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EXPLAINING PRICE POLICY BIAS IN AGRICULTURE:

A POLITICAN-VOTER INTERACTION APPROACH

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EXPLAINING PRICE POLICY BIAS IN AGRICULTURE: A POLITICIAN-VOTER INTERACTION APPROACH

> "... a challenging puzzle ... why is there such a strong perverse relationship between the proportion of the population who are farm people and their political influence in shaping food and agricultural policies? A corollary .. why do governments in many low income countries persistently undervalue agricultural products?"
>
> T. W. Schultz (1979)

Several stylized facts on the patterns of government intervention in world agriculture have emerged including the observation that subsidies to farmers increase in countries with higher levels of per capita GNP while developing countries tend to tax farmers (see, among others Schultz, 1978; Peterson; Bale and Lutz; Binswanger and Scandizzo; World Bank; OECD; USDA; Kerr; Anderson and Hayami; and Krueger, Schiff and Valdes [1987, 1988]). In addition, agricultural protection has increased in industrial countries in the past several decades while that for manufacturing has declined. The taxation of agriculture in many low income countries has occurred in the face of a large rural population while rural votes in industrial countries are relatively fewer.

Alternative explanations for this pattern of intervention have been advanced including social welfare maximization (Johnston and Mellor), 'class' theories of special interests using the state for their own benefit (de Janvry), and alternative theories of interest group behavior (for applications to agriculture, see Olson (1985, 1986); Becker; Miller; Roe and Shane; Gardner; Bullock; Bates and Rogerson; and Balisacan and Roumasset). Olson (1985,1986) for example argues that the rural sector in developing countries is exploited because of the inability of the large and dispersed members of this sector to organize themselves adequately to pressure the government to act on their behalf. In industrial countries, the urban sector is large and dispersed and hence is exploited for the benefit of an organized and smaller rural sector. Becker's theory of pressure groups also argues that relatively small groups are successful

in obtaining subsidies in agriculture. The politician's role in Becker's framework is mainly in responding to pressures imposed by active groups. Competition between pressure groups is the primary determinant of political influence in Becker's framework. Gardner adopts this model by focusing on the cost of generating pressure by farmers in U.S. agriculture.

In this paper we attempt to explain the observed patterns of agricultural prices using the approach initiated by the works of Downs and of Breton, and developed formally by Frey and Lau of rational, self-interested behavior by politicians. In this approach, politicians or political parties compete for support defined in terms of votes, popularity ratings in polls and other measures that reflect the intensity of voter preferences for the government. In order to achieve and maintain power, governments maximize the political support in choosing the level of intervention in agricultural markets. The manner in which policy interventions affect political opinions of individuals is integrated within the political decision-making whereby price policies depend on political support and vice-versa.

For simplicity we assume two interest groups: a rural group consisting of agricultural land owners and an urban group[1]. The political support functions are specified to depend on relative income between groups and redistributed income within groups. We show that the former generates egalitarian wealth transfer policies (from the richer to the poorer group) whereas the latter results in no intervention at all. We further investigate the effects on transfer policies of (i) the pre-policy income gap between the urban and rural sector, (ii) the population ratio between the two groups and (iii) the deadweight loss of redistribution.

The results of our model are consistent with observed patterns of intervention, providing a possible explanation for phenomena like (i) why

industrialized countries subsidize farmers while developing countries tend to do the opposite (ii) why West Germany (with many small farmers) prefers higher cereal prices than other countries in the European Community while the United Kingdom (with fewer, wealthier and larger farms) opposes price increases. The model also explains why Canada and Argentina as two urbanized countries with similar agro-climatic conditions have diametrically opposite agricultural price policies and why non-food export sectors with fewer and richer farms in developing countries are taxed significantly more than farmers in the more populous staple food production sectors.

2. Patterns of Intervention in World Agriculture

The taxation of agriculture in developing countries and subsidization of farmers in industrial countries has become one of the more predominant patterns of government involvement in agriculture observed by economists. The evidence suggests that subsidies increase with the level of GNP. Anderson and Hayami observe that countries in South-East Asia and Europe shift from taxing to subsidizing agriculture in the course of economic development and industrialization. The gap between manufacturing and agricultural productivity increases in the process of industrialization as the urban population gets larger and richer.

Anderson and Tyers determine a correlation between agricultural protection and per capita national income and conclude that society has an income elastic demand for assisting farmers. Honma and Hayami find a statistical correlation between agricultural protection and both its comparative advantage and international terms of trade relative to the manufacturing sector. Anderson and Tyers note several exceptions to these patterns such as food-exporting rich countries like Australia and North America.

Krueger, Schiff and Valdes (1987, 1988) determine the direct (sectoral) and indirect (macro) policy impacts on incentives in agriculture in eighteen developing countries. Farmers are taxed through import-substitution policies in the industrial sector, over-valued exchange rates via exchange-control regimes and import licensing, and suppressed farm prices via government procurement policies (especially marketing boards), export taxes or quotas. Some of these taxes have been offset by subsidies to inputs, irrigation and the like. Direct protection was found to be negative for exportables (typically non-food crops) but positive (with exceptions) for importables (often food staples). Total protection averaged -7 percent for importables and -35 to -40 percent for exportables. Similar conclusions were reached earlier in a study by Kerr.

3. A Theoretical Model

We now develop a model which attempts to explain government behavior in setting price policies. Underlying the model is the notion of a member's intensity of political support, interpreted as the probability that a member expresses support for the government in terms of votes, popularity polls and the like (see Peltzman p. 214). By assuming that politicians maximize political support, we derive results on the rules that govern policy intervention. We shall compare these results with some evidence compiled on the patterns of government intervention in agriculture.

Consider an economy that consists of two homogeneous groups: urban (labor owners) group of size n_u and a rural (land owners) group of size n_r, with $n = n_u + n_r$ the total number of members. Let T denote the total income transfer from the urban to the rural group (a negative T denotes an income transfer from rural to urban) and let $t = T/n_u$ be the per capita urban tax. The per capita subsidy to the rural sector is thus $t_r = T/n_r = tR$, where

$R = n_u/n_r$ is the population ratio. Let $Y_t^o(t)$ and $Y_r^o(t_r)$ denote the urban and rural per capita endowment income net of transfer payments t, so that

$$Y_u(t) = Y_u^o(t) - t \tag{1}$$

and

$$Y_r(t_r) = Y_r^o(t_r) + t_r \tag{2}$$

are the total realized per capita incomes in the urban and rural sectors, respectively.

The transfer T distorts individual choices, which results in the (per capita) deadweight losses $Y_u^o(0) - Y_u^o(t)$ and $Y_r^o(0) - Y_r^o(t_r)$. While a distortion free transfer, such as an inescapable Pigouvian poll tax or an unexpected lump sum transfer is in principle possible we shall not consider such transfers here. We explicitly assume that both $Y_u^o(t)$ and $Y_r^o(t_r)$ are increasing for negative t and decreasing for positive t, each attaining a unique maximum at t=0. The derivatives $Y_u^{o\prime}(t)$ and $Y_r^{o\prime}(t_r)$ will be referred to as the marginal deadweight loss functions (the prime notation indicates derivative with respect to the explicit argument, thus $Y_u^{o\prime}(t)$ and $Y_r^{o\prime}(t_r)$ are derivatives with respect to t and t_r=Rt, respectively). The size of the deadweight loss functions depends on the marginal excess burden of taxation and subsidization and hence depend on factors such as the elasticity of supply and demand. Furthermore, the net trade position for a country can have significant impacts on the efficiency of transfers. A large country importer can improve its terms of trade while a large country exporter does the opposite, thereby exacerbating the cost of transfers.

Two motives are assumed to determine the formation of political opinion by members: the *relative income* motive and the *redistributed income* motive. The relative income motive depends on the member's income relative to the

income of all other members. Its formulation draws upon the literature on relative deprivation (Runciman; Sen; Yitzhaki [1979, 1982]; Chipman) which postulates that the actual standing of member A's income relative to the incomes of other (comparable) members affects the well-being of member A; it therefore affects A's political opinion. Thus, for example, a policy that leaves A's income intact but changes the income of other members would affect A's political support.

Generally speaking, the theory of relative deprivation maintains that a member feels deprived with respect to those with higher income and feels satisfied with respect to those with lower income (Runciman p. 10; Yitzhaki, 1979, p. 322). The level of deprivation (satisfaction) increases with the number of members having higher (lower) incomes and with the income gap. We assume a symmetric role of deprivation and satisfaction i.e., the one is the mirror image of the other. Formally, let $h_{ij}(t) = y_i(t) - y_j(t)$ be the income gap between members i and j, with $y_i(t)$ indicating the income of member i. Let $h_i(t)$ be the aggregate income gap of member i

$$h_i(t) = \sum_{j=1}^{n} h_{ij}(t)$$

Then, the *relative income* motive of member i is represented by a monotonic function of $h_i(t)$, to be denoted by $G(\cdot)$. Thus, an increase in the aggregate income gap (which may be caused by an increase in the number of members with lower income or a decrease in the number of members with higher income or changes in the individual income gaps) causes an increase in the intensity of the political support forthcoming from member i. In the present case, with two homogeneous groups, the aggregate income gap of a rural member is $h(t) \cdot n_u$ and that of urban members is $-h(t) \cdot n_r$, where

$$h(t) = Y_r(t) - Y_u(t) \tag{3}$$

is the income gap between a rural and a urban member.

We shall require that no political support is forthcoming from the group that is initially at a disadvantage unless this group is made better off. This requirement is stated formally as

$$G(x) = 0 \text{ for all } x \leq -|h(0)|. \tag{4}$$

where h(0) is the initial (pre-policy) income disparity between the rural and the urban groups. We further assume that G(x) is strictly concave for $x > -|h(0)|$.

The redistributed income motive merely reflects the simple hypothesis that members prefer policies which transfer more wealth to them and they translate these preferences into political support. We represent this motive by $F(y_i(t)-y_i(0))$, with $F(\cdot)$ an increasing and strictly concave function. This specification is similar, though not the same as those of Brock and Magee; Findlay and Wellisz; and Peltzman.

The urban and rural political support functions S^u and S^r are formulated as:

$$S^u(t) = W_1G(-h(t)\cdot n_r) + W_2F(Y_u(t) - Y_u(o)) \tag{5}$$

and

$$S^r(t) = W_1G(h(t)\cdot n_u) + W_2F(Y_r(t) - Y_r(o)) \tag{6}$$

where W_1 and W_2 are non-negative scalars summing to unity which represent the importance of the relative income motive and the redistributed income motive. Specifications (5) and (6) incorporate two main restrictions: (i)

both S^u and S^r are additively separable in relative and redistributed income; (ii) the effect of these factors is identical for all members (i.e., the same G and F functions and the same weights, W_1 and W_2, appear in S^u and in S^r). These restrictions simplify the analysis and allow us to derive simple and illuminating results. We leave the analysis of the general case for future research.

We note that the marginal deadweight losses $Y_r^{o\prime}(t_r)$ and $Y_u^{o\prime}(t)$ satisfy

$$Y_r^{o\prime}(t_r) + 1 > 0 \quad \text{and} \quad 1 - Y_u^{o\prime}(t) > 0. \tag{7}$$

For suppose $t > 0$, then both $Y_r^{o\prime}$ and $Y_u^{o\prime}$ are negative, but $Y_r^{o\prime}$ must exceed minus unity since otherwise a rural member would become worse off by receiving a larger subsidy. Likewise when $t < 0$, both $Y_r^{o\prime}$ and $Y_u^{o\prime}$ are positive but $Y_u^{o\prime}$ must be less than unity since otherwise the urban member would become better off by receiving a smaller (positive) transfer. From (7) it follows directly that

$$h'(t) = [Y_r^{o\prime}(t_r) + 1]R - Y_u^{o\prime}(t) + 1 > 0 \tag{8}$$

The government chooses t in order to maximize total political support:

$$S(t) = n_u\, S^u(t) + n_r\, S^r(t). \tag{9}$$

The first order condition requires that the optimal per capita transfer t^* satisfies

$$W_1 h'(t^*) n_u n_r [G'(h(t^*)\cdot n_u) - G'(-h(t^*)\cdot n_r)] +$$
$$W_2 R[F'(g_u(t^*))Y_u'(t^*) + F'(g_r(t_r^*))Y_r'(t_r^*)] = 0 \qquad (10)$$

where $g_j = Y_j(t) - Y_j(o)$, $j = u,r$ and it is recalled that $Y_r'(t_r) = \partial Y_r/\partial t_r$.

We define the transfer level which yields egalitarian income distribution by t^e. That is, t^e satisfies

$$h(t^e) = 0. \qquad (11)$$

From (8), the unique level t^e is positive, zero or negative whenever $h(0)$ is negative, zero or positive, respectively. We proceed now to analyze the effects on income transfers of the endowment income disparity, $h(0)$, the population ratio, R, and the magnitudes of the marginal deadweight losses, $Y_r^{o\prime}$ and $Y_u^{o\prime}$. We begin with the extreme cases in which either the relative income motive ($W_1 = 1$ and $W_2 = 0$) or the redistributed income motive ($W_1 = 0$ and $W_2 = 1$) prevail. We then discuss the more general case in which both W_1 and W_2 are positive.

3.1 The Relative Income Effect ($W_1 = 1$; $W_2 = 0$)

In this scenario, individuals deciding on their political support are concerned only with their income relative to that of the other members. Condition (10) specializes to

$$G'(h(t^*)\cdot n_r) = G'(-h(t^*)\cdot n_u) \qquad (12)$$

which, together with the strict concavity of $G(\cdot)$, imply:

Proposition 1: If members are concerned only with relative income, then $t^* = t^e$.

Figures 1 and 2 provide graphical explanations. Figure 1 considers the case $h(0) < 0$. The curve labeled $h_1(t)$ corresponds to the case $R = 1$; the $h_2(t)$ and $h_3(t)$ curves correspond to $R > 1$ and $R < 1$, respectively. The corresponding equity transfers are t_1^e, t_2^e and t_3^e. Note that the equity tax t^e always moves toward zero as R increases, i.e., t^e decreases or increases with R as $h(0) < 0$ or $h(0) > 0$, respectively.

With $h(0) < 0$, so that $t^e > 0$, an increase in R implies that there are more members in the urban sector relative to the rural sector and a smaller per capita urban tax is capable of generating the rural subsidy required to maintain equity. The effect of R on the per capita rural subsidy $t_r^* = Rt^* = Rt^e$ is given by $\partial t_r^*/\partial R = t^e + R(\partial t^e/\partial R)$. t^e and $\partial t^e/\partial R$ are always of opposite signs (t^e increases with R when t^e is negative and decreases with R when t^e is positive). Nevertheless, it is not hard to show:

Proposition 2: If $h(0)$ is negative (resp. positive, zero) then t^* $(=t^e)$ decreases (resp. increases, does not change) and t_r^* $(=Rt^*)$ increases (resp. decreases, does not change) with R.

Proof: The effect of R on t^e is obvious from the graphical explanation. To show the effect of R on $t_r^*=Rt^e$, consider first the case $h(0) < 0$. Suppose R increases from R_1 to R_2 $(R_1 < R_2)$. Then we know that t^e decreases, say from t_1^e to t_2^e, implying, using properties (7), that the income of urban members rises. Thus $Y_u^o(t_1^e) < Y_u^o(t_2^e)$. Since the income of a rural member must equal that of the urban member, the per capita rural income must increase too. Using property (7) again, this can occur only if t_r^* increases. The case

$h(0) > 0$ is proven in a similar manner and when $h(0) = 0$, $t^e = 0$ and $t_r^* = 0$ disregarding the level of R.

In industrial countries, where R increases as the number of farmers relative to the urban population is declining and where it is reasonable to suppose that the endowment incomes are in favor of the urban sector, the rural per capita subsidy is increasing while the per capita tax on the urban sector continuously declines. Hence, it is possible in this model to observe countries with relatively fewer farmers having higher per capita rural subsidies. It is in the interest of support maximizing politicians to do so even though there are relatively fewer farmers to obtain votes from.

Variations in endowment incomes due to changes in technology or input costs (in either the agricultural or industrial sector) shift h(0). For example, if the productivity in the industrial (urban) sector improves relative to the agricultural (rural) sector, then $Y_u(0)$ increases relative to $Y_r(0)$. This results in a leftward shift of the h(t) function and an increase in the optimal urban tax $t^* = t^e$ and in rural subsidy t_r^*. Conversely, technological change in the agricultural sector that raises the relative productivity and endowment incomes of the rural sector will shift the function h(t) to the right (in Figure 1) so that t^e decreases. We summarize the impact of endowment incomes in the following proposition, which can be verified using Figures 1 and 2.

Proposition 3: The optimal tax t^* ($=t^e$) decreases with h(0).

This result has been prevalent in North America and Australia where government supported research and extension has resulted in large technological advances. This may partially explain Anderson and Tyers observation that protection to farmers is relatively lower in these countries.

The insistence by West Germany (FRG) for higher cereal support prices while the United Kingdom (UK) is most strongly opposed can also be partially explained by the relative difference in endowment incomes between the rural and urban sectors in these countries. The FRG has many more cereal farms than the UK and are smaller in size and relatively more inefficient. From a strict interest group point of view, one would expect the UK to favor higher cereal prices. However, the increases in productivity in the industrial sector of the FRG have exceeded that of the UK in past decades while the reverse is true in agriculture between the two countries. Hence, the relative propensity of political preferences in price policy in Europe can be explained in part by the divergence in relative endowment incomes between agriculture and manufacturing across countries.

A similar argument could be made to explain the price policy differences between Canada and Argentina. As both countries are highly urbanized societies with similar agro-climatic conditions, Argentina taxes farmers while the reverse is the case in Canada.

While h(0) is the intercept of the h(t) function, the location and shape of the h(t) depends also on its slope. This slope depends on R and on the marginal deadweight losses $Y_r^{o\prime}$ and $Y_u^{o\prime}$. The effect of R was studied above. We concentrate now on the latter.

Suppose the government changes the instruments it uses to tax and subsidize such that the urban sector is unaffected but the distortionary effects on the rural sector are more severe, i.e. $|Y_r^{o\prime}|$ increases for all $t \neq 0$. This has the effect of reducing rural income for a given level of transfer and causes h(t) to turn clockwise (counter clockwise) about the point h(0) when t is positive (negative). It can be verified using Figures 1 and 2 that the result is an increase in the equity transfer t^e if h(0) is

negative and a decrease in t^e if h(0) is positive. A *ceteris paribus* increase in $|Y_u^{o\prime}|$, for all $t \neq 0$ will have an opposite effect. Becker has transfers higher in sectors with a more inelastic demand and supply.

These results have important implications for observed patterns of government intervention in agricultural markets. Commodity sectors with more elastic supply functions tend to make the producers (the rural sector) more vulnerable to distortionary forces. Hence, one would expect higher producer subsidies (or lower producer taxes) in such cases. On the other hand, inelastic demand is associated with a lower deadweight loss for a given transfer. Thus, one would expect higher transfers in those sectors. USDA calculations indicate that inelastic demand commodities like fluid milk and wheat have higher 'producer subsidy equivalents' world-wide than more elastic commodities like meat and feed grains. Furthermore, the efficiency of transfers are higher for importers than for exporters. It is generally recognized that importers protect agriculture more than exporters in industrial countries because the latter's terms of trade decline (improve) with the subsidization (taxation) of the rural sector (and vice-versa for importers). This may partially explain Anderson and Tyers' observation that North America and Australia subsidize agriculture less because they are predominantly exporters and hence limit subsidies. On the other hand, the dairy and sugar sectors in the United States as net importers have higher rates of protection than export sectors (USDA).

3.2 The Pure Redistributed Incomes Effect ($W_1 = 0$; $W_2 = 1$)

In this scenario, individuals are concerned only with the effect of government policies on their own income. The condition (10) becomes

$$F'(g_r(t^*))(Y_r^{o\prime}(t_r^*)+1) = F'(g_u(t^*))(1-Y_u^{o\prime}(t^*)), \qquad (13)$$

from which the following result follows.

Proposition 4: If a member's political support depends only on the change in income due to redistribution, then the optimal transfer is zero.

Proof: From $Y_r^{o\prime}(0) = Y_u^{o\prime}(0) = g_r(0) = g_u(0) = 0$, it follows that $t^* = 0$ satisfies (13). Furthermore, $t^* = 0$ is the unique solution to (13), for suppose $t^* > 0$. Then, compared to the case $t^* = 0$, the left hand side of (13) decreases because (i) g_r increases (becomes positive) which, by virtue of the strict concavity of F, causes $F'(g_r)$ to decrease, and (ii) $Y_r^{o\prime}$ becomes negative so that $Y_r^{o\prime}+1$ decreases. Likewise, both g_u and $Y_u^{o\prime}$ become negative, which causes the right hand side of (13) to increase. Thus $t^* > 0$ cannot be a solution. In a similar manner, a negative transfer is ruled out, leaving $t^* = 0$ as the unique solution.

The implication of Proposition (4) is that governments will not redistribute income when maximizing political support if redistributed income is the only factor affecting individuals behavior in supporting the government. This result holds regardless of the relative group size, the extent of income inequality between the groups and of the marginal dead-weight loss of redistribution.

3.3 The Mixed Case ($W_1 > 0$, $W_2 > 0$)

If both relative and redistributed incomes affect political support, then the tendency for governments to reduce the disparity in income distribution is partially mitigated by the effect of redistributed income on the

level of political support. Hence, redistributed income considerations dampen the government's propensity to redistribute income away from the relatively advantaged group. The extent to which this occurs depends critically on the relative values of the weights W_1 and W_2.

4. Some Empirical Evidence

The above theoretical results suggest that a country that subsidizes farmers is likely to have lower per capita endowment incomes in the rural sector than in the urban sector (and vice-versa for countries that tax agriculture). This hypothesis is consistent with the observations by Anderson and Hayami that countries who subsidize farmers have high productivity rates and wages in the manufacturing sector (where one can hypothesize that rural endowment incomes are relatively lower) while the opposite is the case in developing countries or in times before industrialization as in the case of Japan and Europe when agriculture was taxed. Hence, one perhaps should not be surprised that wheat prices are the highest in Saudi Arabia (Byerlee and Sain) and the lowest in Ethiopia (Kerr).

Furthermore, Honma and Hayami find a statistical correlation between agricultural protection and its comparative advantage vis-a-vis the manufacturing sector. Hence, agriculture may have a comparative advantage in many developing countries so that endowment incomes would be higher and hence the rural sector is taxed. In addition, it may be that export crop sectors in developing countries have a comparative advantage over import-competing food crop sectors such that the latter are taxed less (Kerr; Krueger, Schiff and Valdes 1987, 1988). This occurs even though farmers in the export sector in developing countries are typically fewer and more able to organize as a pressure group.

The observation by Anderson and Tyers that Australia and North America, although highly industrialized economies, tend to protect farmers less may in part be explained by the fact that relative endowment incomes in agriculture may not be so low as in other countries because of agro-climatic conditions and the advancements in technology due to publicly funded research.

A fascinating feature of European agricultural politics has been the increasing polarization between the UK and the FRG on matters relating to support prices of the Common Agricultural Policy (CAP), particularly in regard to cereal prices. The UK has argued for lower price supports while the FRG has been the most vocal for higher prices. This occurs even though the total costs of the cereals regime is higher for the FRG because (a) FRG's taxpayer contributions are higher because the value-added tax is based on the level of GNP and the UK is one of the lower income members (in 1986, FRG's financial contribution to the CAP was twice that of the UK's (7156 million ECUs versus 3506 for the UK)); and (b) UK's consumer costs are lower as they are a substantial net exporter of cereals (unlike the FRG). Hence, the FRG contribute to invisible transfers from FRG consumers to producers elsewhere in the EC resulting from intra-EC trade at supported prices (BAE, p. 67). In addition, the FRG contribute more to import levy income resulting from off-shore trade because the FRG is a significantly larger net importer. Furthermore, the benefits of the cereal regime is greater for the UK because of larger production. Not only is the absolute level of farm benefits higher in the UK but so too are the per capita benefits because the number of cereal farms is much higher in the FRG. In 1986, there were 50,349 'general cropping' farms in the FRG with the UK having only 20,824 farms (Commission of the European Communities). Hence, it would appear

puzzling why the UK is so adamant for lower prices and why the FRG argues for the opposite. This irony is further complicated by the fact that not only are farms fewer in number in the UK, but also are larger and more variable in size distribution, leading the Olson-Becker interest group models to predict that the price preferences of the UK and the FRG would be reversed. Olson (1985, 1986) argues that larger and fewer firms promote the political power of an industry by reducing costs of organizing, preventing free-riding and mitigating opposition. Olson (1985) and Gardner also argue that a higher variability in farm size and a lower geographic dispersion of farms would lead to more lobbying and higher subsidies. Yet the farms in the FRG are far more uniform in size and are more geographic disperse, evidence that is contrary to the revealed political preferences for prices by the UK and the FRG and hence contradicts the predictions of interest-group models.

The model developed in this paper emphasizes the importance of the relative rural-urban endowment income differential in explaining the UK and FRG relative price preferences. The UK has few, large and cost-efficient farms while in the FRG farms are many, small and high cost. On the other hand, the industrial sector in the FRG is richer than that of the UK. The pre-policy income gap between the rural and urban sectors is therefore higher in the FRG. It is possible that this pre-policy disparity in relative incomes is a fundamental force in the current and historical political economy of agricultural policy in these countries.

The applicability of our model is tested by using the 'nominal rates of protection' (NRPs) for eighteen developing countries reported in Krueger and Krueger, Schiff and Valdes (1987, 1988) as a proxy for the level of transfers to/from farmers. The data covers the average of the time period

1980-84 and sometimes involves several agricultural sectors in one country (see appendix for details). The explanatory variables include the per capita GDP in the urban and agricultural sectors (Y_u and Y_r, respectively); the ratio of urban to rural population (R); and per capita arable land (LC):

1980-1984: $$NRP = \underset{(-3.93)}{-47.9} - \underset{(-2.52)}{14.2}\,(Y_r - Y_u) + \underset{(2.58)}{21.0}R - \underset{(-2.44)}{16.3}LC$$

$\bar{R}^2 = 0.379$ F Value = 4.463 NOBS = 18

The t-statistics are given in parenthesis. All variables have the anticipated signs and are statistically discernable at the 95 percent confidence interval. The per capita GDPs are proxies for endowment incomes and reflect differences in the average productivity across countries between agriculture and the non-agricultural sectors. In addition to variations in the productivity between the urban and rural sectors, a measure of endowments in the rural sector (per capita arable land LC) is included to capture the impact of *fixed* capital on the endowment incomes of agriculture. The per capita GDP in the agricultural and urban sectors (Y_r and Y_u) can be viewed as measures of how *produced* capital affect endowment incomes. A similar measure of the effect of fixed capital on urban endowments is not readily available but perhaps could include in future research proxies such as natural resource endowments or education levels of the working force.

Consistent with our model, the positive coefficient of R implies a positive relation between the per capita agricultural subsidy, as reflected by the NRP, and R (cf. proposition 2). Furthermore, the negative coefficient on (Y_r-Y_u) indicates that a decrease in the rural-urban income gap will result in an increase in agricultural protection. For example,

dramatic growth in the manufacturing sectors of the newly-industrialized countries would generate, as observed, an increase in agricultural protectionism.

The empirical evidence above gives support to the notion that governments respond to relative endowment income differences in setting their price policies. Farmers in industrial countries are compensated for high adjustment costs (the 'farm problem'). In developing countries, on the other hand, agriculture is burdened with the consequences of equity-motivated policy designed to satisfy urban consumers demand for 'cheap food' because food is a major share of total expenditures. Hence, policies in developing countries can be viewed as dealing primarily with poverty or 'basic needs' (Schuh).

5. Concluding Remarks

This paper uses a model of politician-voter interaction to explain some observed patterns of government intervention in agriculture. The manner in which members form their political opinions is assumed to depend on relative income and on redistributed income. The relative income factor motivates policies that result in an egalitarian income distribution. Such equity considerations by politicians are not driven by social concerns or ethical reasoning. Rather, it is in the self-interest of politicians to provide such an outcome. The redistributed income factor motivates policies that maintain the status quo in which no wealth transfers take place. The final outcome is somewhere in between, depending on the weights individuals place on the relative income and the redistributed income motives when forming their political opinions.

The main purpose of this paper is to emphasize the role of politician-

voter interaction in the formation of agricultural policies. The results show how wealth transfers depend on the endowment (pre-policy) income disparity between farmers and the urban sector, the relative number of farmers and the deadweight loss caused by redistribution policies.

Some limitations and possible extensions of the present approach should be mentioned. First our approach, like any other model based on politician-voter interaction, is less applicable to non-democratic societies, where member's political views matter less. Even within a democratic system there are large differences from one system to another. Thus, for example, a parliamentary system in the UK compared to proportional representation in the FRG may partially explain the relative success of farmers in the FRG. The analysis should be extended to account for such differences. Another extension should allow for more than two groups.

Finally, interest groups also play an important role on the political stage. It will be interesting to combine these two theories of political behavior (interest groups and politician-voter interaction) within a unified framework of analysis; the foundations of which are already laid down by Peltzman and Brock and Magee.

Footnotes

1. In the industrial western democracies the agricultural sector consists mainly of family owned farms, thus land owners comprise the entire agricultural sector. In developing countries the agricultural sector consists also of landless workers; they are included in the urban group in this paper. This may be justified by viewing landless workers as "labor owners" and assuming that they are free to sell labor services in the urban sector (with high urban unemployment, this assumption does not hold and a finer partition to more groups will be necessary). Land, on the other hand, is immobile and as such absorbs the residual between revenues and production costs, i.e., the production rents. Any change in prices would therefore be reflected in land rents, thereby affecting land values. Thus, on the production side, land owners are the main gainers or losers of agricultural policies.

2. Although assumed exogenous in our analysis, these weights, W_1 and W_2, may in fact vary across socio-economic characteristics for individuals within groups or between groups.

3. In addition, our model assumes the functions $G(\cdot)$ and $F(\cdot)$ are the same over time and between sectors and groups. However, Downs emphasized how uncertainty and differential information affected voter preferences and government policies. Voters are well informed on issues affecting them as income earners, giving rise to inequality in political influence in favor of producers. The latter have lower information and uncertainty costs because benefits are concentrated and hence producers are more sensitive in their political support. A generalization of these issues awaits further research.

4. Equation (9) makes the simplifying assumption that politicians maximize the sum of individual support functions. However political support is not additive in reality because political institutions transform the economic basis of policy costs/benefits into political costs/benefits. An example is distributive politics or disproportionate representation in the United States whereby each state is represented by two senators. As an illustration, the wheat sector is likely to receive higher subsidies because states like Kansas have few consumers and other major producing sectors for which wheat farmers would have to compete with in having their senators support outcomes in their favor. In future work, political districting and cost accounting as developed in Weingast, Shepsle and Johnsen should be applied in an appropriate manner to equation (9). The 'political influence' of voters may not only vary across sectors within a country but also across countries where differing political institutions could result in different policy outcomes.

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Appendix

Data for the nominal rates of protection (NRPs) are taken from Krueger, Schiff and Valdes (1987) (part of these data are reproduced in a paper by the same authors in 1988 but without the decimal point) and supplemented by additional information given in Krueger. The combination of these three data sources are used to calculate an average NRP for each of the eighteen countries for 1980-84.

The average NRPs are in percent and refer to total protection that include both direct (sector specific) and indirect (macro) protection. For details, see the appendix in Krueger, Schiff and Valdes (1988).

Urban income is proxied by non-agricultural GDP (billions of local currency) converted into U.S. dollars, deflated by the GDP deflator (1980=100) and divided by urban population. Non-agricultural GDP is determined by multiplying total GDP (from IMF Financial Statistics (monthly)) and subtracting the agricultural share of GDP (obtained from the World Bank Development Report (annual)). Exchange rates, GDP deflators and total population are all obtained from the IMF Financial Statistics (monthly). Rural population is obtained from the FAO Agrostat database (obtained via personal correspondence).

The variable LC represents arable land area for 1985 (obtained from the FAO Production Yearbook (annual)) and is divided by the rural population. All other data are averages for the time period corresponding to the dependent variable.

FIGURE 1

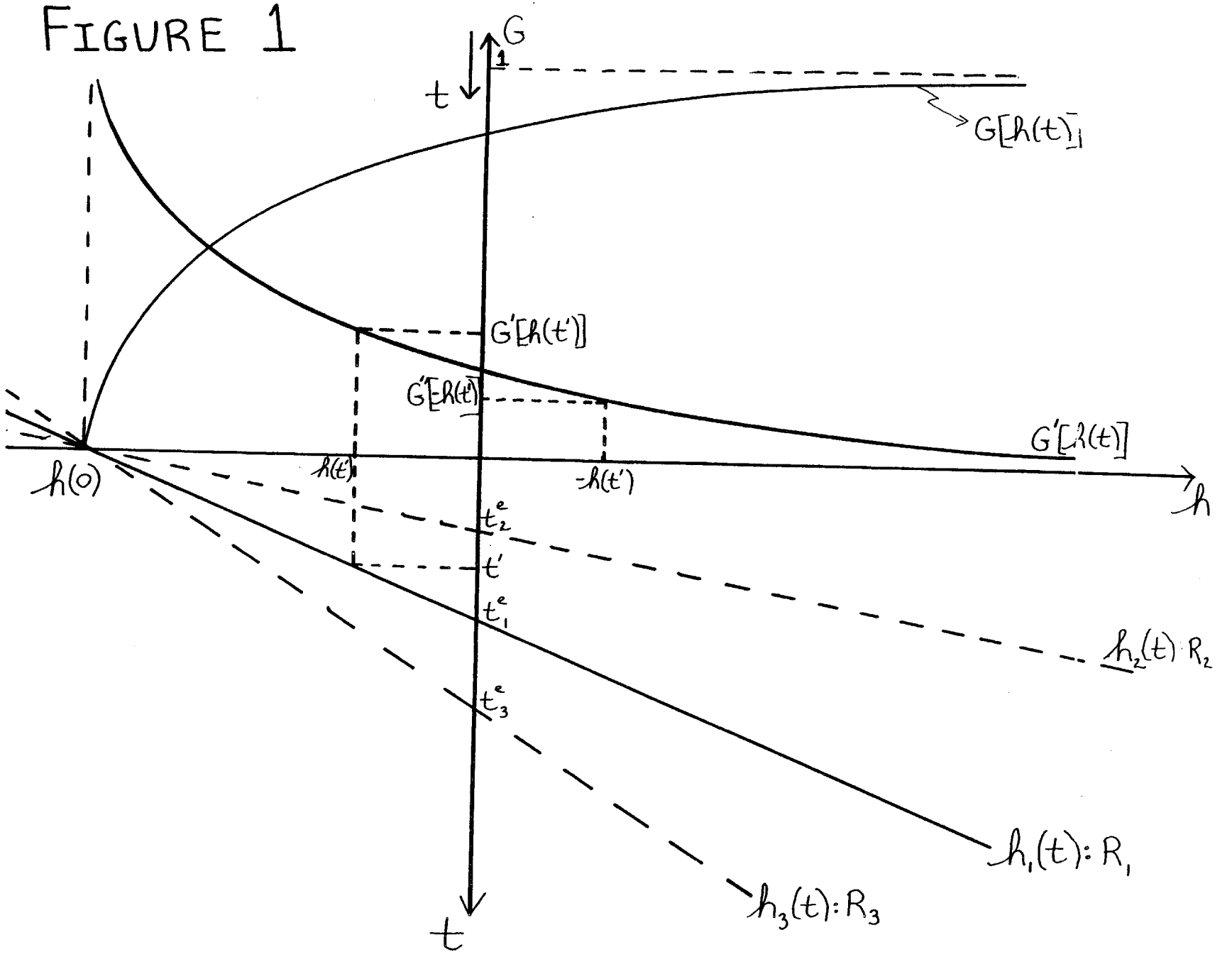

FIGURE 2.