ECONOMIC DEVELOPMENT CENTER

COMPETITION AMONG RENT SEEKING GROUPS IN GENERAL EQUILIBRIUM

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ABSTRACT

A two sector general equilibrium model is developed in which households can influence the government's choice of the relative price of traded goods and the level of public goods supplied to each sector. The model is used to illustrate key problems addressed by the political economy literature, modeling issues that arise, and the nature of insights that can be obtained that traditional approaches cannot discern.

Key words: General equilibrium, political economy, rent seeking, lobbying.

COMPETITION AMONG RENT SEEKING GROUPS IN GENERAL EQUILIBRIUM

I. Introduction

Capital accumulation and technological change in human, bio-physical, and mechanical capital, combined with the efficient allocation of resources to meet final demands, remain virtually unchallenged in economic thought as the keys to economic growth. In much of the analysis of these issues collective action, via the state, is restricted to two roles: addressing the presence of market failures and achieving distributive justice. Until fairly recently, the behavior of governments in fulfilling these roles has been incorporated into economic models largely in the form of benevolent activity to correct market failures, and to redistribute income using instruments designed to have minimal effects on efficiency.

It now is becoming apparent that these traditional neoclassical views alone cannot provide adequate descriptive insight into the process of attaining economic growth and distributive justice, nor can they meet the challenge of providing prescriptive guidance to their attainment. It is well-known that governments use policy instruments that distort their economies and are wasteful of resources. Traditional models have difficulty addressing questions concerning why countries persist in their pursuit of policies that yield an inefficient allocation of resources and exacerbate adjustments to external shocks. Are these interventions the result of policy mistakes? If this is so, why have countries failed to learn from their mistakes?

A partial explanation is that policies are the outcome of political pressure exerted by domestic interest groups. These groups seek to achieve outcomes that provide them with some advantage, but which may be socially wasteful. This explanation has been forwarded under the rubric of·models of "rent seeking" (Krueger).[1] The rent seeking literature has focused on a variety of sources of "government failure" and the social costs imposed when, acting in their own self-interest, individuals seek a differential economic advantage through collective action and the power of the state.

This recognition of rent seeking behavior and its costs has led some

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[1]Other labels are "directly unproductive profit seeking activity" (Bhagwati) or more generally "political economy" (Colander).

analysts to conclude that government activity should be severely restricted. For example, Buchanan (p.14) states:

"As long as governmental action is restricted largely, if not entirely, to the protection of individual rights, person and property and enforcing voluntarily negotiated private contracts, the market process dominates economic behavior and ensures that any economic rents that appear will be dissipated by the force of competitive entry."

However, this view may be excessively narrow, since it does not ascribe legitimate concern to the market failures or distributional justice which provide a rationale for collective action. Perhaps more rich in its implications for policy analysis is the view that societies are faced with a trade-off between the need to redress the market failures and unfairness inevitably associated with market economies, and the fact that the means by which to do so inevitably admit manipulation of the rent-seeking sort. As with productive efficiency in input use, societies are challenged to achieve institutional efficiency, i.e., to design public institutions which identify and resolve problems created by market failures and injustice in ways that minimize that sacrifice of economic efficiency.

In this paper we seek to provide an introduction to recent work in this area. However, this is not a literature review. Rather, following a brief perspective on the scope of the governance literature, we forward a simple general equilibrium model in which agents can influence government policy. The model serves to illustrate key problems addressed by the political economy literature, the modeling issues that arise, and the kinds of insights that can be obtained that traditional approaches cannot discern. Then, using this structure, we attempt to tie together selected issues addressed in the literature that concern foreign trade, voting, bureaucracy, coalition formation and the free rider problem, and endogenous economic growth. Clearly, within the confines of this paper we can only sketch some of the essential elements of these additional considerations. Since the formal approaches to political economic behavior are necessarily abstractions of complex social systems, their acceptability may not evolve around whether they true or false depictions of reality. Instead, as Aumanns (p. 37) remarks in his discussion of game theory, "we cannot ask, is it right or is it wrong? Rather, we must ask, how often has it been useful? how useful has it been?" It is in this spirit that we proceed.

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II. Relation to Literature

The breadth of the literature on political economy depends on whether the topic is narrowed to formal mathematical models or broadened to include the numerous non mathematical contributions of, for example, Parsons, Holt and Turner, Bates and others that have studied the relationships between economics, polity and political structures. We provide a brief overview by selecting only representative or leading contemporary contributions from four different schools, namely, (i) collective choice, (ii) public choice, (iii) political science and (iv) international trade and regulation.

The important contribution of the collective choice school lies in the recognition that group behavior is way of aggregating individual preferences, that a coalition is an organization that devises rules governing member behavior, and the organization consumes resources. Olson concludes that broad based coalitions are likely to pressure governments to intervene in ways that are less wasteful of resources than are narrow based coalitions. And, stable societies are likely to accumulate more coalitions over time with the result that policy decisions are made more slowly, thus slowing down society's capacity to introduce technical change, adapt to shocks and to decrease a country's rate of economic growth.

Bates, reflecting the political science view, draws on coalitions to explain economic policy in a broader context.[2] He suggests that the interests of urban consumers in developing countries coincide with those of domestic industrialists who view low-priced food as serving to decrease the pressure on wages. At the same time, the rural sector is highly diversified and, for reasons of free riding, organization and information costs, it is willing to expend fewer resources to influence policy than is the urban sector. The outcome is policies which tend to support import substitution, industrialization and low cost food to urban households. The same argument applies to developed economies where the food share of the consumer's budget is small, so that consumers are less willing to expend resources to influence food prices. Agriculture becomes a smaller component in the economy, farms tend to be more specialized so that income becomes sensitive to commodity policy. Within their area of specialization, farmers also face lower organizational costs because of the relative ease of overcoming the

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[2]The literature on voting and economic policy is briefly discussed in Section VII.

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free rider problem compared to urban groups. The result is that agriculture receives protection relative to the industrial sector.[3]

The public choice school includes the contributions of Buchanan, Tolluck and their followers.[4] The key recognition is that since policy choices (whether in public or private organizations) affect individual utility, it is rational for individuals to withdraw resources from the production of goods and services and allocate them to lobbying, or to other efforts to gain access to political authority and effect policy choice. Economic losses can include policy-induced dead weight losses plus the welfare loss from the resources consumed in altering policy. This focus shifts attention to institutions outside of the typical market place concept and places it on legal and illegal activities such as licensing, tax avoidance and so on. The public choice school has touched on a broad range of issues, including log rolling and the behavior of bureaucrats (Tullock, and Niskanen).

The international trade and regulation school begins with the seminal contribution of Krueger and includes Bhagwati, Bhagwati and Srinivasan and more recently, Appelbaum and Katz (1986, 1987) and Young and Magee. Other important contributions include Becker and a host of studies on political systems and regulation that have recently been reprinted in a volume edited by Stigler. Generally speaking, these efforts place emphasis on the motivation for allocating resources to unproductive profit seeking (DUP) activities, the consequent shrinking of an economy's production possibilities, and implications to factor returns and trade. Examples of DUP activities are tariff seeking, tariff evasion, seeking of tariff revenues, and licenses.

Applebaum and Katz focus on rent seeking and rent avoidance and later, on an environment where regulators of instruments induce rent seeking. Young and Magee combine the approach of Findlay and Wellisz, who studied how resources contributed by interest groups affected trade protection, with that of Mayer's model where trade policy is determined by fully informed voters[5]. Becker investigated the presence of political pressure groups that

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[3]This general line of reasoning is also provided by Hayami and Honma, and Anderson.

[4]The approach and scope of this school can be gleamed from the volume edited by Rowley, Tollison and Tullock.

[5]Peltsman is a frequently cited contribution that was among the first to

allocated resources to influence central authority to countervail taxes and provide subsidies in their favor. This structure allows for competition among groups and, drawing upon Olson, allows for the rising cost of lobbying by larger groups. Later we discuss some of these contributions in the context of the base model presented below.

III. The Model

In this section we present a general equilibrium model of an economy with two distinct parts: (i) a small open economy with two households (rural and urban), two goods (food and non-food), and two factors, labor and sector specific input; and (ii) a government which provides a public good to each sector, and sets the relative price of the two goods in response to lobbying by households.

The Household

Households are indexed by $i = r$ (rural), u (urban). Households choose levels of food q_{ri} and non-food (q_{ui}) to consume. They also choose the amount of labor (L_i) allocated to the production of the rural good (y_r) and urban good (y_u); the amount of land (x_r) and plant and equipment (x_u) to rent in or out; and the amount of labor to hire in or to work out side of the sector. They are given endowments of labor ($\bar{L}_i$), and land and plant and equipment ($\bar{x}_i$). Market failure is captured by the presence of a rural and an urban public good (G_i) that is supplied by the public sector. These goods may be treated as roads, electrification, and other activities which increase the productivity of labor. A departure from this neo-classical tradition comes about later in the development of the model when households are allowed to allocate resources to influence the government's choice of the levels to set policy instruments.

The household's optimization problem is, for $i = r, u,$:

(1) $\qquad V_i(p, \Pi_i) \equiv \underset{X_i}{\text{Max}} \ U(q_{ri}, q_{ui}),$

$\qquad X_i = \{(q_{ri}, q_{ui}, L_i, x_i) \in \mathbb{R}_+ \mid \Pi_i = pq_{ri} + q_{ui}\}.$

Disposable income Π_i depends on profits π_i from the production of the i-th good, returns to the endowments of labor ($\bar{L}_i$) and sector specific factors ($\bar{x}_i$), and proportion γ_i of the tax bill T. Denote prices by p, w and c_i for the rural good, labor and the sector specific factor, respectively. The

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formulate voting rules in a theory of market regulation.

price of the urban good is taken as numeraire. Then,

$$(2) \quad \Pi_i - \pi_i(p,w,c_i,G_i) + w[\bar{L}_i - l_i^o] + c_i\bar{x}_i + \gamma_i T =$$

$$py_i(L_i,x_i;G_i) + w(\bar{L}_i - L_i - l_i^o) + c_i(\bar{x}_i - x_i) + \gamma_i T$$

for values in X_i that maximize (1).

Initially, we treat the household's lobby level l_i^o as a parameter. The direct utility $U(\cdot)$ and production functions $y_i(\cdot)$ are assumed to be continuous, strictly concave and increasing in the household's choice variables. In this situation, the household's problem is separable (Jorgenson and Lau) so that it can be stated in its dual form, denoted here by the "conditional" indirect functions for utility $V_i(\cdot)$ and profit $\pi_i(\cdot)$. These indirect functions are conditional in the sense that the rule for choosing the lobby level l_i remains to be determined.

Letting E_j denote excess domestic demand, commodity and factor market balances are,

$$(3.a) \quad \Sigma_i q_{ji} - y_j = E_j \quad , \quad j = r, u$$

$$(3.b) \quad \Sigma_i \bar{L}_i - \Sigma_i L_i - \Sigma_i l_i^o - \Sigma_i l_i^g = 0,$$

$$(3.c) \quad \bar{x}_i - x_i = 0,$$

for the rural and urban goods, and for labor and the sector specific factors respectively. The $\Sigma_i l_i^g$ term in the labor balance equation accounts for the amount of labor the government allocates to the production of the rural and urban public goods.

Treating p^w, l_i^o, and the government's policy instruments p, l_r^g, l_u^g as exogenous variables, (3.b) and (3.c) are a system of three equations in the three variables w, c_r, c_u. It is assumed that an equilibrium of the economy exists and is unique. In this case, let $w = w(\vec{e}_i)$, and $c_i = c_i(\vec{e}_i)$ denote the result, where $\vec{e}_i = (p,l_r^o,l_u^o,l_r^g,l_u^g,\bar{L}_r,\bar{L}_u,\bar{x}_r,\bar{x}_u)$.

The Government

We assume a government that forms preferences over the utility of households in the economy, and then chooses policy instruments as though it sought to maximize its preferences subject to the condition that it cannot incur a fiscal, and hence a trade, deficit. The government's policy instruments are the relative price p, and the amount of labor l_i^g to allocate to the production of the rural and urban public goods (G_r,G_u). That is, government is assumed to solve

(4)   Max $U_g = I_r(\rho_r, \rho_u)V_r + I_u(\rho_r, \rho_u)V_u$, $X_g = \{(p, 1_r^g, 1_u^g) \in R_+\}$.
        X_g

Maximization takes place subject to the production function for public goods,

(5) $G_i = G_i(1_i^g)$

and the requirement that fiscal expenditures

(6) $C = - w\Sigma_i 1_i^g + (p - p^w)E_r$

equal the lump sum income transfers (T) to households, i.e., $T = C$[6]. We

assume y_i is continuous, quasi-concave and increasing in 1_i^g. The values I_i

are weights that define the government's preference ordering. They are

specified as influence functions whose arguments are determined by the

political pressure (ρ_i).

The influence functions represent the end product of pressure generated

by special interest groups. Different countries use different methods to

define the power of the state. A fundamental characteristic of virtually

all political systems is that they are subject to pressures from special

interests. Hence, we allow households to lobby for purposes of generating

political pressure (ρ_i) that yields influence I_i; i.e., households lobby in

order to alter the parameters of the government preference function, and

hence the choice of instrument levels in X_g[7].

This structure is very much a "reduced form" approach. Details of the

institutions for establishing laws, politicians, political parties,

mechanisms for enacting laws and defining policy instruments from a set of

possible instruments receive no particular attention. The basic result is

that policy instruments can be used to raise the welfare of the more

influential groups. Unlike the rent seeking literature in which, absent of

other distortions in the economy, rent seeking is an activity that reduces

efficiency (Buchanan), it is now possible for lobbying to increase an

economies production possibilities, albeit at a cost of allocting labor from

production to lobbying activities.

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[6]Fiscal effects of trade are $(p - p^w)E_r = (P_r/P_u - P_r^w/P_u^w)E_r + (P_u/P_u - P_u^w/P_u)E_u$.

[7]An alternative approach to individual household lobbying is to specify a
third sector to the economy that specializes in the production of political
influence as a function of the resource cost required to produce it and the
willingness of the households to pay these costs. This approach would
capture the activities of, for example, law firms that lobby on the behalf
of their clients. However, this tends to complicate the analysis with out
adding significant insights beyond the approach followed here.

Following Becker, political pressure is produced in an environment of rules and institutions that map lobbying into pressure, i.e., a pressure production function,

(7.a) $\rho_i = \rho_i(1_i, z_i)$.

Similar to a technology, ρ_i is positive, continuous and quasi-concave, in the amount of labor 1_i allocated to lobbying. For the moment, z_i is a vector of exogenous variables that summarize the state of the political economy; they affect the efficiency of converting lobbying into pressure. This function represents a political technology, perhaps one of a set of possible technologies that are available to households to produce political pressure.

The end result of lobbying is a set of weights

(7.b) $I_i = I_i(\rho_r, \rho_u)$.

It follows from the linearity of (4) in I_i that it is relative changes in I_i, and not their absolute magnitudes that matter. We assume that relative influence, $I = I_r/I_u$, is continuous, positive and concave and increasing (resp. convex and decreasing) in ρ_r (resp. ρ_u). Since $\partial^2 I/\partial \rho_r \partial \rho_u = \partial^2 I/\partial \rho_u \partial \rho_r$, if $\partial^2 I/\partial \rho_r \partial \rho_u$ is positive at ρ_r^*, ρ_u^*, then in the neighborhood of this point, an increase in ρ_u increases the marginal product of ρ_r so that an increase in ρ_r decreases the absolute effect of ρ_u on I[8]. These conditions imply that an increase in the political efficiency of the i-th household, e.g., $\partial \rho_i/\partial z_i > 0$, can decrease the relative influence of the j-th household and induce the latter to countervail the increased efficiency of i with more labor allocated to lobbying, all else constant.

IV. The Government's Decision Rules

For household choices $(q_{ri}, q_{ui}, L_i, x_i) \in \mathbb{R}_+$, the value of the government's preference function (4) either (i) declines beyond some point p^*, 1_r^{s*}, 1_u^{s*}, or (ii) reaches an upper bound. In the case of (i), further distortions in the economy lead to an increase in taxes T to the point where the product of the government's preference weight and the decline in the i-th household's utility exceeds the product of the increase in the j-th household's utility and the government's preference weight for this household. Boundedness of (4) comes about because of the government's budget constraint, i.e., it is not permitted to obtain free resources from the rest of the world. Since the government cannot incur a budget deficit,

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[8]If the cross derivatives are negative at ρ_r^*, ρ_u^*, then an increase in ρ_u decreases the marginal product of ρ_r on I.

the j-th household's income is also bounded from above by the amount of
income that is possible to transfer from the i-th household. The bound is
approached when the i-th household's budget approaches zero.

Proposition 1: If the Negishi condition holds, i.e., $I_i = 1/V_{i,\Pi_i}$, and
if $E_{r,p}$ is non zero, then a maximum to (4) is characterized by $p = p^w$ and
$\pi_{i,G_i} G_{i,1_i^g} = w.$ [9] See Appendix for sketch of proof.

Under these conditions, the government chooses a price that would also
prevail under free trade. As well, labor is allocated to the production of
public goods to the point where the product of the marginal value product of
the public good, π_{i,G_i}, and the marginal physical productivity of labor in
producing the public, $G_{i,1_i^g}$ in the i-th sector equals the wage. If each
sector has several agents, G_i is a pure public good in the sector. In this
case, under the conditions of proposition 1, public goods supply satisfies
the Sammuelsonian efficiency condition in each sector as well as being
efficiently allocated between sectors. Hence, by construction, the model
does not preclude a free trade - efficient public good result.

For the case of an interior solution to (4), let the government's
policy decision rules be denoted by:

(8.a) $p = p(\vec{e}_2)$

and

(8.b) $1_i^g = 1_i^g(\vec{e}_2).$

where, $\vec{e}_2 = (p^w, 1_r^o, 1_u^o, \bar{L}_r, \bar{L}_u, \bar{x}_r, \bar{x}_u, z_r, z_u)^{10}.$

Proposition 2: If the tax burden is borne by urban households, $\gamma = 0$, price distortion is determined by:

$(p - p^w) = \{(1-I)[(y_r - q_{rr}) + (\tilde{L}_r - L_r)w_p]\}/E_{r,p}$

when $\tilde{L}_r - L_r > 0$, and $\tilde{L}_u - L_u < 0$ and by

$(p - p^w) = \{(1-I)[(y_r - q_{rr}) - (\tilde{L}_u - L_u)w_p]\}/E_{r,p}$

when $\tilde{L}_r - L_r < 0$, and $\tilde{L}_u - L_u > 0$, where $\tilde{L}_i = \bar{L}_i - 1_i$ and $I = I_r V_{r,\Pi}/I_u V_{u,\Pi_u}$.
See Appendix for a sketch of the proof.

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[9] Unless otherwise indicated, notation V_{i,Π_i} denotes $\partial V_i/\partial \Pi_i$.

[10] Noted that p and 1_i^g are homogeneous of degree zero in I_i.

For the case of a normal good, $E_{r,p}$ is negative, and w_p is positive[11]. The direction of price distortion depends on whether relative infulence favors rural households, $I > 1$, and whether households are labor surplus, $(\tilde{L}_i - L_i)$ positive, or deficit. If infulence favors labor surplus rural households that produce a market surplus, $(y_r - q_{rr})$ positive, then $p > p^w$. If the rural household produces a surplus and is labor deficit (hence, urban households supply surplus labor to the rural sector and to the government), an increase in domestic price increases production costs. The sign $p - p^w$ is indeterminant in this case, though, a labor deficit almost surely serves to decrease the level of price distortion. The sign is also indeterminant when rural households are deficit producers of the rural good, and have a labor surplus.

Throughout this section, virtually identical results are obtained when $\gamma = 1$. Also, these results are easily generalized for the case of two freely mobile factors of production, except in this case, the sign of w_p depends on the Stopler Samuelson condition.

Proposition 3: If the tax burden is borne by urban households, $\gamma = 0$, the difference in the marginal value products of the public good are determined by:

$$\pi_{r,G} G_{r,1^g_r} - \pi_{u,G} G_{u,1^g_u} = (1 - I)((\tilde{L}_r - L_r)(w_{1^g_r} - w_{1^g_u}) + \pi_{r,G} G_{r,1^g_r}) -$$

$$(p - p^w)(E_{r,1^g_r} - E_{u,1^g_u}),$$

for $\tilde{L}_r - L_r > 0$, and $\tilde{L}_u - L_u < 0$, and

$$\pi_{r,G} G_{r,1^g_r} - \pi_{u,G} G_{u,1^g_u} = (I - 1)((\tilde{L}_u - L_u)(w_{1^g_r} - w_{1^g_u}) - \pi_{r,G} G_{r,1^g_r}) -$$

$$(p - p^w)(E_{r,1^g_r} - E_{u,1^g_u}),$$

for $\tilde{L}_r - L_r < 0$, and $\tilde{L}_u - L_u > 0$. See Appendix for sketch of proof.

If infulence is unbiased, $I = 1$, then the marginal products equal wage, as shown in proposition 1. If infulence favors rural labor surplus

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[11]If, rather than a Ricardo-Viner type of model, another freely mobil input were specified, then the sign of w_p would depend on the Stopler-Samuelson condition. If E_r positive, (the rural is good imported) then for normal goods $E_{r,p} < 0$ (Dixit and Norman, p. 224). If E_r negative, the sign of $E_{r,p}$ cannot be unambiguously determined. If the income effect is "small" then $E_{r,p}$ is negative, hence the same result (Woodland, p.153).

households, then all else constant, $(\tilde{L}_r - L_r)(w_{1g_r} - w_{1g_u})$ positive will

encourage the allocation of public goods to the rural relative to the urban

sector. The direction of biase in public good allocation in this case is

determined by the wage effect of labor allocated to the production of public

goods in the rural relative to the urban sector, i.e., $(w_{1g_r} - w_{1g_u})$ positive.

It can be shown that $(w_{1g_r} - w_{1g_u})$ positive depends on the marginal product of

the public good in the production of y_i and the marginal product of labor

used in the production of the i-th sectors public good, i.e.,

$(\partial y_r/\partial G_r)\partial G_r/\partial_{1g_r} > (\partial y_u/\partial G_u)\partial G_u/\partial_{1g_u} > 0$. In this case, the rural household

benefits from increased productivity from public good allocation and from

the increase in wage income to surplus rural labor. However, if $(w_{1g_r} - w_{1g_u})$

is negative, then allocation of the public good to the urban sector also

benefits the rural labor surplus household thus decreasing the bias in

allocation of the public good to the rural sector. If the rural sector is

labor deficit, then the converse of these results apply.

The terms $E_{i,1g_i}$ are the effects on excess demand from an allocation of

labor to the production of the i-th public good. It enters the above

expression because allocation of the public good alters excess demand and

hence taxes. This term can be shown to be negative when $\pi_{i,G_i} G_{i,1g_i} > w$,

otherwise its sign is indeterminant. If the conditions from proposition 2

prevail that yield $p > p^w$ for a labor surplus household, and $(E_{r,1g_r} - E_{u,1g_u})$

positive, then price distortion in favor of rural households also induces

the allocation of public goods to the rural sector. Otherwise, price

distortion in favor of the rural sector is not necessarily in the same

direction as the "bias" in the allocation of the public good to the sector.

The marginal value product of the public good, $\pi_{r,G_r} G_{r,1g_r}$, appearing on

the right hand side, suggests that if infulence favors the rural household,

then, all else constant, an incremental increase in the productivity of the

rural public good induces an additional increment of public good to be

allocated to the rural sector. Conversely, if infulence favors the urban

household, an incremental increase in the productivity of the rural public

good induces an allocation of the public goods toward the urban sector.

An important implication of these results is that if the marginal

product of labor allocated to the production of the public goods is small

relative to the gains to the i-th household from distorting p from its

border price, then the government may "prefer" to distort the relative price rather than investing in public goods as a means of transferring income to households.

V. The Household's Decision Rules

Assuming that the i-th household takes the actions of the j-th household as given, correctly perceives the objective of government, equation (4), knows the political process through which lobbying is transmitted to influence, equation (7) and (8), the household, in principle, can solve the problem[12]:

$$(14) \qquad \max_{l_i} V_i(p, \Pi_i), \quad l_i \in \mathbb{R}_+$$

subject to the government's decision rules for p and l_i^g. Substituting the policy decision rules into (14), and assuming differentiability of $p(\vec{e}_2)$ and $c_i(\vec{e}_2)$, the FOC for the rural household is:

$$(15) \qquad [y_r - q_{rr}]p_{l_r} + [\bar{L}_r - L_r - l_r][w_p p_{l_r} + w_{l_r}] + \pi_{r,G} G_{r,l_r^g} l_{r,l_r}^g +$$

$$\gamma [T_p p_{l_r} + T_G G_{r,l_r^g} l_{r,l_r}^g] = w.$$

See the Appendix for this derivation.

Condition (15) provides insights into the rural household's willingness to pay, i.e., lobby, to influence policy in its favor. Essentially, this condition is one of equating the marginal returns from lobbying to marginal costs. To ease exposition, suppose that γ is either zero or that the household is not aware of the tax implications of its lobbying behavior. Suppose also that p_{l_r} and $[w_p p_{l_r} + w_{l_r}]$ are positive.

Consider the first term. If the household produces in excess of consumption, $(y_r - q_{rr})$ positive, and its lobbying efforts result in an increase in the price of y_r relative to the urban good ($\partial p/\partial l_r$ positive), then the household realizes a gain from lobbying. This result has several implications. First, it suggests that the more specialized is the household, i.e., (y_r large relative to q_{rr}) the more willing it is to allocate resources to influence policy. Second, the availability of a cost-reducing technology (e.g., an increase G_r) also tends to increase the household's willingness to influence policy. Effectively, a cost-reducing technology tends to increase the household's market surplus and thus the

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[12]If can be shown from the envelope theorem that to constrain the choice of l_i to the household's budget constraint is redundant.

returns to a marginal increase in the resources allocated to lobbying.

When the rural good (food) is an important component of household expenditures, the marginal cost of a price increase, given by the product $- q_{rr} \partial p / \partial 1_r$, implies an increase in expenditures on food. Hence, the willingness to lobby for an increase in the price food is lowered in this case. This result is consistent with the observation that in countries where food accounts for a relatively large share of disposable income, political pressures tend to favor cheap food policies. Typically, in the process of development, market surplus increases while the proportion of income spent on food decreases. Then, rural households are more willing to influence policy that favors the rural good. In this case, Urban households tend to be less willing to influence food policy since less of their income will be affected by the lobby resources allocated for this purpose. Hence, this result is consistent with the observation that in developed countries, where food is a small component of expenditures and y_r is large, pressures tend to favor policies that subsidize food production.

The rural household's net labor position is given by $(\bar{L}_r - L_r - 1_r)$. A negative net labor position contributes to the household's preference for a cheap wage policy. Households with a small endowment of the sector specific factor would likely be labor surplus, and hence they, along with labor surplus urban households, would tend to prefer policies which increase real wages. Of course, an increase in wages due to higher rural good prices presents urban labor surplus households with a trade-off between increased expenditures on rural goods and higher wage income.

The marginal value product of the public good, $\pi_{r,G_r} G_{r,1_r^g}$, can be viewed as the "social good" side of the lobbying process. The more efficient is the government in producing the public good, and the more important is the public good to increasing the production of y_r, the more willing is the rural household to lobby. Whether the government responds by increasing the supply of the rural public good, however, or increasing output price, all else constant, depends on proposition 3. Still, as this proposition suggests, when infulence favors rural households, public good allocation to the rural sector is enhanced for larger values of $\pi_{r,G_r} G_{r,1_r^g}$.

Note that the marginal product of the public good also depends on the household's endowment of the sector specific factor $\bar{x}_r$. Thus, the value of economic policy gets built into the value of these factors. Had the model accounted for a skewed distribution of the sector specific factors among

households, then the willingness to lobby for polices that increase the rents to these factors would depend, in part, on whether a household is a surplus or deficit user of the factor. In the context of economic growth and capital accumulation, policies which distort the value of sector specific assets are likely to alter a country's growth path.

Wage (w) is the opportunity cost of the labor allocated to lobbying. An increase in output price will tend to increase wages. This is the typical rent seeking result (Bhagwati, Srinivasan) that the allocation of resources to influence prices, and away from the production of public goods, can decrease a country's production possibilities. Further, these results suggest that factor market imperfections that lower w, such as imperfect labor mobility between the rural and urban sectors, will affect the willingness to lobby.

The efficiency with which lobbying activity is converted into influence is revealed by the partial derivatives p_{l_i} and l^g_{i,l_i} in (15). If occupation, age, or other changes increase the efficiency of converting lobbying into pressure i.e., $\partial^2 p_i / \partial l_i \partial z_i > 0$, (or the changes in the efficiency of converting pressure into influence), then it can be shown that, all else constant, an increase in z_r can yield an increase in the household's lobby level since $\partial^2 p / \partial l_r \partial z_r > 0$, and $\partial^2 l^g_r / \partial l_r \partial z_r > 0$ depending on propositions 2 and 3.

VI. The Game Component of the Model

In the previous discussion, the i-th household chose its lobbying level assuming a fixed lobbying level of the j-th household. The households' commodity and factor demands are conditional on these fixed lobbying levels. In addition, the government's decisions regarding relative prices and public good provision, as specified in (8.a) and (8.b), depended upon the parameter vector $\vec{e}_2$, which included these fixed levels. In this section, we consider how lobbying levels might be jointly determined.

The modeling of lobbying itself naturally is approached using game theory. This simple statement immediately reveals the complexity involved in this effort, since a very wide variety of game-theoretic approaches is available, each of which makes some sense in the current context.

The most straight forward model has three agents: the government and the two households in the economy. Care must be given to the usual interpretation of the households in the two sectors as "representative" of larger numbers of agents in this context, as we discuss in more detail

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below. The government acts as "nature" and sets, exogenously, and once-and-for-all, the decision rules specified as functions of lobbying according to (8). The households take these as given, and then play a noncooperative game against one another. It is important to note that the decision rules in (8) actually are a kind of "reduced form" for the more elaborate institutional setting defined by (7.a) and (7.b); from the game-theoretic perspective, it is more natural to focus on (8).

The simplest approach at this level is to posit a one-shot game, with Nash behavior, and to search for Nash equilibria in lobbying levels. Even with this simple setup, the existence of a Nash equilibrium is not trivial; for more on this issue see Coggins et al.

Assuming strict concavity of (14) in l_i, let

(16.a) $l_i = l_i(\vec{e}_i)$

denote the household's lobbying rule obtained from (15), where $\vec{e}_i = (p^w, l_j^o, \bar{L}_r, \bar{L}_u, \bar{x}_r, \bar{x}_u, z_r, z_u)$. Equation (16.a) is the i-th household's best response to the j-th household's action. Then l_i^o are a Nash solution if, and only if,

(16.b) $\partial V_r / \partial l_r \big|_{l_u(\vec{e}_u)} = 0, \quad \partial V_u / \partial l_u \big|_{l_r(\vec{e}_r)} = 0.$

Of course, there need not be a Nash solution to this game, and if there is, it need not be unique. Suppose, however, that a Nash solution exists. Then we can state (16.a) as

(16.c) $l_i = \bar{l}_i(\vec{e}_3)$

where $\vec{e}_3 = (p^w, \bar{L}_r, \bar{L}_u, \bar{x}_r, \bar{x}_u, z_r, z_u)$. Substituting for l_i in the government's policy decision rules yields:

(17.a) $p = \tilde{p}(\vec{e}_3)$

and

(17.b) $l_i^g = \tilde{l}_i^g(\vec{e}_3).$

Hence, both the lobby and policy decision rules are functions of variables exogenous to both households and the government. Condition (16.b) is also the definition of equilibrium. If (16.b) does not hold, then it is possible for the i-th household to reallocate lobbying resources to countervail the lobbying efforts of the j-th household, which then responds accordingly. In so doing, the households also change their level of choices $(q_{ri}, q_{ui}, L_i, x_i)$.

Of course, it is not necessarily the case that Nash behavior is most natural here. An alternative would replace the Nash assumption with reaction functions such that an increase in lobbying by one agent directly

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would call forth a change in lobbying by the other (either an increase or a decrease). The natural equilibrium concept for this game is a consistent conjectures equilibrium (Breshnahan). In some cases, the partial derivatives in (16.b) can be replaced by total derivatives, but in other cases, more complex restrictions need to be placed on the reaction functions if equilibria are to exist.

Within the static context, it is natural to consider next the way in which the government can be brought into the game. The government may recognize that the agents in the economy respond in their lobbying to alternative forms of the decision rules in (8). Moreover, the government may have its own preferences over these outcomes. The form that these preferences may take is discussed in the public choice literature. For example, the government may act benevolently in its choice of (8)so as to mitigate any potential negative welfare effects of lobbying, or it may act to increase its influence (the Leviathan postulate) via its choices. Note that this discussion concerns the <u>functions</u> in (7), and hence the functions in (8), and not the specific level of I which defines the government preferences over agents for any given level of lobbying.

The previous paragraph posited that the government acted as a Stackleberg leader, able to announce the decision rules (8) as its "strategy," and then act to sustain the economic outcome after households lobbying levels are chosen. In the next level of complexity within the class of static games, there exists a direct feedback mechanism from the households to the government decision rule. An example of such a feedback mechanism is a voting structure, such that the announced decision rules serve as "platforms" in elections among competing governments. Or, one might think that the agents in the economy could overthrow the announced decision rule if it treated them sufficiently badly, thereby limiting the scope of choice of decision rules by the government. These considerations concern an expansion of the strategy space for households in the economy, and/or an alternative view of the institutions defined by (7). We briefly address this issue for the case of voting in the next section.

One of the concerns that would have to be addressed in all of these static game-theoretic treatments of lobbying is how the households and the government are able to find an equilibrium in circumstances in which it is not unique. As well, there are other natural absences of information that should be confronted in this portion of the model.

All of the foregoing discussion was directed to static models. Of

course, it is more "realistic" to assume that the agents know that they are playing a dynamic game. As is well known, the move to dynamic games will have important consequences for the outcomes under the model. For example, let us revert momentarily to the case in which the government acts as nature and sets the decision rules in (8) once-and-for-all. Suppose further that these functions define a Prisoner's Dilemma for the households. In a static world, the dominant strategy (Nash)equilibrium yields a non-efficient outcome for the game. However, if the agents recognize that play will repeat indefinitely, they may achieve a cooperative outcome.

Similarly, in a dynamic setting, it may be reasonable to invoke alternative equilibrium concepts that rule out certain Nash equilibria. For example, with multiple Nash equilibria, some equilibria may involve non-credible threats, and one might appeal to the notion of subgame perfection (Selten). The dynamic setting similarly would enrich the more complex static games discussed above which incorporate government behavior and institutions. Clearly, it is beyond the scope of this paper to explore the numerous ramifications of alternative game forms for the basic model elaborated above. Suffice it to say here that investigation of the relationship between the institutions in (7) and the strategies in (8), and of the nature of the game defined between the households and the government, provides a very rich source for further research.

VII. Extensions: Relation To Selected Literature

This section focuses on foreign trade, voting, bureaucracy, coalitions and the free rider problem, and endogenous economic growth. The intent is to tie selected other issues that have been addressed in the political economy literature mentioned to models of this type and to suggest the nature of the insights that result.

<u>Foreign Trade</u>

Extending the concept of rent seeking to foreign trade raises the types of game theory questions mentioned above to trade relations among nations. To see this, note that the net trade condition (3.a) for the case of K countries becomes:

$$\Sigma^K_{k=1} \{\Sigma_i q^k_{ji}(p^k(\vec{e}^{\,k}_2), \Pi^k(\vec{e}^{\,k}_2)) - y^k_j(\vec{e}^{\,k}_2)\} = 0, \ i,j = u,r.$$

where the term in {·} is the k-th country's excess demand for the j-th commodity. If markets clear at relative world price p^w, then, assuming monotinicity, relative world price $p^w = p^w(\vec{e}^{\,1}_2, \vec{e}^{\,2}_2, \cdots, \vec{e}^{\,K}_2)$, is, potentially, determined by lobbying $(1^k_r, 1^k_u)$ in each of k countries. We briefly mention

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three implications of rent seeking in the context of the the Uruguay round of the GATT negotiations.

Trade negotiations can be viewed as an effort by governments to search for a treaty that will leave the k-th country no worse off, in terms of (4), than in the current state. Equation (4) defines the k-th country's payoff to treaty outcomes. Hence, studies, (such as Harrison et al) that investigate possible outcomes using net social gains as the payoff are likely to be misleading, since the estimated gains need to be weighted by the relative influence of the interest groups represented in (4). The paper by Johnson et al. illustrates this point. Using the policy instrument set common to the US and the EEC's 1986 agricultural policies and estimates of the preference weights in (4), they found that the 1986 program was a Nash equilibrium. When the instrument set was changed to allow for decoupled payments to those interest groups with the largest political influence, a Nash equilibrium for liberalized trade resulted, free trade did not.

A second implication is that if a treaty under GATT is to be sustained by the body politic, then trade negotiations need to take into account the reaction functions (16.a) of special interest reaction groups in the home and other large trading countries. This point was made by Paarlberg (p. 255) when he criticized those recommending a U.S. negotiation position that advocated free trade as being too ideological with the result that ··"liberal-minded agricultural policy makers are currently lavishing their scarce policy resources on the improbable option of a "coordinated" liberalization through GATT."

A third implication is that a coalition may form among, for instance, agricultural interests in the large exporting countries. Interest group r in countries k and k* lobby with knowledge of the others reaction functions (16.a). The coalition can be viewed as a leader in a Stackelberg game with a possible result that negotiations result in illiberal trade. Paarlberg (p. 180) also noted this tendency when he remarked that "When the international "coordination" of OECD agricultural policies takes place under such circumstances,·· (i.e., the presence of rent-seeking groups)··, the illiberal tendencies in those individual policies can be strengthened rather than weakened."

Voting

A pervasive issue is how various political process serve to aggregate individual preferences. Since Arrow showed that a majority rule social

welfare function has the undesirable property of being intransitive, numerous others have found that voting outcomes are largely dependent on the conditions or rules under which voting takes place. For instance, Black showed that simple majority voting as a means of reconciling differing individual preferences will produce continual cycling so that outcomes depend on where the cycling stops. Riker, in response to Downs model of vote maximizing political parties, argued convincingly that parties seek only sufficient votes to ensure minimally winning coalitions. Still others have shown that in the presence of limited and costly information, it is not worthwhile for voters to become well informed on most issues or even to vote, and that elections artificially skew decision-making in favor of programs with obvious benefits but no so obvious costs.[13] Empirical evidence on voting behavior also yields counter intuitive results. For example, Pletzmen finds either no connection or a perverse connection between the interests of constituents and the votes of their senators.

Hence, models of voting behavior are only likely to provide general insights into questions of special interest group influence over economic policy. In this spirit, we briefly review the approach taken by Young and Magee and then suggest an approach of our own.

Young and Magee consider two lobby groups, two political parties, two goods and two factors. The two political parties align with their respective capital and labor constituencies and set trade taxes (subsidies) which, through the Stopler-Samuelson affect, benefit capitalists (labor) because it increases (decreases) the relative price of the capital (labor) intensive good. Effectively, this approach replaces equations (4), (7.a) and (7.b) by a voting mechanism which posits that the pro-capital party's odds of victory are determined by an exogenously given log linear function

$$\log\{\pi/(1-\pi)\} = \epsilon + \kappa \log K - \lambda \log L - \sigma \log S + \tau \log T$$

where unit values are assumed for the parameters $\kappa, \lambda, \sigma, \tau$, ϵ is set to zero and K, L, S and T denote subsidy and tax on the domestic price of the labor and capital intensive good, respectively. Capitalists (labor) allocate a portion of their capital, K (labor, L) endowment to their respective party. In turn, the pro capital (pro labor) party sets the subsidy (tax) to maximize its probability π (1-π) of being elected and hence, through

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[13]See John Ray for a discussion of empirical findings that special interests prefer trade protection supported by policy instruments whose costs are not easily discernible.

Stopler-Samuelson, augment (decrease) the income of capitalists (labor).
Each party leads one lobby in a Stackelberg fashion, but adopts Nash
behavior towards the other two players while each lobby adopts Nash behavior
towards the other three players. Conditions are derived for an interior
solution to the game.

The model is driven by factor endowments. As in the case of the model
presented here, key results include (i) factor endowments are important
determinants of agent's willingness to expend resources to influence policy
outcomes, (ii) an increase in a sector's endowment raises its average rate of
return since it increases the willingness of the sector to expend more
resources to influence policy, (iii) all groups can be made worse off when
account is taken of the resources absorbed by the political activity
bringing about the distortion, and (iv) changes in technical and taste
parameters that make factor returns more sensitive to the politically
manipulated prices, induce less extreme choices in prices. However, agent's
are willing to expend more resources to influence policy outcomes.

We now sketch how the model presented here can be modified to include
the presence of political parties and how this affects the willingness to
lobby. From equation (4), let U_g^m denote the preference function of the m-th
party which posses influence functions I_i^m, i.e., each party is endowed with
a different influence function. Let n_i denote the number of rural and urban
households, $i = r,u$. Following Nash behavior, each household is assumed to
solve (14) for the case of each party, and then to vote for that party for
which its utility is the largest. Effectively, the m-th party's "platform"
is defined by the policy rules such as those in (8). The party receiving
the largest number of votes becomes the party that maximizes (4) to
determine the policy rules realized.

While a number of outcomes are possible, an interesting outcome that
seems consistent with observation is that by voting, the masses limit the
ability of the otherwise powerful lobby groups to influence policy outcomes.
That is, the masses can limit the willingness of those who can alter the
influence $I_i^{m'}$ of the m'-th party with relatively few resources because,
depending on the number of voters n_r relative to n_u, the m' party can be
eliminated from power thereby leaving an I_i^m that is less responsive
(productive) to the loosing group. Effectively, the rural masses bound the
lobbying power of the urban elite.[14]

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[14]Since the parameters of the influence functions reflect the underlying

Bureaucracy

In the presence of market failure, a common view is that government is the appropriate agent for taking corrective measures to attain Pareto superior outcomes. Tullock focusing on the rewards and penalties facing a bureaucrat located in a hierarchy, concluded that bureaucrats seek to expand the size of their bureaus, since salary and other perquisites of office are related to the size of the budgets they administer and control. Niskanen's model of a budget maximizing bureaucracy showed that a bureaucracy could succeed in expanding budgets to a point where tax payers were no better off than they would be in the absence of the public good. Casting the spirit of Niskanen's approach into a general equilibrium framework provides broader insights than he was able to provide.

In the context of our model, we sketch how the behavior of bureaucrats can be introduced. Presently, the government chooses the instruments p, 1^g_r, and 1^g_u without a bureaucracy to implement them. Bureaucrats are defined as a third interest group whose conditional indirect utility $V_g(p, \Pi_g)$, pressure $\rho_g(1_g, z_g)$ and influence $I_g(\rho_r, \rho_u, \rho_g)$ functions correspond to (1), (7.a) and (7.b) respectively. In the spirit of Niskanen, the bureaucrat implements and manages the government's policy instruments in exchange for a budget b_g to perform this service, where the size of the budget has a positive effect on the bureaucrat's income. The budget, exclusive of labor costs, is a function of the level of the policy instruments,

$$b_g = b(p - p^w, 1^g_r, 1^g_u).$$

Budget costs are a monotonicaly convex and increasing function of the wedge between domestic and world prices, $|(p - p^w)|$ and the amount of labor 1^g_i allocated to the production of public goods. Labor required to implement and manage policy is given by the bureaucrat's labor endowment $\bar{L}_g$ plus labor obtained from the labor market, $\sum_i L_{gi}$. The bureaucrat's income is

$$\Pi_g = \pi_g(b_g) + w\bar{L}_g$$

where $\pi_{g,b_g} > 0$ indicates that the size of the budget has a positive impact on this group's income. The bureaucrat faces an advantage in that no loss in wage income occurs from time allocated to lobbying since lobbying occurs while employed. Another advantage may by be that less lobbying time is required to obtain influence relative to other households. Equations (3),

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structure of a country's legal structure, incentives exist for the powerful to attempt to alter this structure in order to circumvent this outcome.

(4) and (6) also need to be modified to reflect the addition of a third sector to the economy.

The key result of this modification is the possibility for a coalition to form between bureaucrats and either rural or urban households. For instance, it can be shown that if the gain to the bureaucrat's income from an increase in the wedge between domestic and world price, $\Pi_{s,|(p-p^w)|}$, is large relative to gains from the production of public goods, $\Pi_{s,1_i^s}$, and w_p is negative, then bureaucrats will lobby for $p - p^w < 0$. This policy can be in the interests of urban households. Hence, the urban household may be able to obtain what was not otherwise obtainable in the absence of bureaucrats. Effectively, urban households form a coalition with bureaucrats in a noncooperative game with rural households.

As in the case of Niskanen, another parameterization of the model can yield the result that bureaucrats will tend to lobby for the production of public goods G_i to the point where their provision can leave households no better off than with some initial endowment of public goods so that $\pi_{i,G_i}G_{i,1_i^s} < w$, $i = r,u$. The production possibilities for the economy can also be reduced as more labor is drawn into the production of bureaucratic services.

<u>Coalitions and The Free Rider Problem</u>

Olson noted that even though agents have some interests in common and can be expected to lobby for their interest, in the absence of special arrangements, rational individuals will not act in the groups interest. Services of a lobby are like a public good, their provision to anyone in the group means provision to everyone. Consequently, there are incentives for individuals to free ride. In spite of incentives to free ride, lobbies exits. The key to overcoming the free rider problem lies in the ability of an organization to institute a set of selective incentives to individuals depending on whether they contribute to the provision of the collective good.[15]

This reasoning in the context of our model is that a narrowly based coalition would prefer to lobby to seek their differential advantage through price policy in contrast to expenditures on the public good G_i. As we noted, in the presence of market failure, lobbying can, in principle, expand

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[15]Structuring incentives and the free rider problem are typically dealt with in the theory of organizational design (see Marschak).

societies output.[16]

Adapting our approach to include organizational design is beyond our scope. Instead, we extend the approach of Becker. Becker models the end result of the design problem by defining pressure functions (7.a). These functions are modified as follows:

$$\rho_i = \rho_i(n_i l_i, n_i, z_i) = \rho_i(1_i, n_i \cdot z_i)$$

where n_i is the number of households in the sector and 1_i is the total labor allocated to lobbying by the sector. The effect of the free rider problem on the level of lobbying required to generate pressure is

$$\partial^2 \rho_i/\partial 1_i \partial n_i = (\partial^2 \rho_i(n_i l_i, n_i, z_i)/\partial 1_i^2)n_i + \partial^2 \rho_i(n_i l_i, n_i, z_i)/\partial 1_i \partial n_i)$$

where the sign of the first term is determined by whether there are increasing or decreasing returns to scale in lobbying, and the second is assumed negative because of free riding. Effectively, free riding increases the cost of producing pressure as the number of households n_i in the i-th sector increase. Parametric changes in z_i capture the ability of the lobbying organization to institute a set of selective incentives to individuals depending on whether they contribute to the provision of the collective good, i.e., allocate labor to lobbying. An alternative approach is mentioned in footnot eight.

As mentioned, agent's willingness to lobby is determined from (15), where, with single sector households, differences in sector specific endowments $\bar{x}_i$ have no effect on the agent's lobbying level. However, if sector specific endowments are not evenly distributed among the n_i households, i.e., there exist farms and factories of different sizes, then, aside from free riding, lobbying levels will vary among households in the sector since, for each j-th household in the i-th sector, the term

$(\bar{x}_i - x_i)(c_{i,p}P_{1_i} + c_{i,1}s1^s_{i,1_i})$ enters (15)[17]. Households for which $(\bar{x}_i - x_i)$ is positive will be motivated to allocate a different level of labor to lobbying than will households where this term is negative. Hence, total lobby level $\Sigma 1_i$ depends on the distribution of endowments as well as the number of households in the sector. Moreover, if households held some of

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[16]Using an overlapping generations model, Prescott and Boyd derive this result for a special case.

[17]The pressure function now becomes $\rho_i = \rho_i(\Sigma_j 1_{ij}, n_i, z_i)$. Hence, the derivative, $\partial p/\partial 1_{ij}$, implyies that each agent perceives its contribution to altering policy.

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their wealth in the other sector's sector specific factors (as could be the case in the presence of capital markets), then they would be less likely to allocate as many resources to influence their otherwise more narrow interests.

Economic Growth

Lucas and others (Romer, Borrow) have investigated the possibility that the level and rates of the disparate growth in per capita income among the world's economies lies in how society, acting collectively, addresses problems of market failure attributed to externalities, learning and public goods. In this context, it appears possible that efforts of individuals or groups to seek their differential advantage lead to government interventions that distort market signals, induce an inefficient allocation of resources in the private sector, as well as under investment in areas where markets otherwise function poorly to optimally allocate society's resources.

The static framework presented here only offers a glimpse into this important question. To address these issues necessarily requires a growth model, perhaps along the lines of Borrow, with additions that depict the rational behavior of agents to allocate resources to influence policy in their favor. Our static framework suggests that lobbying can, in principle, expand a country's production possibilities beyond what they would be in the absence of lobbying. The model also suggests that growth and agent's willingness to allocate resources to seek their differential advantage are almost surely path dependent. For instance, the shadow prices of the sector specific endowments $\bar{x}_i$ are functions of the government's policy instruments. In a dynamic model, wealth is embodied in these endowments, and a sector's capacity to participate in capital markets and to invest depends on the value of these endowments. Moreover, the presence of a policy threat, e.g., to alter policy in a way that lowers the value of the endowment, may induce households to lobby at levels much higher than in the absence of a threat. Effectively, the value of the protection offered by policy gets built into the value of sector specific assets. Hence, once a country is launched on a path where policy affects the value of endowments, a constituency may form to maintain the policy, since otherwise a decline in wealth could result.

As the value of protection gets built into the value of sector specific assets, so to may the value of protection get built into political assets. Political scientists have focused considerable attention on the path

dependency of policy.[18] In the context of our static model, the exogenous variables z_i in the pressure and influence functions can be viewed as quasi-fixed factors that reflect the capital embodied in organizational structures through which lobbying is managed, and the institutional change (e.g., congressional committees) brought about by laws that define, legalize and guide the use of policy instruments and so on. How these institutional changes might be depicted in a dynamic framework is a challenge for future efforts.

VIII. Summary Remarks

This paper sought to provide some of insight into the general area of political economy. This task is complicated by the need to integrate the contributions from a number of schools of thought. At the same time, the strength of addressing these issues broadens the domain of questions and insights that traditional economic approaches cannot discern; issues that are fundamental to questions of economic growth, distributive justice, and the economic relations among nations. The formal modeling of political economy "layers" another level of complexity over the functioning of markets, a "layer" of complexity that may be even more cultural and region / nation specific than market behavior alone. Hence, returning to the view of Aumann, formal constructs of political economy may need to be judged on the basis of whether they provide useful insights as opposed to whether they are true or false.

Nevertheless, political economy constructs are almost certain to share a number of structural elements in common. Since a subsidy to one sector of an economy is almost always an implicit tax to another, models of this type will almost surely need to be multi-market if not general equilibrium in nature. Second, since resources are required to generate economic policy, the behavioral structure within which they are allocated will almost surely need to be specified. Third, the problem of how a political process serves to aggregate individual preferences will need to be modeled. Our approach was to posit the end result of a process that gave rise to a government forming preferences over the utility of agents in the economy where the parameters of these preferences are influenced by the willingness of agents in the economy to expend resources in terms of lobbying and other political activity. The selection among possible

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[18]See for example Goldstein.

preference functions could come about through voting. Clearly, the last two properties of political economy models are dependent on institutional structures that guide this process and that themselves are evolving over time. Hence, we return to the value of institutional knowledge and the contributions of studies of the role of institutions and their evolution in explaining economic phenomena.

While the insights provide by these frameworks my verge on the qualitative relative to traditional approaches, they nevertheless suggest a number of quantitative approaches. For instance, equations (8.a) and (8.b) are candidates for fitting to time series data and then, using an endogeneity test, test the null hypothesis of whether the data supports the presence of a Nash equilibrium in the formation of economic policy. Clearly, care must be taken in estimating the weights of a government's preference function since they are endogenously determined. Methods to measure a household's willingness to pay to influence economic policy is suggested by (15). Another approach is to cast the type of structure developed here into a computable general equilibrium framework.[19] Nevertheless, achieving empirical measures of political phenomena presents a real challenge, since many of the resources allocated to generate political outcomes, and the role which political tactics and strategies play in eventual outcomes, are complex and often not observable to the analyst.

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[19]This approach is illustrated by Roe and Yeldan.

SKETCH OF PROOF TO PROPOSITION 1:

Preliminaries: The first order conditions to (4) simplify to:

$$\partial Z/\partial p = I_r[V_{r,\Pi_r}[- q_{rr} + y_r - L_r w_p - x_r c_{r,p} + w_p \tilde{L}_r + c_{r,p} \bar{x}_r +$$

(10.a)
$$\gamma[- w_p \Sigma_i 1_i^g + E_r + (p - p^w)E_{r,p}]]] +$$

$$I_u[V_{u,\Pi_u}[- q_{ru} \qquad - L_u w_p - x_u c_{u,p} + w_p \tilde{L}_u + c_{u,p} \bar{x}_u +$$

$$(1-\gamma)[- w_p \Sigma_i 1_i^g + E_r + (p - p^w)E_{r,p}]]] = 0$$

$$\partial Z/\partial 1_r^g = I_r[V_{r,\Pi_r}[- L_r w_{1_r^g} - x_r c_{r,1_r^g} + \pi_{r,G_r} G_{r,1_r^g} + w_{1_r^g} \tilde{L}_r + c_{r,1_r^g} \bar{x}_r +$$

(10.b)
$$\gamma[- w - w_{1_r^g} \Sigma_i 1_i^g + (p - p^w)E_{r,1_r^g}]]] +$$

$$I_u[V_{u,\Pi_u}[- L_u w_{1_r^g} - x_u c_{u,1_r^g} + \qquad w_{1_r^g} \tilde{L}_u + c_{u,1_r^g} \bar{x}_u +$$

$$(1-\gamma)[- w - w_{1_r^g} \Sigma_i 1_i^g + (p - p^w)E_{r,1_r^g}]]] = 0$$

$$\partial Z/\partial 1_u^g = I_r[V_{r,\Pi_r}[- L_r w_{1_u^g} - x_r c_{r,1_u^g} + \qquad w_{1_u^g} \tilde{L}_r + c_{r,1_u^g} \bar{x}_r +$$

(10.c)
$$\gamma[- w - w_{1_u^g} \Sigma_i 1_i^g + (p - p^w)E_{r,1_u^g}]]] +$$

$$I_u[V_{u,\Pi_u}[- L_u w_{1_u^g} - x_u c_{u,1_u^g} + \pi_{u,G_u} G_{u,1_u^g} + w_{1_u^g} \tilde{L}_u + c_{u,1_u^g} \bar{x}_u +$$

$$(1-\gamma)[- w - w_{1_u^g} \Sigma_i 1_i^g + (p - p^w)E_{r,1_u^g}]]] = 0$$

for an interior solution when use is made of the following relationships:
$$V_{j,p} = - V_{j,\Pi_r} q_{rj}; \quad \pi_{r,p} = y_r; \quad \pi_{i,w} = - L_i; \text{ and } \pi_{i,c_i} = - x_i.$$

Proof: If the Negishi condition holds, i.e., $I_i = 1/V_{i,\Pi_i}$, then

simplifying (10) yields:

$$\partial Z/\partial p = (p - p^w)E_{r,p} = 0,$$

$$\partial Z/\partial 1_r^g = \pi_{r,G_r} G_{r,1_r^g} - w + (p - p^w)E_{r,1_r^g} = 0,$$

$$\partial Z/\partial 1_u^g = \pi_{u,G_u} G_{u,1_u^g} - w + (p - p^w)E_{r,1_u^g} = 0.$$

Hence, if $E_{r,p}$ is non-zero, then proposition 1 follows.

SKETCH OF PROOF FOR PROPOSITION 2

Let $I = I_r V_{r,\Pi_r}/I_u V_{u,\Pi_u}$. Note that household and labor market

identities imply, for case a: if $\tilde{L}_r - L_r > 0$, $\tilde{L}_u - L_u < 0$ then $1^{gr} = \Sigma_i 1_i^g$,

and for case b: if $\tilde{L}_r - L_r < 0$, $\tilde{L}_u - L_u > 0$ then $1^{gu} = \Sigma_i 1_i^g$, where 1^{gi}

denotes the amount of labor allocated to government employment by the i-th household, $i = u, r$. Using (3.a) and (3.c), we obtain from condition (10.a),

Case a:

(11.a) $\partial Z/\partial p = [I - 1][(y_r - q_{rr}) + (\tilde{L}_r - L_r)w_p] + (p - p^w)E_{r,p} = 0$

Case b:

(11.b) $\partial Z/\partial p = [I - 1][(y_r - q_{rr}) - (\tilde{L}_u - L_u)w_p] + (p - p^w)E_{r,p} = 0$,

Rearranging yields proposition 2.

SKETCH OF PROOF FOR PROPOSITION 3

Using (3.a) and (3.c), we obtain from condition (10.b),

Case a:

$$\partial Z/\partial 1_r^g = [I - 1][(\tilde{L}_r - L_r)w_{1_r^g}] + I[\pi_{r,G_r}G_{r,1_r^g}] +$$

$$[- w + (p - p^w)E_{r,1_r^g}] = 0,$$

$$I[\pi_{r,G_r}G_{r,1_r^g}] - w = [1-I][(\tilde{L}_r - L_r)w_{1_r^g}] - (p - p^w)E_{r,1_r^g}.$$

Define $I = 1 + \alpha$,

(11.c) $\pi_{r,G_r}G_{r,1_r^g} - w = [1-I][(\tilde{L}_r - L_r)w_{1_r^g}] - (p - p^w)E_{r,1_r^g} - \alpha\pi_{r,G_r}G_{r,1_r^g}$,

and similarly for

Case b:

(11.d) $\pi_{r,G_r}G_{r,1_r^g} - w = [I-1][(\tilde{L}_u - L_u)w_{1_r^g}] - (p - p^w)E_{r,1_r^g} - \alpha\pi_{r,G_r}G_{r,1_r^g}$.

The derivations from (10.c) are,

Case a:

(11.e) $\pi_{u,G_u}G_{u,1_u^g} - w = [1-I](\tilde{L}_r - L_r)w_{1_u^g} - (p - p^w)E_{r,1_u^g}$,

Case b:

(11.f) $\pi_{u,G_u}G_{u,1_u^g} - w = [I-1](\tilde{L}_u - L_u)w_{1_u^g} - (p - p^w)E_{r,1_u^g}$.

If both households have a labor surplus, then $\tilde{L}_i - L_i = 1^{gi}$. Subtracting (11.e) from (11.c) and (11.f) from (11.d) yields the conditions in proposition 3.

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