathcal{L}}{\delta \lambda_2} = 0$$

where g_{knak}, g_{hnah}, f_h, f_u are the first derivatives with respect to lobbying expenditures (n_{ak}, n_{ah}), and inputs (x_h and x_u) respectively. The Lagrange multiplier on the transfer constraint is an efficiency measure. In the absence of transfer costs, a dollar transferred adds a dollar to profits. Thus, the transfer Lagrange multiplier (λ_1) is at most one and ($1-\lambda_1$) is the transfer cost per

dollar. The first order conditions with respect to x_h and x_u , therefore, require net marginal value products to equal marginal transfer benefits. Condition (11) directs the farmer to exhaust arbitrage opportunities in lobbying markets. That is, marginal returns to lobbying must be equalized across input and output markets. The resulting maximum profit function is:

$$(13) \qquad \Pi^* = \pi(\bar{n}_a, w_u, \boldsymbol{B}_r, n_{ok}, w_0, \boldsymbol{p}_0)$$

The profit function thus depends on the maximum transfer budget (B_r), the lobbying budget ($\bar{n}_a$), input price (w_u), lobbying by other agents (n_{ok}) and market prices (p_0,w_0). An important question is whether the maximum profit function has any empirical content, that is, whether it is possible to extract testable hypotheses from the model. Of particular interest are sign restrictions imposed by the model on the following first (14) and second derivatives (15) of the profit function:

$$(14) \qquad \frac{\delta\Pi^*()}{\delta w_0} \; ; \; \frac{\delta\Pi^*()}{\delta \boldsymbol{B}_r} \; ; \; \frac{\delta\Pi^*()}{\delta \bar{n}_a} \; ; \; \frac{\delta\Pi^*()}{\delta n_{ok}} \; ; \; \frac{\delta\Pi^*()}{\delta \boldsymbol{p}_o}$$

$$(15) \qquad \frac{\delta^2\Pi^*()}{\delta \boldsymbol{B}_r^2} \; ; \; \frac{\delta^2\Pi^*()}{\delta \bar{n}_a^2} \; ; \; \frac{\delta^2\Pi^*()}{\delta n_{ok}^2} \; ; \; \frac{\delta^2\Pi^*}{\delta \boldsymbol{p}_o^2} \; ; \; \frac{\delta^2\Pi^*()}{\delta w_0^2}$$

To derive the sign restrictions, the envelope theorem (Takayama, 1993, p.132) was applied to the primal dual yielding:

$$(16) \qquad \frac{\delta \Pi^*()}{\delta \boldsymbol{B}_r} = \lambda_1 \geq 0 \ ; \ \frac{\delta \Pi^*()}{\delta \bar{n}_a} = \lambda_2 \geq 0$$

$$(17) \qquad sign \ \frac{\delta \Pi^*(\ )}{\delta n_{ok}} = sign \frac{\delta g_k()}{\delta n_{ok}} y_k (1 - \lambda_1)$$

$$(18) \qquad \frac{\delta \Pi^*}{\delta p_o} = \frac{\delta \Pi^*}{\delta \boldsymbol{B}_r} y_k \geq 0 \ ; \ \frac{\delta \Pi^*()}{\delta w_o} = -\frac{\delta \Pi^*()}{\delta \boldsymbol{B}_r} x_h \leq 0$$

Equation (18) is a version of Hotelling's and Shephard's lemma in the presence of lobbying activities. Equation (17) does not give definite sign restrictions on the profit function. The sign depends on what is assumed about the Lagrange multiplier and the marginal impact that lobbying by other agents has on the pricing function. If this marginal impact is positive, then n_{ok} will have a non-negative impact on the farmer's profit as long as the Lagrange multiplier is less than one. Thus, other agents' lobbying will have a positive impact on the farm's profit when:

$$(19) \qquad \frac{\delta \Pi^*(\ )}{\delta n_{ok}} \geq 0 \ \ if \ \frac{\delta g_k()}{\delta n_{ok}} \geq 0 \ \ with \ \ 0 \leq \frac{\delta \Pi^*(\ )}{\delta \boldsymbol{B}_r} = \lambda_1 \leq 1$$

At the optimum, the Hessian of the primal dual must be negative semi-definite for the second order necessary conditions to hold. In turn, negative semi definiteness of the Hessian implies that its diagonal elements are non-positive. This generates further sign restrictions on the profit function as follows:

$$(20) \qquad \Pi^*_{\boldsymbol{B}_r \boldsymbol{B}_r} \geq 0 \ ; \ \Pi^*_{\bar{n}_a \bar{n}_a} \geq 0 \ ; \ \Pi^*_{w_o w_o} \geq 0 \ ; \ \Pi^*_{p_o p_o} \geq 0$$

$$(21) \qquad -\Pi^*_{n_{ok} n_{ok}} + g_{k_{n_{ok} n_{ok}}} y_k (1 - \lambda_1) \leq 0 \ \Rightarrow \ \Pi^*_{n_{ok} n_{ok}} \geq g_{k_{n_{ok} n_{ok}}} y_k (1 - \lambda_1) \leq 0$$

The lack of any definite sign restriction on (21) is due primarily to the absence of sign

restrictions on the second derivatives of the output pricing function with respect to n_{ok}. Some of the economic agents with interest in farm policy include farm input suppliers, agricultural marketing firms and food processing firms. However, they all have been shown to either benefit from or be unaffected by commodity programs while consumers have group characteristics that prevent them from being an effective lobbying voice (Knudson et al., Alston, et al., Ndayisenga and Kinsey). This observation and decreasing returns to lobbying indicate that the second derivative of the profit function with respect to lobbying by other agents is positive. In other words, farmers' profits do not decline as a result of other agents' lobbying.

Endogenous Transfers

Model (5)-(7) assumes exogenous policy transfers. This assumption is quite restrictive and applies more to direct government transfers because fiscal constraints may be a sufficient incentive to control expenditures. However, the government has less incentive to restrict transfers from consumers to producers because of consumers' high transaction costs and the relative vulnerability of consumers as a political constituency. In addition, producers may prefer to lobby for policies that minimize political risks for politicians by taxing the least effective interest group such as final consumers. It is therefore important to relax the transfer exogeneity assumption and endogenize the policy transfers. Suppose that the farmer's objective is to maximize transfers from government policies and regulations. This leads to the decision problem (22)-(23) where the symbols are as previously defined. The last term in the objective function is the maximum profit in the absence of lobbying efforts. The objective function is the difference between maximum profits with and without lobbying. The maximum profit with lobbying has two

components, a market component and the sum of transfers from output policies and input policies.

$$(22) \qquad Max_{n_{ak}, n_{ah}, x_k, x_u} \; \boldsymbol{B}_s = p_k f(x_h, x_u) - w_h x_h - w_u x_u - n_{ak} - n_{ah} - \pi_o(p_0, w_0)$$

$$(23) \qquad (ii) \qquad n_{ak} + n_{ah} \le \bar{n}_a$$

The Lagrangean for this problem is given by:

$$(24) \qquad \mathcal{L}(.) = p_k f(.) - w_h x_h - w_u x_u - n_{ak} - n_{ah} - \pi_0(p_0, w_0) + \lambda_2(\bar{n}_a - n_{ak} - n_{ah})$$
$$with \quad \lambda_1 \ge 0 \;,\; \lambda_2 \ge 0$$

Assuming an interior solution, the first order necessary conditions evaluated at the optimum are:

$$(25) \qquad \frac{\delta \mathcal{L}()}{\delta x_h} = p_k f_h - w_h = 0 \;;\; \frac{\delta \mathcal{L}()}{\delta x_u} = p_k f_u - w_u = 0$$

$$(26) \qquad \frac{\delta \mathcal{L}}{\delta \lambda_2} = \bar{n}_a - n_{ah} - n_{ak} = 0$$

$$(27) \qquad \frac{\delta \mathcal{L}()}{\delta n_{ak}} = \frac{\delta \mathcal{L}}{\delta n_{ah}} = 0 \quad \Rightarrow \; -\frac{g_{k_{nak}} y_k}{g_{k_{nah}} x_h} = 1$$

The first order conditions with respect to inputs are familiar. At the optimum, the input use must be such that the marginal value product equals the marginal input cost. The Lagrangean multiplier is the shadow value of the lobbying expenditure and measures the impact of an extra dollar of lobbying on the maximum transfer. Condition (27) gives the optimal condition for allocating the lobbying expenditure among outputs and inputs. At the optimum, the marginal returns to lobbying in the input and output markets must be equalized. Alternatively, condition (27) may be written as:

Thus, the relative returns to lobbying in market input x_h and output market y_k is equal to the

$$(28) \qquad -g_{h_{n_{ah}}} x_h = g_{k_{n_{ak}}} y_k \qquad \Rightarrow \qquad -\frac{g_{k_{n_{ak}}}}{g_{h_{n_{ah}}}} = \frac{x_h}{y_k}$$

average product of input x_h in producing output y_k for transfer maximizing farms. The result is quite useful empirically, particularly when output and input data are more easily accessible than lobbying data, because it allows the computation of relative returns to lobbying as the average product of the input. The resulting transfer function is:

$$(29) \qquad B_s^* = b_s(\bar{n}_a \ , \ n_{ok} \ , \ p_o \ , \ w_o \ , w_u)$$

This transfer function represents the maximum transfer that the farm can expect given its lobbying expenditures and the prevailing market input and output prices. Envelope properties and sign restrictions of this maximum transfer function can be derived as previously described:

$$(30) \qquad \frac{\delta B_s^*}{\delta \bar{n}_a} = \lambda \ \geq \ 0$$

$$(31) \qquad \frac{\delta B_s^*}{\delta n_{ok}} = \frac{\delta g_k()}{\delta n_{ok}} y_k \geq 0 \ \ if \ \frac{\delta g_k}{\delta n_{ok}} \geq 0$$

$$(32) \qquad \frac{\delta B_s^*}{\delta w_o} = -\frac{\delta \pi_o(p_o, w_o)}{\delta w_o} = x_{oh} \geq 0 \ ; \ \frac{\delta B_s^*}{\delta p_o} = \frac{\delta \pi_o(p_o, w_o)}{\delta p_o} = -y_{ok} \leq 0$$

Shephard's and Hotelling's lemma applied to the no lobbying profit function generate expressions in (32). Negative semi-definiteness of the primal dual implies the following second order restrictions:

$$(33) \qquad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta \bar{n}_a^2} \leq 0$$

$$(34) \qquad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta n_{ok}^2} \geq \frac{\delta^2 \boldsymbol{g}_k()}{\delta n_{ok}^2}$$

$$(34) \qquad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta p_o^2} + \frac{\delta^2 \pi_o}{\delta p_o^2} \geq 0$$

$$(36) \qquad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta w_o^2} + \frac{\delta^2 \pi_o()}{\delta w_o^2} \geq 0$$

Since supply increases with own price and input demand is nonincreasing in own input price, the second terms of (35) and (36) are positive. Thus, the above inequalities hold when the rate of change in the transfer function decreases (increases) as output prices (input prices) increase:

$$(37) \qquad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta p_o^2} \geq 0 \quad ; \quad \frac{\delta^2 \boldsymbol{B}_s^*}{\delta w_o^2} \geq 0$$

Figure 1 and 2 illustrate [(30), (33)] and [(32), (37)] respectively.

Comparative Statistics: A Summary of the Results

The results of this model show, first, that transfers to farmers increase with lobbying at a decreasing rate. Second, when a firm lobbies in its input and output markets, the relative returns from lobbying in the two markets are the average product of the input. Thus, it is

possible to calculate relative returns to lobbying without knowledge of the total lobbying expenditure or its allocation to various markets. All that is required is the knowledge that the firm lobbies in both the particular input and output markets. Third, transfers are inversely correlated with output market prices and positively related to the input market prices. Ceteris paribus, high commodity prices lead to increasingly lower transfers while high input prices lead to increasingly higher transfers. Alternatively, transfer payments and market income are inversely correlated. This establishes the widely observed and quite intuitive phenomenon of countercyclicity of farm transfers. While this result is not novel (Bullock, 1992, p.617), its derivation from the transfer maximizing agent model is new, and remarkably simple. It follows directly from applying the envelope theorem to the objective function.

When transfers are exogenous, the comparative statics analysis indicates that the maximum profit function, with lobbying, is nondecreasing and concave in the transfer and lobbying budget constraints.

Empirical Evidence: Data

Data for the farm sector, used in this research, were collected at the commodity group level. The data requirements were (a) total transfers from various policies to the various agricultural commodity groups (PSE), (b) the lobbying expenditures by the agricultural commodity groups, (c) the world market price for the agricultural commodities and (d) an input price index for a composite input used to produce each commodity. The world price and the input price index are proxies for the prices that would have prevailed in the absence of government intervention. The maximum transfer function must be interpreted as pertaining to

the whole commodity group rather than the individual farm. Table I lists the commodity groups as well as the corresponding average lobbying expenditures, producer subsidy equivalents, cash costs index and output prices.

Data on lobbying contributions by agricultural commodity organizations were published by the Federal Election Commission on financial activities (83/84, 85/86, 87/88). Their reports give information on the contribution of various groups to U.S. senate and house candidates, by party affiliation. The lobbying expenditures of a given commodity group are the contributions of the farm group or organization which represent the interests of the farmers of the commodity. For example, lobbying expenditures related to cattle ranchers are lobbying contributions made by the National Cattlemen's Association. For eggs and pork the lobbying associations are, respectively, the United Egg Producers and the National Pork Producers Council. The commodity groups considered are dairy, cattle, poultry, eggs, sugarcane and sugarbeets, rice, wheat, pork and wool. Lobbying expenditures data for these commodity groups exist for the years 1983, 1985 and 1987.

Policy transfers to commodity groups were measured by the Producer Subsidy Equivalent (PSE). The PSE is a comprehensive measure of transfers. The PSE accounts for infrastructure support and input assistance policies as well as output price enhancing policies including direct price policies (price floors and target prices), trade policies (export enhancement programs, tariffs and nontariff measures) and supply side policies (acreage reduction, supply management). Thus, it is broader than direct government transfers. The PSE is generally defined as the level of producer subsidy that would be necessary to replace the array of actual farm policies employed in a particular country in order to leave farm incomes unchanged and can be thought of "the cash

value of policy transfers occasioned by price and nonprice policies" (Josling and Tangermann, 1989, p.346). Data on the PSE for commodity groups were collected from an OECD database on government support for agriculture in OECD countries (1993).

This OECD source also contains the world price (p_{oj}) for commodities for which the PSEs are available. This is the price that would prevail if the markets were undisturbed by government intervention.

The input index W_{oj} is the cost of farm inputs that would prevail without government intervention. This type of price information is not available. As a proxy, an index of total cash expenses calculated from the United States Department of Agriculture cost of production series (1985, 1986, 1988, 1989, 1994) was used.

Transfers, Lobbying and Market Prices.

The theoretical framework gives no information about the functional form that ought to be used for the transfer function for farm commodity groups. However, in order to limit the outcome as little as possible, the functional form specified should be as general as possible. In this research, a quadratic function was used. It imposes no a priori restrictions on elasticities. The maximum transfer equation and the expected sign restrictions on the coefficients are of the form:

$$(38) \qquad B_j = \beta_0 + \beta_1 \bar{n}_{ajt} + \beta_2 p_{0jt} + \beta_3 w_{0jt} + \beta_{11} \bar{n}_{ajt}^2 + \beta_{12} \bar{n}_{ajt} p_{0jt} + \beta_{13} \bar{n}_{ajt} w_{0jt} + \beta_{22} p_{0jt}^2 + \beta_{23} p_{0jt} w_{0jt} + \beta_{33} w_{0jt}^2 + v_{it}$$

$$(39) \qquad \beta_1 > 0 \ , \ \beta_2 < 0 \ , \ \beta_3 > 0 \ ; \ \beta_{11} < 0 \ , \ \beta_{22} > 0 \ , \ \beta_{33} > 0$$

where v_{it} is a stochastic error term of unknown heteroskedasticity. B_j is the PSE per unit of

output, $\bar{n}_{aj}$ is the lobbying by commodity group j; w_{oj} is an input market cost index and p_{oj} is the world market price for commodity j.

The transfer equation was estimated with the SHAZAM econometric software. The White's heteroskedasticity consistent covariance matrix estimator was used to correct the estimates for an unknown form for heteroskedasticity (White). The estimates are, therefore, Generalized Least Square Estimates. The results are reported in Tables II-IV. Table II reports the estimates of the quadratic maximum transfer function when all the variables are included. Table III reports the estimates of the maximum transfer function when lobbying by farm commodity groups and the square of this lobbying are the only explanatory variables. Table IV gives the results when transfers are a simple linear function of lobbying. The motivation behind these two last regressions is to identify the amount of variations in farm transfers explained by the lobbying expenditures alone.

This research posited that lobbying by farm commodity groups must be an important determinant of transfers to farmers. The theoretical framework suggests a positive relationship. Further, the model developed suggests that transfers are countercyclical, that is, they vary inversely with market output prices and directly with market input prices. Alternatively, transfers are low (high) when market incomes are high (low). Does the data support these expectations? Tables II-IV help answer this question.

Table II shows that lobbying expenditures by farm groups ($\bar{n}_{aj}$ and $\bar{n}^2_{aj}$) have the expected signs and are significantly different from zero. Lobbying by farm groups increases transfers to the farm sector at a decreasing rate. Transfers are also inelastic with respect to lobbying. A ten percent increase in lobbying expenditures resulted in an 8.27 percent increase in transfers. In

turn this suggests that transfers, and thus policymakers, are not overly responsive to lobbying by commodity groups. This result, probably, reflects inertia and transaction costs of coalition formation, negotiating, debating, modifying, and voting on the legislation needed to implement transfer policies. Inelasticity with respect to lobbying is an indication of the legislators' value of time. Another possible interpretation is that in countries (like the United States of America) with few political parties and numerous interest groups, the latter must work harder to get the attention of any party due to their own large numbers. This implies that legislators do have some market power. This supports the view that political parties act as Stackelberg leaders towards the lobbies which act as followers (Magee, et al., 1989).

The world output price (P_{oj}) has the expected negative sign but is not statistically significant; the second order effect for the World Output Price (P^2_{oj}) has a wrong sign but is not statistically different from zero. The output price result implies that output market prices do not affect the transfers. This result should, probably, be expected because agricultural commodities world market prices are not truly free market prices. They are distorted and reflect domestic and trade policies of various countries. Viewed from this perspective, the outcome should be viewed as a measurement problem and should not necessarily be interpreted to mean that market prices are irrelevant to transfers.

The World Input Price (W_{oj}) - proxied by an index of total cash costs - has the expected sign and is statistically significant. The second order effect for the World Input Price (W^2_{oj}) does not have the expected sign even though it is statistically significant. This result is puzzling. On one hand, the theory prescribes that transfers increase with input prices at an increasing rate. On the other hand, empirical results suggest that transfers increase with input prices at a decreasing

rate. The basic intuition behind the theoretical result is that because farmers get compensated for input price increases, they do not substitute cheaper inputs for the more expensive ones. They make the adjustment in the political rather than the economic market. Econometric results suggest the opposite adjustment. However, it must be emphasized that the variable used is not a true price. It is an index of total cash costs which include subsidized as well as nonsubsidized inputs. For these reasons, the cash costs index may not properly capture second order effects.

The elasticities of transfers with respect to the input and output price are also less than one. A 10 percent increase in the input price (cash costs) resulted in a 9.2 percent increase in transfers while a 10 percent increase in output prices resulted in a 5 percent reduction in transfers (albeit not significant). This suggests that policy makers are more responsive to input price (cash costs) changes than they are to output price changes or to lobbying efforts.

With respect to the countercyclicity hypothesis, one observes that transfers are negatively related to the market output price and positively related to the input price. The interpretation is that transfers will take place when the output market is relatively depressed and/or when input prices are high.

Since the focus is on lobbying and because of measurement problems of the price variables, the transfer equation was estimated with lobbying as the sole explanatory variable (Table III). The coefficient on lobbying was still positive and significantly different from zero. Moreover, the regression explained 76 percent of the variations in transfers to commodity groups. This result did not change when the second order effect of lobbying was ignored (Table IV). The lobbying variable alone explained 74 percent of the variation in transfers to commodity groups. The coefficient on lobbying was still significant and transfers were still not very inelastic with

respect to lobbying.

Conclusions.

This paper presented a theoretical framework for incorporating lobbying into farm profit maximizing decision models and derived the comparative statics implications. When government transfers to farmers are exogenous, it is was found that the maximum profit function is increasing and convex in the lobbying budgets as well as the exogenous maximum allowable transfer from the government.

With endogenous transfers, comparative statics results indicated that the maximum transfer function is nondecreasing and concave in lobbying expenditures. The maximum transfer function is also nondecreasing and convex in the world input market price but is nonincreasing and convex in the world output market price. This result is consistent with the statement that transfers are countercyclical. They are high (low) when market income is low (high). The model was also confronted with data to check whether it could explain variations in transfers to farm commodity groups.

Estimates of the maximum transfer equation support the model well and are quite revealing. The coefficients on first and second order effects all had the expected sign except one. Moreover, the coefficient on agricultural lobbying expenditures was highly significant in all the equations. In fact, lobbying expenditures by agricultural commodity groups alone explained 75 percent of the variation in the transfer to commodity groups. The transfers were relatively inelastic with respect to lobbying, as well as to the world input and output market prices.

Although the results are robust and generally support the theoretical model, they do not

definitely separate and identify the cause and effect. That is, the model may be mispecified because of possible simultaneity between lobbying expenditures and transfers. Certainly, it is possible that increased transfers induce more lobbying expenditures. Transfer payments provide more resources to spend on lobbying. In addition, politicians encourage policies and regulations that foster identifiable constituent groups such as commodity groups. This gives politicians groups to target for benefits and groups that will, in turn, collect and contribute campaign money.

The overall conclusion is that lobbying is an important explanatory variable of transfers to agricultural commodity groups. Since it is known that farmers spend money in and receive benefits from political markets, analysts should explicitly incorporate this information in farm level models. This requires a systematic data collection effort to build databases on participation in political markets by economic agents involved in the food and agricultural sector.

Table I. Commodity Groups' Average Producer Subsidy Equivalents, Lobbying Expenditures, Cash Costs Index and Output Prices, 1983-1987.

Commodity Group	Total PSE in $ mil	Total Lobbying in 000$	Cash Costs Index	Output Price in $ per Ton
Sugar Cane	1,074.1	824.1	0.856	159
Rice	680.8	38.8	0.949	236
Beef and Veal	7,366.9	234.1	0.940	1199
Wheat	469.7	34.8	0.845	103
Milk	12,321.4	2,290.2	0.950	113
Wool	113.1	18.4	1.024	1,458
Egg	335.3	29.4	0.904	175
Poultry	1,078.0	446.0	0.876	855
Pork	7710.4	12.4	0.767	1,452

Source: Averages are computed from data collected from the Federal Election Commission Reports (Lobbying Expenditures), from OECD reports (Producer Subsidy Equivalents, Output Prices) and the USDA (Cash Costs) over 1983, 1985 and 1987.

Table II. Transfer Equation With All Variables Included.

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 18 DF	ELASTICITY AT MEANS
$\bar{n}_{aj}$	5289.9	1923.4	2.7504*	0.82757
P_{oj}	-363.43	316.34	-1.1489	-0.48984
W_{oj}	0.49E+06	0.20E+06	2.3703*	0.91977
W^2_{oj}	-0.49E+06	0.23E+06	-2.1885*	
P^2_{oj}	-0.23E-02	0.13602	-0.168E-01	
$\bar{n}^2_{aj}$	-43.366	3.0597	-14.173*	
$P_{oj}\bar{n}_{aj}$	14.001	1.3848	10.111*	
$W_{oj}\bar{n}_{aj}$	-146.65	2593.3	-0.56552E-01	
$P_{oj}W_{oj}$	493.35	219.33	2.2493*	

R-SQUARE ADJUSTED = 0.9814

Functional Form: Quadratic.

Dependent variable: Producer Subsidy Equivalent (PSE) per unit of output over three years and nine commodities.

The asterisk (*): Indicates significant at 5% level, two tail-test.

Table III. Transfer Equation With All Variables Excluded Except Lobbying.

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 25 DF	ELASTICITY AT MEANS
$\bar{n}_{aj}$	7432.2	1399.9	5.3089*	1.162
$\bar{n}^2_{aj}$	-4.6016	2.6555	-1.7329	

R-SQUARE ADJUSTED = 0.7619

Functional Form : Quadratic and no Intercept.

Dependent variable: Producer Subsidy Equivalent (PSE) per unit of output over three years and nine commodities.

The asterisk (*) : Indicates significant at 5% level, two tail-test.

Table IV. Transfer Equation with All Variables Excluded Except Lobbying.

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 26 DF	ELASTICITY AT MEANS
$\bar{n}_{aj}$	5148.5	490.19	10.503*	0.80544

R-SQUARE ADJUSTED = 0.7436

Functional Form : Linear and no Intercept.

Dependent variable: Producer Subsidy Equivalent (PSE) per unit of output over three years and nine commodities.

The asterisk (*) : Indicates significant at 5% level, two tail-test.

Figure 1 Transfers as a Function of Lobbying Expenditures by Farmers

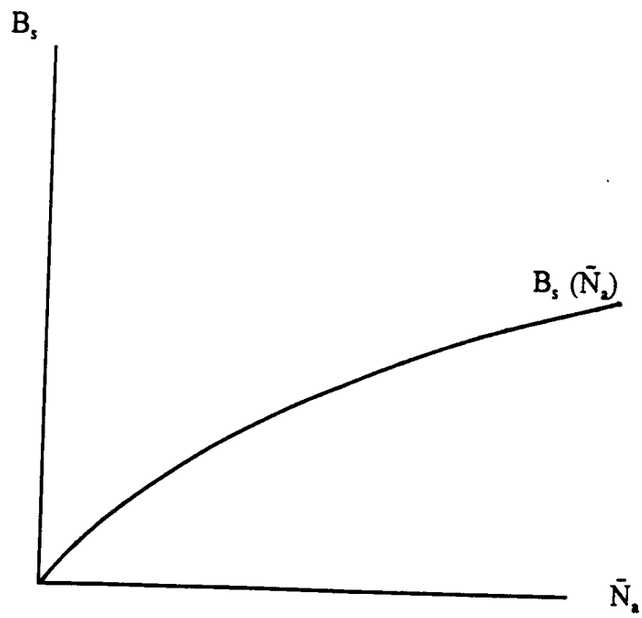
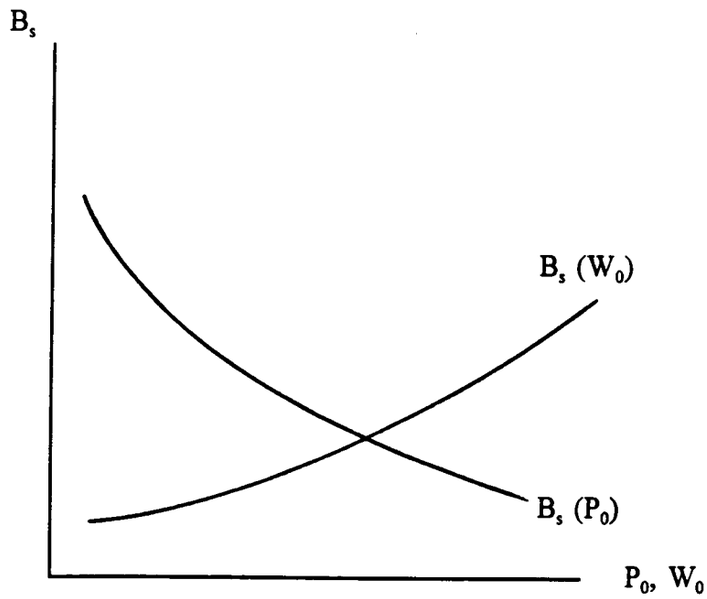


Figure 2 Transfers as a Function of Market Output (P_0) and Input (W_0) Prices



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