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DEVELOPMENTS IN THEORY AND EMPIRICAL APPLICATIONS
OF ENDOGENOUS GOVERNMENTAL BEHAVIOR

Gordon C. Rausser, Erik Lichtenberg, and Ralph Lattimore

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CHAPTER

DEVELOPMENTS IN THEORY AND EMPIRICAL APPLICATIONS OF ENDOGENOUS GOVERNMENTAL BEHAVIOR*

Gordon C. Rausser, Erik Lichtenberg, and Ralph Lattimore†

1. Introduction.

Governmental intervention in agricultural systems is often treated as a passive, exogenous force in econometric forecasting models. Such intervention assumes many forms. In some countries the national government actively intervenes in the hopes of achieving self-sufficiency; in other countries marketing boards or marketing orders attempt to influence private sector behavior; and still other countries, especially planned economies, governments manage both domestic systems and international trade directly. The demand of governments to intervene actively in agricultural and food systems and their propensity to respond is well known and need not be elaborated here (Brandow).

The distortions arising from governmental intervention in both domestic and international systems have been documented on numerous occasions (Abbott, 1979a; Brandow; Rausser and Stonehouse). The effects of governmental intervention are pervasive, regardless of whether it assumes the form of income supports, supply controls, or barriers to trade. Many of these policies have the direct effect of transferring wealth from taxpayers or consumers to individual producers while transferring risk in the opposite direction. Others redistribute wealth and risk within the private commodity systems among various participants along a vertical commodity chain. All these policies assuredly distort the traditional market-price signal mechanism. Under many of these policies, producers in effect become shielded from the full impact of price variations and learn to respond not only to market price variables but to governmental policy variables as well.

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One of the principal motivations for governmental intervention is the basic instability of the private sector. This instability emanates especially from the characteristics associated with yield uncertainties, highly inelastic demand and supply, asset fixity, and rapid technological change as well as from other structural characteristics of agricultural systems. Conventional wisdom has long held the view that the resulting unstable markets can and should be stabilized by conscious economic policies of national government. Such recommendations, however, neglect instability and imperfections in the political-administrative system. As Lindbeck has argued, the most reasonable approach is to treat instabilities and imperfections explicitly in both market and political-administrative systems. This view is substantiated by the historical performance of governmental intervention in domestic agricultural commodity systems.

Differences between various short-term economic forecasts often depend less on the internal functioning of the private sector than on different assumptions of future policies. Perhaps more importantly, longer run forecasts for agricultural and food systems must be conditional upon governmental policy variables. Even for short-run, one-year forecasts prior to announced levels of governmental policies, once again, the only feasible alternative is conditional forecasting. In some instances, it is even possible that, for certain temporal periods, i.e., annual time intervals, a simultaneous interaction exists between a governmental setting of policy variables and the responses of private sector behavioral units. Nevertheless, the vast majority of the current literature, represented perhaps best by Houck and Ryan, deals only with conditional behavioral response on the part of the private sector where the conditioning elements relate to governmental policy.

Given the feedback relationships among governmental policymakers and the private sector, however, it is quite possible that governmental policies which appear beneficial in the short run could well prove in the long run to be undesirable. Moreover, the very nature of economic theory leads us to the *a priori* view that the conditional behavioral relationships of the private sector should change drastically over time as a result of governmental intervention. For example, Lucas, as well as Kydland and Prescott has argued that a change in policy will result in a change in the environment facing economic units. Given rationality, this will result in

shifts of the equations representing the behavior of such units. This source of parameter instability can only be avoided by reasonably accurate measurements of expectation formation patterns and dynamic responses, a dubious hope at best.

In the long run, especially for forecasting purposes, it would seem essential to endogenize both private and public sector behavior related to a particular system. Unfortunately, little empirical evidence quantifying the behavior of governmental administrators has been accumulated. Our posture in the specification of these relationships should remain largely "positive" rather than "normative" in spite of these obstacles. What is necessary is an eclectic approach of the kind suggested by Lindbeck (p. 11) which combines proxies for "electability" with more idealistic variables such as producers' and consumers' welfare in the criterion function of governmental decision makers.

Such a positive approach is entirely consistent with the recent advancements in the theory of economic regulation (Stigler, Peltzman). Much of this literature is concerned with wealth redistributions through the regulatory process. As Peltzman has noted, there is a growing disenchantment with the value of the traditional welfare analysis which attempts to eliminate one or another unfortunate allocative consequence of market failure. In particular, he notes:

The creeping recognition that regulation seemed seldom to actually work this way, and that it may have even engendered more resource misallocation than it cured, forced attention to the influence which the regulatory powers of the state could have on the distribution of wealth as well as on allocative efficiency. Since the political process does not usually provide the dichotomous treatment of resource allocation and wealth distribution so beloved by welfare economists, it was an easy step to seek explanation for the failure of the traditional analysis to predict the allocative effects of regulation and the dominance of political pressure for redistribution on the regulatory process. This focus on regulation as a powerful engine for redistribution shows clearly in such works as Jordan's *Producer Protection* and Posner's (1971) *Taxation by Regulation*. The common role of regulation in this literature is as a fulcrum upon which contending interest seek to exercise leverage in their pursuit of wealth.

In the final analysis, the formulation of government policy cannot be considered a single, indivisible process. On the contrary, it consists of a

series of subprocesses which occur in markedly different institutional settings and which vary greatly in their essential characteristics as a consequence. The most important distinction is between the setting of policy and the implementation of policy. On the one hand, government policy is composed of a body of legislation, administrative codes, and the like. The process of setting policy can be defined as the specification of an area requiring government intervention, the determination of general goals and specific targets for that intervention, and the choice of instruments to be considered permissible for use in achieving the stated goals. A policy is thus a set of goals and instruments drawn from the larger set of goals and instruments available to the government.

Policy is set in both the legislative and executive branches of government. The most important factors in this process seem to be relations between the electorate and the various elected officials, between the legislative and executive branches, and between members of the legislative branch. The study of this process needs to be able to relate the behavior of these agents to the actual subset of goals and instruments which emerges as government policy.

On the other hand, policy exists in reality as it is implemented. The process of implementation can be defined as the choice of policy instrument levels given the policy set, that is, given the set of admissible goals and available instruments. Policy is generally implemented by the government bureaucracy. While the electorate and the legislature do have an impact on the bureaucracy, it seems unlikely that they are the chief factors in policy implementation. The study of implementation must, rather, focus on explaining bureaucratic behavior from a more internal point of view.

This paper will emphasize the policy-setting/implementation distinction in evaluating the various formulations proposed for endogenizing governmental intervention in agriculture and food systems. A number of alternative paradigms will be examined in Section 2 including (a) liberal-pluralist conceptual formulations, (b) theory of the state conceptual formulations; (c) economic regulation conceptual formulations; and (d) rent-seeking interest group and conflict resolution conceptual formulations. The applicability of each formulation to a phase of policy formation will be considered. The implications of these conceptual formulations for empirical

work will be briefly examined. In Section 3, empirical approaches which address the quantification of governmental criterion functions will be investigated. A number of alternative specifications will be evaluated and possible improvements will be advanced. The second major part of Section 3 will survey direct estimation of endogenous governmental behavioral equations. Section 4 will offer concluding remarks and recommendations for future directions.

2. Alternative Paradigms

A number of alternative paradigms addressing the basis of endogenous governmental behavior are available in the current literature. One paradigm, which includes many alternative formulations, might be characterized as the liberal-pluralist framework and is found largely in public finance literature. A second paradigm has become known as the "theory of the state" and emanates from radical economics. A third will be referred to as the theory of economic regulation, proposed and developed by Stigler (1971), Posner (1974), and Peltzman. A fourth paradigm will be characterized as the theory of rent-seeking interest groups and conflict resolution.

Each formulation will be described as advanced by its adherents. The applicability of the formulation to problems of characterizing government policy formation will be examined and its empirical implications will be developed. Estimation or alternative substantiation of relationships predicted by each conceptual framework will be briefly examined.

2.1 Liberal-Pluralist Frameworks

The alternative formulations included in this framework concentrate on forces shaping the distribution of income and wealth in the private sector. These formulations include the "self-interest coalition"; the "self-interest median voter"; the "private insurance"; the "social insurance"; the "Pareto-optimal income redistribution"; and the "relative income" specifications. The purpose of each of these formulations is to account for observed changes in the distribution of income. From these models, a set of testable hypotheses concerning the redistribution of income and/or the change in income distribution through time may be extracted.

2.1.1 *Self-Interest Coalition Models.* Several models are based on the premise that individuals have an interest in redistributing income from others to themselves. They are presumed to enter into voter coalitions to express this demand to politicians. Politicians are motivated by votes and thus satisfy such a demand in order to increase their probability of election (Downs, Buchanan and Tullock). The initial conditions for such formulations include an equal distribution of votes and an unequal distribution of income.

The Downs variant has a coalition of the bottom 51 percent outvoting the coalition of the top 49 percent with a predicted redistribution from the latter to the former, i.e., from high-income families to low-income families. The redistributive instruments in the Downs framework include taxes, transfers, and the benefits of government services.

The Buchanan and Tullock version of the self-interest formulation incorporates vote trading and allows the same individual to enter multiple coalitions. They admit the possibility of exchanging votes in the process of government decision making associated with taxes, transfers, and government services. In some coalitions, the individual wins (receives net benefits) while in other coalitions, due to exclusion, the individual loses (pays net costs). Unfortunately, their framework does not result in a prediction of whether a particular individual is a net winner or loser.

It should be noted that the Buchanan and Tullock version is not significantly different from the Downs version. To be sure, it is reasonably straightforward to translate the net gain or net loss by coalition based on industry groupings into net gain or losses by size classes of income. Given the type of winning coalitions most frequently cited, i.e., industry groupings, the net winners will often be predominantly among the upper income and higher income families while the net losers, representing consumer groups, will be predominantly among lower-income and middle-income families. Thus, there is a presumption that voter coalitions with vote trading will lead to a redistribution from low-income families to upper income families.

There is an incentive for a net loser to search out a coalition that will vote for one more good; that good (service, transfer, or tax loophole) which will convert a net loser into a net gainer. This net loser, if successful in the search, becomes a net gainer and must, therefore, fall within the bottom

51 percent. If unsuccessful in the search, this net loser must fall within the top 49 percent. Thus, if this incentive is particularly strong, the dynamics of the model transform it into a Downs formulation. The result is redistribution from upper income to lower income families combined with partial redistributions from lower income families to upper income families.

Hence, self-interest coalition formulations predict redistribution from the top to the bottom at one point in time and, over the long run, a continual movement in the direction of greater equality in the distribution of income. Of course, complete equality will not necessarily be achieved over the very long run if the bottom 51 percent fears impairment of work incentives on the part of the top 49 percent. Moreover, other reasons for failure to achieve complete equality include the bottom 51 percent expectation of upward mobility or if the top 49 percent uses their available resources to purchase more political power or influence than their votes would command and/or persuade the bottom 51 percent of the supposedly disastrous and disincentive effects on the volume of output resulting from redistributing income.

2.1.2 *Self-Interest Median: Voter Formulations.* Director's law is cast in the self-interest framework, neglecting voter coalitions or vote trading. Everyone is presumed to have a potential demand for redistribution of income toward themselves (Stigler, 1970). Presuming that preferences for distribution toward oneself are single-peaked with respect to income, the median voter is king, and his preferences for such redistribution are satisfied through the political process. This model predicts redistribution from low-income and high-income families toward middle-income families, with emphasis placed on the net gains to the middle-income classes. In a formal median-voter model, to the extent that voting participation rates are lower for low-income families than for high-income families, the median voter will have an income greater than the median-income recipient.

The model predicts increasing redistribution over time. As Stigler has argued, "as income has become a widely usable basis for income and expenditure programs . . . both the extent of government activities and their income redistribution effects [will] grow" (Stigler, 1970, pp. 5 and 6). As the net gains to the middle classes grow through time, it is also suggested that the net distribution of high-income families relative to the low-income

families will grow. Second, if the demand for redistribution toward oneself is positively related to income (the usual property of a normal good); then over time, as real per capita income increases, the median voter will use the political process to purchase increasing quantities of redistribution.

2.1.3 *Private Insurance Formulations.* In a world where individuals are risk averse, the existence of goods that cannot be redistributed (e.g., health and human capital), imperfect markets and moral hazard prevent the emergence of private markets that spread the risk of disastrously low incomes (Arrow, Pauly and Willett, Zeckhauser). In such a model, voters may choose to provide such insurance through the political marketplace. Basically, private insurance for income interruption is provided via governmental intervention. Rodgers has argued that low-income families will have a higher demand for such insurance than high-income families; as a consequence, the latter groups must be bribed with premium (tax) reductions to persuade them to enter the insurance contract. Since a moral hazard problem does not vanish just as result of insurance provided by governments, categorical rules are needed to restrict the insurance payments to those who are afflicted by genuine income interruptions.

If high-income families must be bribed with tax reductions to enter insurance contracts, then the rate of redistribution from middle-income families may exceed similar rates from high-income families. The predictions that can be generated from such a model are, however, unclear. If the moral hazard problem is effectively obviated by the nature of the program, then changes in the redistributive pattern through time would be a function of the changing pattern and importance of risk that are insurable. If moral hazard problem is not adequately resolved, then, over time, if individuals alter their behavior so as to claim benefits under the plan, an increasing amount of redistribution of income would be observed.

2.1.4 *Social Insurance Formulation.* The implication of the private insurance formulation that high-income groups must be bribed is inconsistent with casual evidence that such groups often make substantial net contributions to fiscal redistribution of income. Musgrave's prudent humanitarian model is designed in part to account for this evidence within a social insurance formulation. Individuals with a low risk of income interruption are presumed to be sufficiently prudent to insure themselves

against such outcomes. They are also presumed to be sufficiently humanitarian to partially finance income-replacement benefits for other less prudent individuals. The latter individuals have a higher risk of income interruption for which no private insurance has been secured. The prudent humanitarian voters are viewed as efficient and thus choose the alternative form of governmental intervention which minimizes their contributions. In Musgrave's analysis, these prudent humanitarians influence choice of a legislative framework that reduces the moral hazard problem and requires the less prudent than those with a higher risk of income interruption to finance a portion of such risk themselves.

The crucial aspect of the prudent humanitarian model is that social insurance emerges as a device to force compulsory savings on the less-prudent and low-income individuals and to protect the prudent, high-income individuals.

Model predicts, for specific income interruptions, a redistribution from individuals with middle and high incomes to those with temporarily low incomes--achieved via compulsory contributions on all members of society. The net contribution rate of high-income individuals would be greater under a private insurance formulation but lower under public welfare schemes. It should be noted that Musgrave is careful to note that the core of this model deals only with explaining the contributing finance aspect of social insurance; thus, the formulation is incomplete as a theory of income distribution.

2.1.5 *Pareto-Optimal Income Redistribution Formulation.* The seminal work of Hochman and Rodgers (1969) introduced the Pareto-optimal income redistribution formulation which in essence transformed issues of distribution into a question of efficiency. One variant of this formulation specifies that donors of taxes derive utility from the income levels of transfer recipients. Hence, the donors are consequently prepared, in fact, eager to support transfer schemes. To donors with similar utility functions, the commodity, "increased incomes of the poor," is a collective consumption good--an efficient quantity of which can only be provided through the governmental sector. The presumed interdependent utility functions advanced by this formulation leads to increased welfare of the donors of taxes even though their after-tax incomes declined and recipients' after-tax incomes rise.

This framework predicts redistribution of income to low-income individuals from high-income individuals; some variations of this framework suggest that the largest transfers will be made to the poorest while smallest transfers will be made to the less poor. If, over time, the income differential between donors and recipients remains constant, *ceteris paribus*, then size of the redistributive tax transfers will remain constant. If, over time, the income differential increases, *ceteris paribus*, then the size of the redistribution increases. On the other hand, decline in income differentials leads to decreases in the redistribution of income.

This formulation suffers from a major conceptual defect, viz., a disenfranchised recipient class. Once the preferences of recipients count and such groups are politically active, it is no longer possible to predict that a unique Pareto-optimal redistributive tax transfer scheme will exist. Under these circumstances, Hochman and Rodgers' (1969, 1970) Mutt and Jeff model, where Jeff is a stylized beggar in the street who accepts whatever coinage is dropped in his outstretched hand, is no longer germane. When the preferences of recipients count, normative neatness and simple positive predictions of this formulation vanish.¹

2.1.6 *Relative Income Formulation.* Thurow (1973, 1975) has sketched, via a secondary thesis to the development of a formal job competition model, a theory of income redistribution. This model is built upon four empirical observations drawn from the U. S. economy: (1) income inequalities fell considerably during the Great Depression (Second World War period) and remained stable after the War; (2) the political popularity of minimum wage policies; (3) the political acceptability of adequate transfer income floors for those who are disabled and elderly and thus unable to work; and (4) the political unpopularity of income transfers to those who are able to work, even if they cannot find employment. In Thurow's model, individual workers who may differ in their views of economic justice have reached a consensus that justice is linked to relative incomes. Thus, the well-being of many of the members is tied directly to a normative appraisal of relative incomes. The government is directed to implement policies to achieve such "desired" distribution of income if market mechanisms fail to do so.² In this framework, economic benefits, derived from tax-transfer redistributive mechanisms, are proportional to the cost imposed upon the recipients. Moreover, recipients of economic benefits who bear equal economic costs are treated equally.

This model generates a relatively stable distribution of income. Given a social judgment on minimal levels of resource control, the model predicts the legislated existence of a minimum economic floor provided that the recipients who are able to bear some costs of receiving such income supplements in fact do so. Specifically, there will be political support for minimum wages, disability, and retirement pensions while there will not be political support for guaranteed annual incomes, negative incomes taxes, or other general demogrant schemes. These results follow directly from the empirical observations which gauge the structure of the model.

The model requires major "social shock" changes in normative values to effectuate in any substantive change in relative incomes over time. Thurow finds this requirement consistent with empirical evidence in the United States over the period 1930-1946. The impact of the Great Depression led to social policies to alleviate hardships during the War in which there emerged a "consensus" that economic burdens of war should be shared in a reasonably equal fashion. According to Thurow, once the crisis represented by the Depression and the War was over, the narrowed wage differentials remained relatively constant and did not widen. The postwar generation came to regard the new income differentials as "just." Unfortunately, in general, the framework fails to specify a mechanism to appropriately classify social shocks which generate permanent changes from those which fail to generate such changes. Under such circumstances, explanations of observed changes in income inequality over time become *ad hoc*.³

2.1.7 *Summary*. In general, liberal-pluralist models focus principally on the policy-setting process and on the relationship between policymakers and voters in particular. Little, if any, distinction between the legislative and the executive branches is made. In addition, legislators are assumed to simply transmit voter preferences; that they might have interests of their own is not considered.

Policy in these frameworks relates to societal income distribution. Income alone is considered the indicator of well-being regardless of source. Effects of voters' interests are characterized in terms of income distribution; empirical work thus focuses on changes in income distribution over time.

The high level of aggregation implicit in this approach makes any examination of policies relating to particular sectors of society rather difficult. In the case of price supports for wheat, for example, farmers and urban professionals may be predicted to have identical interests based on identical incomes whereas in reality those interests in the short run are diametrically opposed. Income alone is not a valid criterion of interests. More important than income is its source. Income class *per se* does not necessarily reflect the wealth position of various social groupings and hence ignores their more fundamental concerns.

2.2 *The Theory of the State Formulations*

Each of the liberal-pluralist formulations examined above is based upon a "state" which emerges from an atomistic exchange economy. This economy is presumed to be the result of many competing interest groups, none of which has significant monopoly power to alter relative factor prices in its favor. Thus, the state as it emerges has no appreciable effect on the original distribution of factor income. The government, as an institution of the state, intervenes to tax individuals and provide services which result in the redistribution of income. A serious challenge has been leveled at this view of the state by the radical paradigm. This paradigm, often referred to in the literature as the "theory of the state" presumes that governmental institutions emerge as the result of one dominant interest group with significant monopoly power (Jessop, O'Connor, Roemer).

The theory of state formulation is based upon groups of agents called classes rather than individual economic agents. The most important of these classes are the dominant capitalist class or bourgeoisie, the working class or labor, and the petit bourgeoisie. The formulation is cast in a monopoly setting with the dominant class exercising economic power. The dominant class or owners of capital make use of their monopoly power to control or direct the resources of the state. The government, as an institution of the state, attaches primary importance to two functions: (1) the accumulation of capital and (2) the legitimation of state activities on behalf of capitalists. The dominant classes, via the government, transfers wealth to itself through a number of institutional responses. Such responses result in increasing shares of wealth and income accruing to the dominant class relative to other classes. Over time, intervention of the state in the

process of the accumulation of capital becomes increasingly important to the dominant classes.

The increasing concentration of wealth results in a continually increasing inequality in the distribution of income over time. As the observed distribution of income becomes very unequal, the nondominant classes (the working class, the unemployed, impoverished farmers, etc.) threaten to remove their support of the state and, hence, delegitimize the government. In the face of extreme social discontent, extreme opposition to the state and the threat of possible revolution, the government is presumed to respond by providing a range of social services and income supplements.

The theory of the state formulation predicts an initial increase in income inequality, the continuing increase in such inequalities as the result of the accumulation of capital, and the expansion of governmental expenditures (services and transfers) necessary to buy off the social discontent of nondominant classes. These results lead to testable hypotheses suggesting that economic inequality among individuals will be maintained or possibly increased over long periods of time. The protection of the economic share of output for the dominant class in the context of this formulation leads to a number of testable hypotheses. First, the tax-transfer system will not alter the ordinal ranking of individuals even though it may tax differentially those with different incomes. Second, the members of the dominant class in pursuit of the accumulation of capital will seek a set of taxes and transfers which at least maintain after-tax relative economic position. Third, the dominant class, in seeking to forestall social unrest and worker bitterness, will be prepared to support transfers to the poor and taxes on owners of capital as well as on workers. In the latter connection, the owners of capital will prefer taxes which appear to fall on capital or business but can be shifted to consumers or workers such as indirect sales taxes, corporation income taxes, and personal income taxes with, of course, scope for loopholes on capital income. Moreover, within the class model of domination by those with economic power, there will be no fundamental reforms of the economic system that impinge upon the concentration of wealth or the mode of production. Finally, a crucial element of the theory of state relates to the necessary expansion of the government sector in order to sustain the accumulation of capital and the legitimation of the state.⁴

There are a number of problems and internal inconsistencies in the theory of state formulation. First, there seems to be a steadfast refusal to define rigorously the dominant class and its formation and maintenance as an effective coalition. Second, the nature of monopoly power embedded in this formulation can be seriously questioned. Product demand is ignored; the monopoly sector is presumed to be "sealed off from market forces." For example, all increases in wages can and will be passed on in higher prices without altering the quantity of final product demanded. Similarly, organized labor is able to achieve any desired increase in wages. All productivity gains in the monopoly sector may be bargained away by organized labor. But unless consumers have infinitely inelastic demand for all monopoly products, market demand will be affected as wages and prices are increased. The implications of such shifts in demand are not accounted for by this formulation.

The formulation is also particularly deficient in its treatment of local and state governments which are simply treated as extensions of central governments, and they deal only with peripheral issues. Last, it is possible that the asymmetrical knowledge assumption of these formulations is their weakest link. In general, they presume superior knowledge or "class consciousness" of the dominant class. This class knows its own best interest. The dominant class uses nationalism as a tool to further their interests over those of the working classes with the latter groups being swayed by such concerns. The dominant class is presumed to be able to indoctrinate others with the ethos of private acquisitiveness whereas the working class has not been able to persuade others of the value of collective action and sharing. The dominant class knows the incidence of taxes whereas the working classes do not; thus, the latter end up bearing more tax burdens. Moreover, the working classes never learn. The working classes who struggle with monopoly capitalists to keep their real wages increasing, i.e., organized labor, fail to learn that their government is reducing their real income in order to "buy off" social discontent elsewhere, i.e., among the unorganized labor population.

2.3 Theory of Economic Regulation.

The two principal architects of the theory of economic regulation are G. Stigler and S. Peltzman. The latter has formalized Stigler's pioneering

work extending and generalizing a number of his important results. The focus of this theory is not on political power relationships; instead, such power relationships play a role analogous to tastes in consumer choice theory. In other words, the framework concentrates on the behavioral effects of changes in constraints under a regime of stable power relationships. In this setting, the regulator desires to maximize the "majority" defined by the number of potential voters in the beneficiary group times the probability that a beneficiary will grant support less the number of potential voters in opposing groups times the probability that those who are "taxed" will oppose.

The probability of support from the beneficiary group is specified to be a function of per capita net benefit. This per capita net benefit measure includes dollars spent by beneficiaries in campaign funds, lobbying, and the like to mitigate opposition and the cost of organizing direct support of beneficiaries. A total dollar transfer to the beneficiary group is generated by a tax at a fixed rate t on the wealth of each member outside the benefited group. Hence, the choice facing the regulator involves the amount that he asks the beneficiary group to spend in campaigns, lobbying, etc., to mitigate opposition as well as the amount that he bids for a total dollar transfer to the beneficiary group. In the political market, the beneficiaries "bid" the former amount and "ask" the latter amount. As a simplification, Peltzman assumes that the regulator chooses both the support amount and the transfer amount.

Peltzman specifies a number of reasonable assumptions including (a) opposition is enhanced by increasing tax rates and mitigated by voter per capita educational expenditures; (b) the probability of the members of the beneficiary group members granting support is subject to decreasing returns with respect to per capita net transfers; (c) the probability of opposition exhibits similar properties with respect to per capita educational expenditures; and (d) there are assumed to be increasing political costs to taxation. The most critical assumption imposed by Peltzman is that the wealth of each member of the potential opposing group is a decreasing function of the transfer tax. This assumption rules out a "pure" transfer, i.e., one which has no allocative effects.⁵ The general proposition that wealth is not totally inelastic with respect to taxes has important implications for the evaluation of the whole range of government redistributive policies.

The regulator is presumed to determine the size of the group to benefit, the amount asked from the beneficiary group to mitigate opposition, and the amount transferred to the beneficiary group. From the optimizing conditions for each of these choice variables, Peltzman is able to demonstrate that the ratio of the beneficiary group to the total population is less than unity. This result is hardly surprising since net gains to regulation are ruled out. Hence, the political wealth maximizer must benefit only a subset of the population; and under certain conditions, that subset will indeed be small.

This framework demonstrates clearly that losers (namely, the members of the opposing group) must be taxed less than the interest of the winners would dictate. In other words, a revenue-maximizing tax is not optimal from the standpoint of the regulator. Instead, the regulator must seek to balance the marginal political return from a transfer with the marginal political cost of the associated tax. This logic can also be employed to show that the rational regulator will exploit differences within a group that, taken as a whole, either wins or loses.⁶

The regulator's choice problem is not limited to selecting the size of the interest group to benefit or tax but includes the selection of an appropriate structure of benefits and costs. To be specific, suppose the opposition group can be decomposed in terms of their respective per capita wealth, their responsiveness of their wealth to taxes, or in their voting sensitivity to taxes. In this event, if among the opposers one group has sufficiently large per capita demand and sufficiently low demand elasticity in tax responsiveness relative to the other decomposed group, the latter group may become part of the "winners," i.e., receive a subsidized price. Hence, the regulator's constituency cannot in general be limited to one economic interest.

To generate a number of testable hypotheses, Peltzman investigates the politics of price-entry regulation. In this setting, the politician's objective function is to maximize, once again, his majority where the arguments of this criterion function are the wealth of various interest groups. Peltzman presumes a zero sum game, i.e., one group's wealth can be increased only by decreasing another's. Hence, market failures are excluded from consideration. This simple framework allows Peltzman to derive seven testable hypotheses.

its general equilibrium representation has been investigated by Brock and Magee (1978 and 1979). It admits both economic and political markets and a process for resolving conflicting goals. In economic markets, the desired quantities traded by buyers and sellers are equilibrated by the price mechanism, while in political markets the levels of powers exercised by conflicting groups are balanced through adjustments in the stock of social claims. Political markets are presumed to be in equilibrium whenever stock of legal instruments and a flow of political rewards adjust to the point where neither politicians nor the supporters or opposers wish to alter any variable which affects the form or shape of governmental intervention. Power, in contrast to the economic regulation paradigm, is not swept under the rug; but instead, its formation and effectiveness assume a central role. Rents are presumed to exist in both economic and political markets which may or may not be socially approved. Through the interaction among economic and political markets, participants in one market can create rents in another market. In essence, economic groups compete in political markets over the distribution of income through "pork barrel" policies such as tariffs, subsidies, bureaucratic practices, judicial processes, regulation, and the like. In Zusman, a cooperative game formulation is advanced as an analytical framework, while in Brock and Magee (1978) a noncooperative game theory framework is employed to analyze the interaction of political and economic markets.

The general model of Brock and Magee, for example, assumes an economy consisting of individual agents, politicians, firms, and goods which are produced and either consumed or used as inputs. The demand and supply functions are computed in the usual Arrow-Debreu-McKenzie setting with consumers maximizing utility and producers maximizing profits. In this framework governmental intervention leads to losers who would be willing to pay up to a certain amount to prevent the intervention, while gainers would be willing to offer up to a certain amount in order to secure the intervention where each of these two amounts are defined as variations in income required to make individuals indifferent between two political equilibria. These equilibria might refer to the case of no governmental intervention and governmental intervention or simply a change in governmental intervention. Obviously, in a world in which it is costless to organize, information is perfect, no market failures exist, etc., the amount offered by losers to oppose would always exceed the amounts offered by gainers. However, once we recognize that political functions (relating political

First, regulation will tend to be more heavily weighted toward "producer protection" in depressions and toward "consumer protection" in expansions. Second, governmental intervention and regulation are both normal goods. This implies that the income elasticity for producer protection ought to be less than that of consumer protection. As Peltzman notes, this follows from the negative wealth effect of demand growth on regulated equilibrium prices. Third, the tendency of regulation to change prices infrequently, i.e., the "regulatory lag" should be stronger for demand changes than for cost changes. This result obtains due to opposing wealth and substitution effects which occurs for demand shifts but not for cost changes. Fourth, in a growing technologically progressive industry, producer protection ought to yield to consumer protection over time. Fifth, in a regulated industry, there should be a negative correlation between prices and profitability. In other words, an increase in profits, whether its source is due to increased demand or lower costs, generates an incentive for the regulator to move toward a combination involving higher profits and lower prices. Sixth, elastic demand in economies of scale creates biases favorable to consumers simply because these features enhance the amount of consumer surplus gained while mitigating the producer surplus lost due to regulated price reductions. Seventh, regulation should reduce conventional measures of owner risk by, in effect, buffering firms against unexpected demand and cost changes. In other words, in the context of finance, regulation should reduce systematic as well as diversifiable risk.

While the economic theory of regulation does yield a set of hypotheses for empirical testing, its focus on legislative behavior makes it applicable only for restricted components of the policy-setting process. In this context, its implicit assumption that electability rides on each vote is rather disturbing. Clearly, voters are forced to choose between candidates who present a set of past voting decisions many of which necessarily represent trade-offs in overall electability. Empirically, the theory of regulation lends itself to hypothesis testing via qualitative choice models, as the emphasis on probability of passage of a bill obviously implies. Empirical analysis along these lines has been conducted by Camm and is discussed at greater length in Section 3.2.

2.4. Rent-Seeking Interest Groups and Conflict Resolution

This paradigm was partially characterized by Ann Krueger in 1974, the framework advanced by Zusman (see Section 3) emanates from this paradigm, and

contributions to politically determined income changes) vary considerably across individuals and groups, the existence of redistributive techniques emerge. What is required to move from one political equilibria to another is that the potential gainers be more efficacious in their generation of political investments than potential losers.

Brock and Magee employ a noncooperative game theory framework with politicians acting as Stackelberg leaders. In their analysis, tariffs are used throughout as the exemplary redistributive policy. Three types of industry lobbies are investigated--the concentrated industry, the regulated industry, and the self-policed industry. In a two-politician and a two-lobby game, opposing lobbies with perfect information leads to the protectionist lobby contributing only to the high tariff politician. A rational single lobby will contribute to both politicians only with imperfect information and "inaccurate" expectations functions.

In political markets, the Brock and Magee formulation results in competing politicians each attempting to maximize their probabilities of election. These probabilities are functions of campaign contributions from lobbies and the politicians' tariff positions. The political market equilibria that are obtained from this formulation, regardless of whether information is perfect or imperfect, have the following properties: (a) at any equilibrium point, the reaction function of one politician is always positively sloped while that of another is negatively sloped (he counteracts his political opponent); (b) inconsistent politicians make large changes in their tariff positions for a given change by their opponent which results in unstable political markets; (c) wide differences among consistent politicians in terms of their respective campaign contribution responses to tariff changes lead to stable political market equilibria; (d) increased political power by a tariff lobby always causes one politician to increase while the other politician decreases his tariff position; (e) the average tariff position of two politicians may either rise or fall with increased power by the tariff lobby; and (f) increased lobbying power will augment the range between the tariff positions of two politicians when the high tariff politician increases his position and vice versa when the high tariff politician decreases his position. Each of these results have direct implications for testable hypotheses, in particular, results (d) and (e).

Conceptually, the Brock-Magee model represents a refinement of the Stigler-Peltzman framework. As such, it shares the focus on the legislative process. The game theory framework is more flexible than the Stigler-Peltzman formulation, however, so that many of the difficulties raised by the economic regulation formulation can be avoided.

Empirical work based on the rent-seeking interest group formulation is reviewed at greater length in Section 3, along with more detailed discussion of several specific models that have been proposed. These models are applicable to all phases of the policy formation process in contrast to the preceding formulations. They are also able to distinguish between interest groups in a fairly refined way, increasing their flexibility.

3. *Empirical Approaches*

In empiricizing governmental behavior, we must first determine whether our focus is the election process, the legislative choice process, the bureaucratic choice process, or some combination. The Stigler-Peltzman framework, for example, concentrates on the first process; the liberal-pluralist frameworks concentrate on the second with some reference to the first; the Brock-Magee framework concentrates on the first and third, while the theory of the state framework attempts to concentrate on all three.

Few of the theoretical formulations surveyed have been investigated empirically for the case of government intervention in agriculture and food systems. The notion of interest groups put forward in these formulations is especially important for conceptualizing food and agricultural policy and must be maintained in any analysis. Not all of the elements of these formulations, however, can be considered as relevant to agricultural policy as the notion of interest groups. In this agricultural policy setting, frameworks revolving around electability will usually prove too general to be of much use. Agricultural interests are too particular to affect the elections of all politicians, certainly, and are probably insufficient to make most electoral frameworks coherent with respect to agricultural policy. Electability, as noted above, depends more on overall record than on any single vote. Since voting records come into being as the result of a complex set of very particular dealings, it is unlikely that they can be linked to group interests in any stable, straightforward fashion; for an area of policy like food and agriculture, this is certainly the case.

Moreover, agricultural policy is not highly volatile in the sense of changing its basic orientation and transmission mechanisms often or rapidly. Controversy instead centers principally on questions of enforcement or implementation of existing orientations, generally via traditional mechanisms. As a result, the following discussion will concern itself with bureaucratic behavior. Its goal will be to explain the selection of alternative levels of given policy instruments (policy implementation) rather than the choice of available instruments from the universe of all possible instruments (policy setting). In the bureaucratic process, we are concerned with how the stated goals are achieved rather than how stated goals are chosen from the set of all possible goals. In this context agricultural and food policy may be considered a separable part of overall policy as well which simplifies the analysis to a great extent.

For given legislation, actual policy instrument choices will be viewed as the outcome of some bargaining process between governmental policymakers or bureaucrats and the interest groups affected by particular decisions. The economic rationale underlying this process is that governmental policy generates rents through its ability to enforce market regulations. In this sense an empirically useful conceptual framework will involve elements of the theory of the state, the theory of economic regulation, and, most particularly, what we have characterized as the theory of rent-seeking interest groups and conflict resolution. The means used by all groups and their attempt to appropriate these rents are some of the major determinants of the final policy choice. We posit that the underlying political process leads government decision-makers to some form of rational behavior. The criterion function governing such rational behavior summarizes the preference structures of various interest groups as well as governmental decision-makers. Given the appropriate specification, the criterion function and actual behavior rules should reflect the relative weighting of group interests implicit in making any particular policy decision.

Empirical analysis, given the above conceptual background, can proceed by directly estimating policy instrument behavioral equations or by estimating the governing policy preference or criterion functions. From the latter, given the appropriate constraint structure, policy instrument or choice equations can be derived. In our treatment of empirical approaches, we distinguish between (1) the specification and estimation of policy criterion

functions and (2) the specification and estimation of policy instrument behavioral equations.

Regardless of whether we attempt to empiricize the governing criterion function or the actual behavioral rules, a clear specification of the underlying rent-seeking bargaining game is required. Given the possibility of changes in legislation or in elected politicians, there is no reason why either the criterion function or the behavioral rules should remain stable. Moreover, since interest groups and governmental bureaucrats may have different objectives, both the criterion function and behavioral rule approaches must incorporate multiple objectives. Such objectives not only differ but are often in direct conflict. A major concern of any positive policy analysis is thus to specify these trade-offs properly. For many agriculture and food public agencies, for example, such objectives include the income of farmers, consumer welfare, the distribution of income, self-sufficiency in production, price stability, the balance of payments, the level of public expenditure, the stabilization of supply flows, and the like. Clearly, choices involving such objectives imply trade-offs. It is a task of an empirically tractable conceptual framework to capture how such trade-offs are made.

In the context of multiple objectives representing various interest groups and governmental bureaucrats, the issue of noncomparability of various objectives naturally arises. It is our view that arguments as to the noncomparability of various objectives miss the point; that the choices actually made do imply that trade-offs--and thus comparisons--are made. As Steiner (p. 31) has noted:

If objectives were genuinely multidimensional and not immediately comparable, some solution to the weighting problem is implicit in any choice and that solution reflects someone's value judgment. Put formally, we now accept in principle that the choice of weights is itself an important dimension of the public interest. This choice is sometimes treated as a prior decision which controls public expenditure decisions (or at least should) and sometimes as a concurrent or joint decision--as an inseparable part of the process of choice.

Ultimately, the purpose of endogenous governmental policy analysis must be to make explicit the weightings used in different policy decisions so that the logic of alternative policy instrument is brought to light.

Another important requirement for an empirically useful conceptual formulation is that uncertainty be incorporated in a reasonable fashion for both the criterion function and the behavioral equation approaches. Few, if any, people believe that the world is characterized by perfect certainty and foresight; yet, certainty models are common in the profession. Moreover, uncertainty is often built into models in an extremely *ad hoc* fashion; for example, as an error term tacked on to the end of an equation. A greater degree of authenticity is desirable.

Uncertainty enters into the process of policy formation in several ways. First, the signals to the policymaking body are often noisy. Politics is well known for its rhetoric and posturing in the public arena--characteristics which carry over into more private places as well. Second, the government's ability to manipulate its chosen set of policy instruments is often uncertain. Third, the effects of these policy instruments on their intended targets are often subject to uncertainty. The notion of "fine tuning" is assuredly somewhat of an overstatement. As a final consideration, general knowledge of the economy is by no means perfect, so that the inferences various agents may draw about the actual nature of economic problems are not necessarily accurate. The noisy information flow between agents and the economy also introduces stochastic considerations into the process of policy formation.

It is probably the case that no single model can account for all these different kinds of uncertainty. It is also probably the case that some effects are important in particular problems while others are negligible. The criterion function or behavioral equation approaches only need to incorporate those which do seem to have important effects and to do so in a way which parallels the way the uncertainty actually enters the problem.

3.1 *Criterion Function Approaches*

Armed with above observations, we now move to a survey of the current literature on the specification and estimation of criterion functions for policy formation. The advances that have been made in this line of inquiry are noted and evaluated. Various approaches that are of some value will be examined, regardless of whether their focus is normative or positive. For example, we find that the multiple objective and uncertainty features of

multiattribute utility analysis are indeed valuable in positive policy analysis, even though this particular approach is basically normative. Once our evaluation is completed, we offer a synthesis of the various criterion function approaches and some possible fruitful extensions for future work.

3.1.1 *Multiattribute Utility Analysis.* Keeny and Raiffa's multiattribute utility analysis was specifically advanced as a method of formalizing trade-offs between objectives under uncertainty. Taking the existing preference structure of the decision-maker as given, they proceed to elaborate a method by which this structure can be made explicit. Their work is based on the Von Neumann-Morgenstern expected utility theory and involves the construction of a criterion function (which they term the multiattribute utility function). The key concerns of the procedure are the measurement of the objectives and the explication of trade-offs between objectives.

The construction of the multiattribute utility function involves a number of steps, all of which are based on data generated from interviews of the relevant decision-maker. The first step is the identification of the relevant objectives and the definition of some performance measures or attributes which serve as indicators of these objectives. Both objectives and attributes should come from the decision-maker and reflect his or her actual value judgments. Keeny and Raiffa stress that there are no "correct" preferences; rather, the purpose is to clarify what exists and what exists is viewed by definition as operational.

To simplify the assessment among multiple objectives or attributes, the mathematical form of the criterion function must be specified. Here the determination of independence relationships among members of the set of attributes is crucial; without such relationships, the analysis could become hopelessly complex or *ad hoc*. The most important concepts in this determination are those of preferential independence and utility independence. Preferential independence of an attribute is defined by preference orderings (or conditional indifference curves) of consequences which depend only on changes in that attribute and do not depend on the levels at which all other members of the set of attributes are fixed. Preferential independence deals with certain levels of the attribute; utility independence, on the other hand, deals with uncertainty. Utility independence of an attribute is defined by conditional preference ordering of

lotteries which depend only on changes in the attribute and do not depend on the levels at which all other members of the set of attributes are fixed.

To illustrate the property of preferential independence more concretely, consider a policymaker who has three objectives: producer welfare, consumer welfare, and food sufficiency. If the policymaker always prefers an outcome in which the level of producers' welfare is high and the level of consumers' welfare is low to an outcome in which consumers' welfare is high and producers' welfare is low, regardless of the level of food sufficiency, the objective or attribute set, producers' welfare and consumers' welfare, is preferentially independent of food sufficiency. If, however, the policymaker prefers high producers' welfare and low consumers' welfare when the level of food sufficiency is high and high consumers' welfare and low producers' welfare when the level of food sufficiency is low, then the set of objectives or attributes is not preferentially independent. Hence, when the level of a third attribute does not influence the preference between combinations of the other two attributes, the latter two attributes are preferentially independent of the third.

For the property of utility independence, suppose a policymaker is faced with two possible outcomes, each with a 50 percent chance of occurrence. The first is a state of favorable weather conditions which implies total food sufficiency, while the second outcome is unfavorable weather conditions with a food sufficiency of only 70 percent. In this environment, suppose a large insurance company offers to purchase all available quantities of the commodity in question and to guarantee a food sufficiency level of 80 percent. If the policymaker prefers the offer of the insurance company, regardless of producers' welfare, then food sufficiency and producers' welfare are utility independent. However, if the policymaker prefers the offer only when the level of producers' welfare is low and the uncertain environment when the level of producers' welfare is high, then clearly the two attributes are not utility independent. Hence, when the risk the policymaker is prepared to assume with respect to uncertainty in one attribute does not depend on the level of another attribute, then the first attribute is utility independent of the second.

For a concrete example of additive independence, suppose the policymaker is faced with two alternatives. For the first alternative, there is a

50 percent chance that producers' welfare and consumers' welfare will be high; and there is similarly a 50 percent chance that both will be low. For the second alternative, there is a 50 percent chance that the producers' welfare would be high but consumers' welfare low and a 50 percent chance that consumers' welfare will be high and producers' welfare low. If the policymaker is indifferent between these two policies, then there is additive independence between producers' and consumers' welfare. If, however, the policymaker is risk averse and wants to avoid two unfavorable outcomes, he would select the second alternative; and the two attributes are not additive independent.

The usefulness of these concepts is that they both imply a form for the multiattribute utility function and vastly simplify the assessment of conditional utility functions over each attribute. For example, if we have three attributes where one is utility independent of its complement and the other two are preferentially independent of theirs, then the multiattribute utility function has the multiplicative form:

$$(1) \quad k u(y) + 1 = \prod_{i=1}^N [k k_i u_i(y_i) + 1]$$

where k , k_i are constants and $u_i(x_i)$ is the conditional utility function of the i th attribute. Mutual utility independence implies the multilinear form

$$(2) \quad \begin{aligned} u(x) = & \sum_{a=1}^N k_a u_a(y_a) + \sum_{a=1}^N \sum_{b=1}^N k_{ab} k_a k_b u_a(y_a) u_b(y_b) + \dots \\ & + \sum_{a=1}^N \dots \sum_{n=1}^N k_{a\dots n} k_a \dots k_n u_a(y_a) \dots u_n(y_n) . \end{aligned}$$

If the preferences over lotteries on all attributes depend only on their marginal probabilities and not on their joint distribution, then we have additive independence and the multiattribute utility function assumes the additive form:

(3)

$$u(v) = \sum_{i=1}^N k_i u_i(y_i) .$$

This is clearly a very strong state of independence since it implies no interaction between attributes.

Relations of independence between attributes are determined by comparing the decision-maker's choices of consequences or lotteries on one attribute over a range of values of its complement. If these choices do not change as the complement does, independence is established.

Finding relations of independence between attributes is of great importance to the process of determining the conditional utility functions of each attribute. If no independence relation holds, then the conditional utility function is multidimensional and its assessment becomes far more complex. Keeney and Raiffa discuss a number of techniques for the latter case. The main thrust is to find ways to reduce the dimensionality of the conditional utility function by considering hierarchies of preferences, by redefining the attributes to achieve utility independence, or by other methods.

If an attribute is utility independent, then its conditional utility function is unidimensional; that is, it has only the single attribute as an argument. The following procedure can then be used to determine this function. First, the best and worst values of each attribute need to be ascertained. This is accomplished by questioning the decision-maker and narrowing down the range of possible values to include only those which are relevant. Next, the qualitative characteristics of the utility function—monotonicity, risk aversion, increasing or decreasing risk aversion, etc., are found by examining the decision-maker's preferences between a given certain outcome and a lottery with equal expected value. When the size of the outcome is made to vary over the relevant range, the answers allow the analyst to ascertain the convexity or concavity of the utility function over certain regions. The size of the risk premium over the relevant range allows the analyst to determine increases or decreases in risk aversion.

If an attribute is not utility independent, then this process must be repeated for ranges of values of the other relevant attributes since the conditional utility function depends on the level of the other attributes. In any event, once the conditional utility functions have been assessed, the final step is to evaluate the scaling constants. These are chosen to scale the multiattribute utility function to the zero-one interval. If utility independence holds for all attributes, for example, the multiattribute utility function has the multiplicative form. Keeney and Raiffa use the normalizations:

$$(4a) \quad u(y_1^0, y_2^0, \dots, y_N^0) = 0 ; u(y_1^*, y_2^*, \dots, y_N^*) = 1$$

$$(4b) \quad u_i(y_i^0) = 0 ; u_i(y_i^*) = 1$$

$$(4c) \quad k_i = u(y_i^*, \bar{y}_i^0) \text{ where } \bar{y}_i^0 \text{ is the complement of } y_i$$

and

$$(4d) \quad 1 + k = \prod_{i=1}^N k_i u_i(y_i).$$

The additive utility function is normalized using only the first three of these conditions. Obviously, other forms have other normalizations.

Overall, this approach is highly appealing for normative work in policy analysis. The framework is able to represent preference structures in a reasonably general, nonrestrictive fashion which remain nonetheless quite tractable. Uncertainty is incorporated in a theoretically appealing fashion. As the work of Keeney and Raiffa clearly demonstrates, the approach is well suited for the task for which it is was designed--making explicit existing preference structures of decision-makers as an aid to more rational treatment of trade-offs between objectives.

Not surprisingly, the approach is less well suited to positive analysis. The key consideration here is the need to specify how policymakers' preferences arise and evolve. The interview techniques used by Keeney and

Ratiffa are of no use in this regard since we can assuredly expect no truthful revelation of the workings of rent-seeking politics. On the contrary, we would expect mainly proclamations regarding the public interest coupled with attempts to keep hidden any collusion with particular interest groups in society. More important, the form of the multiattribute utility function for all but the simplest of cases makes it difficult to expand the framework to include structure pertaining to the underlying political process. The univariate utility functions allow no trade-offs between attributes; the scaling constants are simply normalizers which cannot take on additional meaning. As a result, the approach has only limited usefulness for positive work in policy analysis.

3.1.2 *Rausser and Freebairn: Set of Criterion Functions.* In Rausser and Freebairn, a positive analysis is conducted in which public decision making is treated as a bargaining process between a finite number of centralized public decision-making groups and/or individuals. The disaggregated model of public decision-making implicit in the social choice models discussed by Arrow and others is rejected. The preference structure entering this centralized framework contains the value scale of the policymaking group which has the actual authority along with the pressure or interest groups which directly influence policy selections. It is not concerned with individual utilities, as is the general Bergson welfare function, but with measurable quantities. It exists and manifests itself in observable economic actions. Much like the consumer preference function, it may be revealed by policy actions and hence is "observable." They define this function as a policy preference function.

Due to the importance of the bargaining process in the political decision arena, Rausser and Freebairn suggest the construction of a set of policy preference functions rather than a unique function. These functions reflect the extreme viewpoints and preferences of different central decision-makers actively involved in the bargaining process as well as preference sets lying between these extremes. One of the purposes of their analysis is to generate information that might contribute to the efficiency of the bargaining process in reaching a consensus. They suggest that this purpose can be accomplished by deriving the rational policy outcomes for different preference structures.

The more positive aspect of the Rausser-Freebairn analysis is the use of the revealed preference approach to determine weights associated with various

performance measures or objectives. They empirically investigate U. S. beef import quotas in an attempt to ascertain the weightings of consumers' and producers' welfare implicit in past governmental policy decisions. The method they employ is to assume that a given policy represents an equilibrium maximization of the policymaker's criterion function. The arguments or performance measures of the criterion function, along with the mathematical form of the criterion function, are taken as given. This, along with an empirically estimated econometric model of the U. S. livestock sector, allows Rausser and Freebairn to infer the weights appearing in the criterion function via the revealed preference approach. This approach requires, of course, that the public decision-making process be rational and consistent.

The arguments or performance measures y_i of the policy preference function are the negative of consumer expenditure, cow-calf operator income, and feedlot operator income. Each objective is constructed as a weighted average of several factors. The policy instrument, the level of the beef import quota, is included as an argument in the criterion function. The criterion function itself is specified as quadratic.

As noted above, Rausser and Freebairn employ revealed preference to capture the estimated parameters. For objective or performance measure y_{it} , the marginal policy preference relation is

$$(5) \quad w_{y_{it}} = \hat{k}_{it} + 2\hat{K}_{it} y_{it},$$

where the objectives y_{it} are observable and the coefficients $\{\hat{k}_{it}, \hat{K}_{it}\}$ can be constructed by revealed preference. It is then a simple matter to derive the marginal rate of substitution $w_{y_{it}}/w_{y_{jt}}$. This is done for aggregate producer income and the negative of consumer expenditure.

Knowledge of the underlying system generating y_{it} and y_{jt} allows construction of the feasible set over which the policymaker must optimize. Rausser and Freebairn use an econometric model of the U. S. livestock system; since this representation is linear, the outer bound of the feasible region is linear. As a result, the marginal rate of transformation between producer income and consumer expenditure, given by

$$MRT = \frac{-\frac{\partial y_{jt}}{\partial u_t}}{\frac{\partial y_{it}}{\partial u_t}}$$

is constant along this outer bound. Relating this marginal rate of transformation to the policymaker's marginal rate of substitution allows a determination when policy should change. The actual policy decisions are then used to find an approximation to the point where the marginal rates of substitution and transformation are equal.

The Rausser-Freebairn procedure is able to generate a reasonable approximation to the relative weightings of different attributes implicit in a policy choice. The limitations of their approach are obvious; in particular, the drawbacks of the quadratic utility function, especially under uncertainty, are well known. Moreover, the structure of the bargaining game is only implicit. A more flexible functional specification is certainly desirable. As with all revealed preference approaches, the procedure also requires knowledge of the entire structure of the relevant economic sectors. The cumbersomeness of this requirement is mitigated in this case by the fact that the beef industry can be treated as a separable, block recursive system. Overall, the necessity of specifying the entire relevant underlying economic structure greatly restricts the applicability of this procedure for our purposes. A final consideration is that the Rausser-Freebairn procedure generates approximate coefficients for the utility function. If estimation of these coefficients is the primary focus of the analysis, then approximations may serve quite well. If, however, the goal of the estimation is to use these estimates to investigate other possible structure, then approximations generated by Rausser and Freebairn do not promise substantial results. In summary, then it seems unlikely that this approach can be generalized sufficiently to be of use to examine alternatives to or for that matter the current explicit formation of government policy.

3.1.3 Zusman N-Interest Group, Revealed Preferences. A revealed preference approach has also been applied by Zusman as well as Zusman and Amiad in looking at Israeli sugar and dairy policies, respectively. The policy equilibrium is characterized as the outcome of an n-person cooperative game, an approach which follows the earlier suggestions of Rothenberg. Rather than specifying a criterion function which is maximized solely by government, Zusman uses a social power function derived from an underlying

cooperative game. The concept of equilibrium employed in this game is Harsanyi's generalization of the Nash cooperative game solution to an n-person game. The solution concept implies that the entire cooperative game can be broken down into two distinct components. The first is a noncooperative subgame in which agents bargain to arrive at a division of the final payoff. The division made is determined by the relative strength of the agents and the coalitions they form which, in turn, arise out of damage they can potentially bring to bear on competing agents and coalitions. The possibilities of relative bargaining positions also determine the formation of coalitions. Once the division of the final payoff is determined in the first subgame, the second cooperative subgame ensues. In this subgame all agents jointly strive to maximize the size of the total payoff as this will also maximize each agent's and/or coalition's share. At the equilibrium, the payoff is divided up according to the results of the first subgame; the distribution process may involve side payments in each phase. The strength, or power, of each coalition then determines its relative share.

The above approach is employed by Zusman to investigate the Israeli sugar industry assuming an additive utility function for each interest group composed of the government, the Israeli labor federation (representing consumers), and sugar producers. Each of these three groups are assumed to have a utility function which is separable in the benefits and costs imposed by the sugar subsidy and in the cost of exerting effort to influence the level of this subsidy.

As previously noted, the final equilibrium is found by maximizing the size of the total payoff. As such, it is on a political-economic efficiency frontier which can be defined as

$$(7) \quad \max_x \sum_{i=0}^n H_i U_i(x)$$

where $U_i(\cdot)$ is the i th interest group's utility; $x = (x_0, x_1, \dots, x_n)$ is the vector of all groups' actions; and H_i are the relative weightings derived from the prior noncooperative subgame. Under the assumptions of additive utility and the optimality of government policy, this is equivalent to:

$$(8) \quad \min_{H_i} \max_{x_0} \sum_{i=0}^n H_i [U_i(x_0) - U_i(\hat{x}_0)]$$

where $\hat{x}_0$ is the observed level of policy instruments. The weights, H_i , can thus be found by solving the nonlinear programming problem

$$(9) \quad \max_{x_0} v \text{ subject to } v \leq U_i(x_0) - U_i(\hat{x}_0), i = 1, \dots, n$$

and the economic constraint structure. Harsanyi's solution concept then defines the criterion function as the political-economic efficient frontier. Under Zusman's assumption of additive utility, the saddle point theorem of nonlinear programming can be used to show that the weights, H_i , are the solution of the dual of the above programming problem. Assuming optimality of policy choices means that this problem can be used to solve for the weights of the criterion function, giving an estimate of the coefficients of the criterion function for each time period under examination.

The weights are derived from a prior noncooperative subgame where the relative strengths of the interest groups involved determine the final weighting. In this framework, each group aims to maximize its total payoff at the least necessary cost of exertion of power. Suppose that we can divide all agents into two opposing coalitions, S and $\bar{S}$. Then for coalition S , this condition translates into

$$(10) \quad \left[\max_{x^S} \min_{x^{\bar{S}}} \sum_{i \in S} H_i U_i(x^S, x^{\bar{S}}) - \sum_{j \in \bar{S}} H_j U_j(x^S, x^{\bar{S}}) \right]$$

where x^S , $x^{\bar{S}}$ are the actions of each coalition and the maximin process is constrained by conditions on the division of the payoff within each coalition--basically, a condition ensuring survival of the coalition.

Now suppose that the set of all possible actions consists solely of government policy instruments, x_0 , and the pressures of interest groups measured by the cost of exertive power, C_i . In this case, still assuming additivity, the condition becomes:

$$(11) \quad \max_{x_0} \left[u_0(x_0) + \sum_{i=1}^n \frac{\partial S_i}{\partial C_i} u_i(x_0) \right]$$

where

$$(12) \quad S_i(C_i, \delta_i) = \begin{cases} \alpha_i(C_i) & \delta_i = \alpha_i \text{ a "reward"} \\ -\beta_i(C_i) & \delta_i = \beta_i \text{ a "penalty"} \end{cases}$$

is the "strength function" of the i th interest group. It can be shown that the "reward" strategy is always chosen in the second subgame while the "penalizing" strategy is always chosen in the first. Since the weights, H_i , are determined in the initial subgame, it is clear that

$$(13) \quad H_i = \frac{-\partial \beta_i}{\partial C_i(i)} = \frac{\partial \alpha_i}{\partial C_i}$$

i.e., the weights measure the marginal influence of each agent due to an additional expenditure of influence within each subgame.

Since the weights, H_i , are estimable using the nonlinear programming approach, the underlying cost of power, C_i , can be inferred once sufficient structure is found for the strength functions. Zusman assumes that these take the form

$$(14) \quad \alpha_i = A_i C_i^{a_i} \quad A_i > 0, 0 < a_i < 1$$

$$(15) \quad \beta_i = B_i C_i^{b_i} \quad B_i > 0, 0 < b_i < 1$$

and then that $a_i = b_i = .5$ and $B_1/A_1 = B_2/A_2 = 2$. Using these admittedly arbitrary assumptions, he is able to show that the relative cost of power between groups is the same for both subgames. Trial and error is then used until plausible values of all parameters are found. A similar

procedure was used in Zusman and Amiad's investigation of the Israeli dairy industry.

Under Zusman's assumption of additive utility, then the weights of the overall criterion function--which in his formulation define the slope at points along his political-economic frontier--measure the marginal pressure generated by each agent's exertion of additional power. The weighting of each attribute included in the criterion function reflects the underlying power structure entering the political process. The solution of a nonlinear programming problem yields estimates of these weights, given the standard revealed preference methodology assumption of optimality. Specification of structure for the strength functions, combined with sufficient *a priori* information, subsequently allows estimation of the cost of power and the parameters of the strength functions themselves.

The attractiveness of this approach should be obvious as it incorporates so many of the elements policy formation theory should address in an elegant and intuitively appealing formulation. Several factors, however, militate against the generalization and, hence, broader usefulness of this formalization. First, the framework is a certainty model. It can be reformulated with little insight to include uncertainty simply by replacing maximization of utility with maximization of expected utility. Such a procedure implicitly assumes that all expectations are fulfilled since it is only under this condition that the nonlinear programming procedure can be used. Further, introduction of uncertainty under nonadditive utility may make the framework untractable due to interactions among stochastic terms.

Dropping the admittedly strong assumption of additivity leads to further problems. Without additivity, the criterion function explicitly includes the cost of power as an argument at its equilibrium value; additive utility means that only the marginal exertion of power appears, and then only in the form of the weights. This cost of power is clearly unobservable and is, in fact, difficult to define precisely. Zusman defines it as the subjective valuation of the cost of a group's attempt to influence policy. Acceptance to such a definition severely limits the use of the concept. Its use as an objective category would then imply the strong rationality assumption that each group's subjective valuations of cost were consistent with the effects of their actions. It seems conceivable on the contrary that agents have no such

precise and consistent notion of the effects of any actions they may undertake. Furthermore, under this definition, it is assuredly the case that such costs are not comparable across interest groups; yet, the interesting questions are those which concern the relative power of interest groups and the reasons behind whatever rankings may exist. The problem here is one of measurement in that similar actions of different agents can easily lead to different results. It is the task of policy formation theory to explicate the underlying causal mechanisms; to do so, some objective notion of the cost of power must be developed.

3.1.4 *Theil Random Rational Behavior, Revealed Preferences.* In contrast to Zusman, Schim van der Loeff and Harkema have attempted to incorporate uncertainty into the heart of the policymaking process. Following Theil (1971, 1974), they argue that decision-makers should not be viewed as agents optimizing some function under certainty. On the contrary, the pervasiveness of uncertainty in all aspects of the decision-making process implies that the inability of the decision-maker to meet targets should be incorporated into the behavioral hypotheses. Instead of looking at governmental behavior as optimizing a deterministic criterion function, they argue that this behavior is more accurately characterized as random rational behavior. The objective of the government under this hypothesis is to minimize deviations from policy instrument targets according to the loss in the criterion function such errors incur.

For those frameworks which incorporate uncertainty, the policymaker was assumed to know the desired levels of policy instruments with certainty; only the exact outcome of the policy package was subject to error. The assumption of random rational behavior extends the recognition of this phenomenon into the actual decision process. Since outcomes are uncertain, getting as close as possible to the most reasonable levels of instruments becomes the principal criterion for optimality. This can be accomplished only if sufficient information on the stochastic processes involved is available to the policymaker since otherwise the metric closeness of an estimate is undefined.

In suggesting a revealed preference methodology for the estimation of criterion function parameters under random rational behavior, Schim van der Loeff and Harkema follow Nykamp and Somermeyer in proposing a criterion function quadratic in both policy targets and instruments.

$$(16) \quad W(x, y) = a_N' x + b_N' y + \frac{1}{2} (x' A_N x + x' C_N y + y' C_N' x + y' B_N y)$$

to be maximized subject to a linear constraint structure

$$(17) \quad y = P_N x + s$$

where y is the N_p vector of policy targets, x is the N_d vector of policy instruments, and s is a vector of order p_N of linear combinations of current and lagged exogenous variables and pre-first period lagged x and y . Constrained maximization implies a set of optimal levels of the policy instruments for each time period

$$(18) \quad \hat{x}_t = -(K_N^{-1})_1 [a_N + R_N' b_N + (R_N' B_N + C_N) E(s)]$$

where $(K_N^{-1})_1$ is the $(q \times q_N)$ matrix of the first q rows of the inverse of

$$(19) \quad K_N = A_N + R_N' C_N + C_N' P_N + R_N' B_N P_N.$$

An expected loss function is then derived on the assumption of a first-period error followed by correct decisions:

$$(20) \quad L(x_t, \hat{x}_t) = -\frac{1}{2} (x_t - \hat{x}_t)' Q^{-1} (x_t - \hat{x}_t) \equiv -\frac{1}{2} \epsilon_t' Q^{-1} \epsilon_t$$

where Q is the leading $(q \times q)$ submatrix of K_N^{-1} . Note that the loss function can also be expressed as a function of the elementary decision errors η_t :

$$(21) \quad L(x_t, \hat{x}_t) = \eta_t' \eta_t$$

under the assumption that Q is negative definite. Assuming that the elementary decision errors are normal, uncorrelated, and homoscedastic implies that the decision errors ϵ_t have variance $\sigma^2 Q$. A maximum-likelihood estimator for the parameters of the criterion function may be developed under the assumption of random rational behavior.

In general, the rational random behavior hypothesis is an attractive framework for incorporating uncertainty into the decision process. While Schim van der Loeff and Harkema do not specify a policy-formation process, it is easy to see how their methodology can be extended to include policy endogeneity. One would assume the existence of a criterion function arising out of the underlying political process. Maximization of this criterion function subject to the constraints perceived by policymakers would give the optimal instrument levels, and estimation would proceed as outlined previously. One drawback of the Schim van der Loeff and Harkema approach is its dependence on a quadratic criterion function and linear constraints. However, extension to nonlinear forms should not prove too difficult, though it should make maximum likelihood estimation somewhat more cumbersome. Alternative stochastic assumptions might also be considered in cases for which some skewness of decision errors might be expected.

This approach is an important extension of the imaginary interviewing procedure suggested by Van Eijk and Sandee. Its principal limitation is that it does not specify a policy-formation process. The role of interest or pressure groups is neglected, and a single policymaker is presumed to make rational random choices in which only his values count. There is no underlying bargaining process, conflicts, or consensus points among various policymakers and interest groups. Nevertheless, the methodology offered by this approach offers some promise and should be pursued in future empirical applications once appropriate generalizations have been made.

3.1.5 McFadden Qualitative Choice Models. The models considered above have been concerned with the quantitative choices of a government agency; that is, they consider the problem of how specific levels of policy instruments are set. In general, they look at this determination as arising from a process of optimization over a set of alternatives specified by an underlying utility function. For all frameworks except Keeney and Raiffa's multiattribute utility analysis, both the set of alternatives and their weightings in the utility function are viewed as resulting from the political process. In some cases, however, political processes result in qualitative choices. McFadden (1975, 1976) has used a revealed preference methodology to examine the binary choices of a government agency--in this case the California Division of Highway's decision as to whether or not to build a highway in a particular location.

Like Schim van der Loeff and Harkema, McFadden attempts to integrate uncertainty directly into the underlying utility optimization process. Unlike their approach, in this study uncertainty enters into the criterion function itself. The utility function of the California Division of Highways is characterized as consisting of two components, a function of observed characteristics of possible highway routes $r(\cdot)$ and of unobservable factors. The criterion function is thus

$$(22) \quad u(y_n, s) = r(y_n, s) + w_n$$

where y_n are the observable attributes; s , the description of the environment; and w_n , the contribution to utility of unobservable factors.

In the presence of uncertainty, the observed attributes of a project cannot completely determine the project's utility. If information is noisy, the observations on the project do not fully reveal the exact attribute structure; as a result, utility is composed of an observable component and a stochastic term. Similar results occur when the agency has incomplete control over the attributes of a project. Since the exact outcome is unknown, the utility derived from the measurable portion does not fully account for total possible utility.

Given such random elements, the observed attributes do not fully determine the actual choice made; rather, they only determine the probability that a choice will be made in one fashion or another. Assuming that choices do result from a utility maximization, then actual choices should reflect the underlying preference structure of the government agency. Moreover, assuming that the unobservable factors behave like random drawings from a multivariate distribution and given some assumptions as to the general shape of the agency's preference structure, the parameters of that preference structure can be estimated. In particular, the assumption that the w 's are independently identically distributed according to a Weibull distribution yields the condition that the probability the l th project is chosen, $P_N(l)$ is a function of the utility of observable attributes of that project and of all other feasible projects; that is, all projects in the feasible set N . This can be written:

(23)

$$P_N(l) = e^{r(y_{li}, s)} / \sum_{M \in N} e^{r(y_{mi}, s)}.$$

Use of a linear approximation to the utility function over the observable, i.e., letting

(24)

$$r(y_{li}, s) = \beta' y_{li}$$

leads to McFadden's estimating equations. In these estimations, β_i , of course, measures the proportional change in the log odds of the l th project due to a unit change in the i th observable attribute, y_{li} .

This framework views government policy decisions in terms of public interest rather than as outcomes of a political process involving interest-group contention. McFadden is concerned with discovering the exact measures of costs used by the Division of Highways in order to determine whether the empirical measures reflect total social costs. Though he pays some attention to political variables, his principal concern is how accurately the determinants of alternatives chosen actually reflect their associated social costs.

McFadden's model deals only with qualitative choice; that is, which alternative of many will be chosen. The extension of this model to problems of quantitative choice is straightforward. In particular, it would be simple to use this procedure for cases where either the set of admissible levels of policy instruments can be divided into a number of discrete intervals, or where the set of possible policy choices can be divided into a number of distinct, nonoverlapping regimes. For example, we might consider a case where a support price is set within some range or regimes like high support prices, high self-sufficiency, and high consumer prices versus low support prices, low self-sufficiency, and low consumer prices for production of some agricultural commodity. Each interval or regime will have some probability of being chosen. Such a structure yields a revealed preference model that can be treated in the McFadden qualitative choice framework.

While the avoidance of a *a priori* structure is a great strength of this method, it also constitutes one of its chief weaknesses. The estimated

structure is essentially a reduced form. It is possible to use the technique to measure total impact of an attribute on an outcome. It is not possible, however, to recapture the underlying structure. In particular, it is not possible to examine the relationships between the exertion of power and the policy decision at stake; that is, how different levels of the relevant attributes affect power exertion. It is also not possible to examine the relationship between the exertion of power and the effects of that exertion. If we are interested in examining these structures and especially if we are interested in looking at how they may have changed at various times, McFadden's methodology will be of little assistance.

A second drawback to this approach is inherent in the logit technique itself. Use of logit requires the rather strong assumption of what has been termed the independence of irrelevant alternatives--that excluded alternatives have no impact on choice between included alternative. This assumption has been shown to lead to some highly counterintuitive results. As a result, it is not only undesirable but also untenable in most applications, making logit a rather unattractive choice. Use of this assumption can be avoided by the use of probit, particularly the covariance probit analysis suggested by Hausman and Wise which assumes that the stochastic terms are identically distributed according to a normal distribution, dropping the requirement of stochastic independence. The parameters estimated using probit cease to be concerned with the log odds and instead measure the change in the probability of choice of an alternative due to a unit change in an attribute. Aside from this feature, the interpretation of the results remains the same.

A switch from logit to covariance probit estimation also nullifies a third drawback to McFadden's technique. Logit requires the use of a linear approximation to the utility function; as usual, this assumption has been justified in terms of computational savings. Since probit has no such computational simplicity, there is no necessity to restrict the form of the utility function. As a result, restrictive assumptions of independence between attributes can be avoided, and more general formulations estimated.

3.1.6 Summary and Synthesis

In sum, none of the criterion function approaches examined here are entirely adequate for estimating the effects of power exertion on the final

determination of policy and the relationship between policy alternatives and the generation of political effort (Rausser, Just, and Zilberman). To operationally endogenize governmental policy formulation with the focus on the underlying criterion function, new procedures will be necessary. These procedures will be heavily dependent upon whether the problem is one of setting policy and/or one of selecting, for a given policy set, the levels of various policy instruments. In what follows, we suggest some lines along which policy criterion function models might be fruitfully developed.

The policy set problem is a discrete decision while the choice among alternative levels of the policy instruments can be treated as a continuous decision. Both problems can be combined in a framework which simultaneously determines the discrete selection among alternative sets and continuous choices over the set of policy instruments for a particular set. Recent advancements in discrete continuous choice frameworks (Duncan, Hanemann) may prove useful in this context. An operational approach is to treat these two problems initially as separable and subsequently iterate to recognize whatever simultaneity exists between the two problems.

For the separable, discrete policy set problem, a number of fruitful lines should be explored. One of the more promising is a modified McFadden qualitative choice model. A vector of performance measures or attributes could be measured which vary across each discrete policy set. Suppose that these performance measures could be separated so that each is the concern of a single interest group. For example, the net cost or benefit to an interest group of a policy set might constitute a properly structured performance measure or attribute in the McFadden framework. In this event, the β 's estimated in McFadden's qualitative choice model could be viewed in much the same manner as the strength functions of the Zusman approach. If interest group pressure affects the governmental agency's decision and this pressure is generated by attributes of the policy set, then the β 's change in the probability of adoption of a policy set due to a unit change in the i th attribute should measure the impact of the pressure generated by the expected results of a policy set selection. Given the proper structuring of the performance measures, the estimated parameters would measure the political power each interest group could bring to bear on the ultimate selection.

For the continuous policy instrument selection problem, a synthesis of Keeney and Raiffa, Rausser and Freebairn, and Zusman could prove to be a valuable vehicle for endogenizing governmental policy. This synthesis can be achieved through a revealed preference approach that places emphasis on the notion of interest groups, the bargaining process, uncertainty, and policy equilibrium points. It would begin with an identification of all major interest groups and the major governmental policy agencies. For each of these designated categories, individual objectives would be structured along the lines of Keeney and Raiffa. Once the performance measures are quantified for each objective, the Keeney and Raiffa independence relationships and functional forms of the univariate utility functions could be assessed through actual or, if need be, imaginary interviewing. The functional form of the univariate utility functions would admit a particular type of risk aversion for each interest group and, when combined with the assessed independence relationships (whether preferential, utility, additive, etc.), a particular form of the criterion function would be implied. At this juncture, the unknowns in the criterion function are the weights or trade-offs associated with the univariate utility functions of each interest group and the governmental policy body.

To estimate the weights or trade-offs, we need a number of additional specifications. This includes an empirical specification of the economic structure that is influenced by the policy in question, i.e., the economic constraint structure and the mechanisms for recognizing conflicts, the exertion of power, the effect of the distribution of costs and benefits within particular interest groups (Stigler, 1971; Peltzman), and policy equilibrium points. These mechanisms can be treated by specifying functional relationships between the weights appearing in the multiattribute utility function and the exertion of political power; the exertion of political power, in turn, can be conceived as a function of the distribution of costs and benefits accruing to each individual interest group and governmental bureaucrat which, of course, depends on the selected levels of the policy instruments. The specification of the three mechanisms or functional relationships--policy instruments to the distribution of costs and benefits, the distribution of costs and benefits to the exertion of power, and the exertion of power to the weights appearing in the criterion function--can be represented in compact form as a functional relationship between the weights or trade-offs and the policy instruments. Given specification of the

relationship between the weights and the exertion of power and between the exertion of power and the levels of policy instruments (recognizing the intermediate link between the levels of policy instruments and the distribution of benefits and costs), it should be possible not only to estimate the weights but, as well, some measure of the exertion of power. In this fashion, a framework is available for investigating the trade-offs between various interest groups and governmental policy bodies and for quantifying the impact of political pressure on such trade-offs. Such a framework would admit the possibility of comparisons of interest group effort in achieving a policy equilibrium.

In the above framework, a number of alternative revealed preference approaches are possible. All of these possible approaches are severely handicapped by the nonobservability of political power and, in most circumstances, the distribution of costs and benefits. If such factors were observable, then in principle it would be a simple matter to estimate all of the parameters in the above specified relationships through the revealed preference approach. Due to the inherent nonobservability of some of the key factors, however, a substantial amount of *a priori* structures is required. Such specifications can be used in conjunction with Keeney-Raiffa multiattribute utility functions and empirical representations of the economic structure to estimate parameters appearing in (i) the relationship between the criterion function weights and political power and (ii) the relationship between political power and the actual levels of the policy instruments or performance measures. In this context, we will suggest in what follows two possible revealed preference estimation procedures. For both possible procedures, the basic assumption of revealed preference will be imposed, namely, that past actual levels of the policy instruments are, in fact, the optimal selections.

The first procedure takes as given the Keeney-Raiffa multiattribute utility function, the empirical constraint structure, and functional forms for the relationships (i) and (ii). To illustrate, suppose that there are two interest groups whose performance measures are y_1 and y_2 , respectively, and a governmental policy group whose performance measure is y_3 . In addition, suppose that the univariate utility functions are simple exponentials and that utility independence exists. Under these circumstances, the criterion function is:

$$C(\cdot) = k_1 y_1^{a_1} + k_2 y_2^{a_2} + k_3 y_3^{a_3} + k_4 y_1^{a_1} y_2^{a_2}$$

(25)

$$+ k_5 y_2^{a_2} y_3^{a_3} + k_6 y_1^{a_1} y_3^{a_3} + k_7 y_1^{a_1} y_2^{a_2} y_3^{a_3}.$$

The simplest possible specification for relationships (i) is that the weights are proportional to the power exerted by each interest group and the government agency. i.e.,

$$(26) \quad k_1 = \beta_1 P_1, \quad k_2 = \beta_2 P_2, \quad k_3 = \beta_3 P_3.$$

The weights on the interaction terms are specified simply as a weighted average of the power or strength measure, i.e.,

$$k_4 = \beta_4 P_1 + \beta_5 P_2 + \beta_6 P_3$$

$$k_5 = \beta_6 P_2 + \beta_7 P_3$$

(27)

$$k_6 = \beta_8 P_1 + \beta_9 P_3$$

$$k_7 = \beta_{10} P_1 + \beta_{11} P_2 + \beta_{12} P_3.$$

To keep the illustration as simple as possible, for relationships (ii), let the power exerted be proportional to the level of the relevant performance measures, i.e.,

$$(28) \quad P_1 = \gamma_1 y_1, \quad P_2 = \gamma_2 y_2, \quad P_3 = \gamma_3 y_3.$$

Given the above specifications, the criterion function can be respecified as

$$\begin{aligned}
 C = & \beta_1 r_1 y_1^{a_1+1} + \beta_2 r_2 y_2^{a_2+1} + \beta_3 r_3 y_3^{a_3+1} \\
 & + (\beta_4 r_1 y_1 + \beta_5 r_2 y_2) y_1^{a_1} y_2^{a_2} + (\beta_6 r_2 y_2 + \beta_7 r_3 y_3) y_2^{a_2} y_3^{a_3} \\
 & + (\beta_8 r_1 y_1 + \beta_9 r_3 y_3) y_1^{a_1} y_3^{a_3} + (\beta_{10} r_1 y_1 + \beta_{11} r_2 y_2 \\
 & + \beta_{12} r_3 y_3) y_1^{a_1} y_2^{a_2} y_3^{a_3} .
 \end{aligned}$$

Given a vector of policy instruments along with an empirical specification of the constraint structure representing the economy in question, the necessary conditions for an optimum can be derived. The unknowns that appear in these necessary conditions are the β 's and r 's. The identifiability of these parameters depends in part upon the number of policy instruments. Note that the structure of this problem resembles that of a Stackelberg equilibrium in that the reactions of groups to the level of the policy instruments are incorporated into the weights and thus are included in the government's optimization process. The government acts much like a Stackelberg leader and the interest groups like followers. The treatment of the policy formation process as unfolding in this fashion makes a great deal of sense; the interest groups make their potential reactions known through past behavior, lobbying, and the like; and the policymaker takes these reactions into account along with his own power position in selecting actual levels of the policy instruments.

The principal limitation of the above procedure is that it requires a great deal of *a priori* structure. The parameters of the model may be identified only under restrictive conditions. Even in the simple illustration, for example, it is likely that not all of the parameters can be identified. If all of the parameters are not identified, some could be set at prespecified levels with the balance conditioned upon the prespecified values. In this event, relative clout of various interest groups would represent conditional measurements.

The second procedure involves generating estimates of the weights and then empirically measuring the relationship between the weights and performance measures or policy instruments. In this approach, the policy instruments again are viewed as optimal; thus, they lie on the political-economic frontier. The point on the frontier characterizing the policy selection or equilibrium can be expressed as the weighted sum of the univariate utility functions. The weights in this sum can be estimated using the nonlinear programming problem suggested by Zusman. Once the weights are known and relations (i) and (ii) are specified, it is possible to estimate the β and γ parameters, or products of these parameters, from simple regression equations.

To be more concrete, consider the structure employed as an illustrative vehicle for the first procedure. The procedure considered here would require solutions to the nonlinear programming problem represented in (9). The solution to the dual of this problem would be the weights k_j . Using the same specifications for (i) and (ii), four regression equations must be estimated. Clearly, only the products of some parameters are identifiable; hence, some must be specified *a priori* for the full set of parameters to be identified. Aside from the nonlinear programming problem, this procedure has the advantage of simplifying the estimation problem. Its motivation is theoretically grounded; and, thus, it is a promising alternative.

Both of the above procedures are offered as vehicles for shedding light on the parameters of the bargaining game underlying governmental policy formation. Even though neither procedure posits a specific game formulation, the motivation of structure should be sufficient for empirically estimating parameters which have relevant interpretations. Both procedures clearly incorporate multiple objectives and uncertainty in an appealing fashion. For the second procedure, the random error terms necessary for statistical estimation are justifiable in terms of information imperfections in the policy formation process. Both procedures thus seem quite attractive in terms of the criteria set forth at the beginning of this section. Moreover, these procedures incorporate many of the strengths of the various approaches that have been surveyed. Their chief limitations are the amount of *a priori* structure that must be imposed. While this feature is certainly undesirable, the nature of the problem demands such structure. Ultimately, this structure, combined with observations on investments in lobbying efforts,

formation and maintenance of interest group coalitions, and the like, could lead to the removal of many of the nonobservables in the approaches suggested here. In the meantime, the empirical applications of the above procedures promise fruitful results.

3.2 *Estimation of Behavioral Equations*

The preceding section surveyed attempts to specify and estimate modes of behavior characterized by some criterion function. Keeney and Raiffa's technique focused on extracting that criterion function by examining actual decision-maker preferences. The other approaches surveyed focus on the rational, necessary conditions for an optimum of a specified criterion function. These approaches employ preference procedures to estimate the parameters of these equation systems and to quantify the criterion function.

An alternative means of examining government policy formation is the direct estimation of instrument behavioral equations. Such approaches parallel the traditional estimation of micro supply or demand functions. Most of this work has concentrated on partially reduced form estimation. It can be classified into one of two general categories. The first category concentrates on the policy formation process. The explanation and prediction of government policy determination are the major purposes of such studies. These models are represented by policy behavioral equations in which the underlying structure admits the simultaneous determination of all policy instruments. The second category has concentrated on the private sector, stressing the inclusion of policy determination as a means of improving the performance and predictability of such private sector models. Feedback effects from the private sector to policy formation and vice versa have been of special interest. The resulting models have generally had a market orientation in which one or more policy instruments have been embedded. Equations for the policy instruments have been included in the conceptual or theoretical frameworks but are eliminated or treated as predetermined in the empirical models that have been constructed.

Selected studies from both of the above categories will be surveyed here. Specifically, for the first category, the analyses conducted by Rausser and Stonehouse and by Camm will be examined. For the second category, the studies conducted by Lattimore and Schuh; Abbott (1979a, 1979b); and Lattimore and Zwart, among others, will be compared and contrasted.

3.2.1 *Rausser and Stonehouse Policy Analysis.* Specification of policy behavior equation systems has tended to be largely determined by the authors' beliefs as to the nature of policy formation. In their study of the Canadian dairy industry, Rausser and Stonehouse take as a working hypothesis that the policy formation process is some sort of bargaining game between interest groups in society. Policy instruments such as target returns and support prices for dairy products are the dependent variables in the model, with explanatory variables represented by proxies for consumer, producer, and government agency interests. The coefficient estimates are highly reasonable and tend to confirm the importance of these factors in the process of policy formation.

A weakness of this study is the reduced form nature of the policy estimation model. The authors forego an explicit structural model of policy formation. Hence, there is no need for a great deal of *a priori* structure. The lack of such structure, however, makes it difficult to attach significance to the coefficients or to test specific hypotheses about the policy formation process. The model can be readily extended to overcome this deficiency by the imposition of a structural model from which to draw testable hypotheses along lines similar to those suggested above for use with McFadden's methodology. As a reduced form structure, the principal value of the Rausser and Stonehouse model is prediction. The usual caveats for reduced form forecasts apply; the model is not invariant with respect to structural changes. As long as the general structure holds, however, such a model should continue to forecast well.

One of the most comprehensive exercises involving endogenous government policy is the recent Canadian agricultural sector model (FARM) by Agriculture Canada. This quarterly forecasting model includes 24 endogenous policy variables including administered producer prices, production quotas, and initial or floor price guarantees. The approach is based largely upon the Rausser and Stonehouse framework and thus the preceding discussion applied here as well.

The use of this model for quarterly forecasting does raise some interesting additional empirical problems. Several target prices are administered by implicit or explicit formulae with discretionary elements. The weights used in these formulae, however, have not been used to constrain

the equation estimates. In this short time frame, it becomes increasingly important to explain and predict not only the magnitude but also the timing of the changed value in the policy instrument. One could conceive of a two-stage policy forecasting system as a possible means of handling this problem where the first stage would predict the timing of the change; and the second, the magnitude. Empirically, this procedure could involve mixed qualitative/quantitative procedures or threshold regression techniques as suggested in Rausser and Stonehouse.

3.2.2 *Camm Policy Analysis.* Camm's study of marketing order derives from Stigler's theory of regulation. The view is that the imposition of a marketing order creates rents for producers, hence, the demand. The greater the rents, the greater the demand for regulation. The probability that a marketing order will be imposed should thus increase as the transfer of income grows. Camm develops a price-theoretic model of market discrimination to isolate variables affecting the size of rents and to determine their impacts. The set of independent variables is composed principally of factors affecting supply and demand elasticity. It includes such variables as national demand elasticity, percentage of acreage devoted to the crop of interest, share of production under order, farm value, and variability of crop size. A linear probability model is used to estimate the effect of these variables on whether a marketing order was in effect in 1966. The signs of the estimated coefficients are used to test Stigler's theory.

The results are mixed. The estimation seems to confirm the simpler hypotheses; tests of more subtle hypotheses remain ambiguous. The coefficients of demand elasticity and the order's share of the national market are significantly different from zero and have the correct sign. The remaining coefficients do not allow easy interpretation. It seems likely that the ambiguity of the results may derive in part from specification problems. Use of an alternative qualitative choice model would seem preferable to the linear probability form. Some of the variables used are proxies; more accurate measures might well have resulted in some improvement.

The major weakness of the overall approach is the treatment of marketing orders as separable components of farm policy. It seems unlikely that marketing orders are determined entirely separately from the general policy process. On the contrary, factors such as subsidies, price supports, etc.,

should affect both the supply and demand for marketing orders. A correctly specified model should include the entire relevant range of policy instruments so as to capture the relevant cross effects. The lack of correct specification places all of Camm's findings in some doubt. A second weakness is the reduced-form nature of the estimates. The considerations touched on previously apply here as well. The possible extensions examined in the discussion of McFadden's study also seem relevant.

3.2.3 *Lattimore and Schuh, Thompson and Schuh, Gulliver et al., and Hall Policy Analysis.* A number of attempts have been made recently to integrate endogenous policy formation into models of private market response. Included in this specification, supply and demand equations for particular agricultural markets, is the set of policy instruments considered relevant to the market. The pertinent policy objectives are identified and used to isolate factors which may have a causal relation to the choice of instrument levels. As conditions in the markets under consideration clearly affect the correct level of policy instrument for a given objective, these specifications generally include feedback effects from the market to the policy-formation process. The expanded market system is then estimated in some fashion. The estimated parameters are used for forecasting purposes and to test hypotheses about the structure and objectives of government intervention.

Most of this thrust in agricultural fields appears to have concentrated on trade barriers in international grain markets. These markets are highly distorted by a wide range of commercial and domestic policies. One reaction of major traders such as the European Economic Community (EEC), the United States, and Japan, over much of the post-World War II period, has been to restrict imports and stimulate the production and exports of their agricultural commodities. These actions have had the effect of insulating domestic prices from world prices, causing domestic prices to rise and international prices to fall relative to domestic prices.

Figure 1 illustrates the resulting price distortion for an individual importing country. Prior to the imposition of distorting policy, the domestic price (DP^0) should equal the world price (WP^0) when the latter is valued at the equilibrium free trade exchange rate and transaction costs are taken in account. The two will diverge after the policy has been imposed. The difference between the two,

$$I^0 = DP^0 - WP^0$$

can be thought of as measuring the degree of government intervention. This intervention takes the form of tariffs, nontariff barriers, variable levies, export subsidies, producer subsidies, dumping, and undervalued exchange rates.

The opposite case is also widely observed in agriculture. As Schun pointed out, the development strategies of many countries have led them to pursue cheap food policies as a means of capturing the agricultural "surplus" and transferring it to other sectors of the economy. Schuh argued that trade policy is a vital component of this strategy. Direct restriction of exports or the use of prohibitive tariffs were seen as direct measures a government could use to achieve such ends. The overvaluation of the exchange rate could also be used for this purpose as the overvaluation effectively taxes exports and subsidizes imports of foodstuffs. This case is demonstrated in Figure 1. The imposition of such policies tends to drive the domestic price (DP^1) below world price (WP^1). The degree of this kind of intervention can be measured by $I^1 = WP^1 - DP^1$.

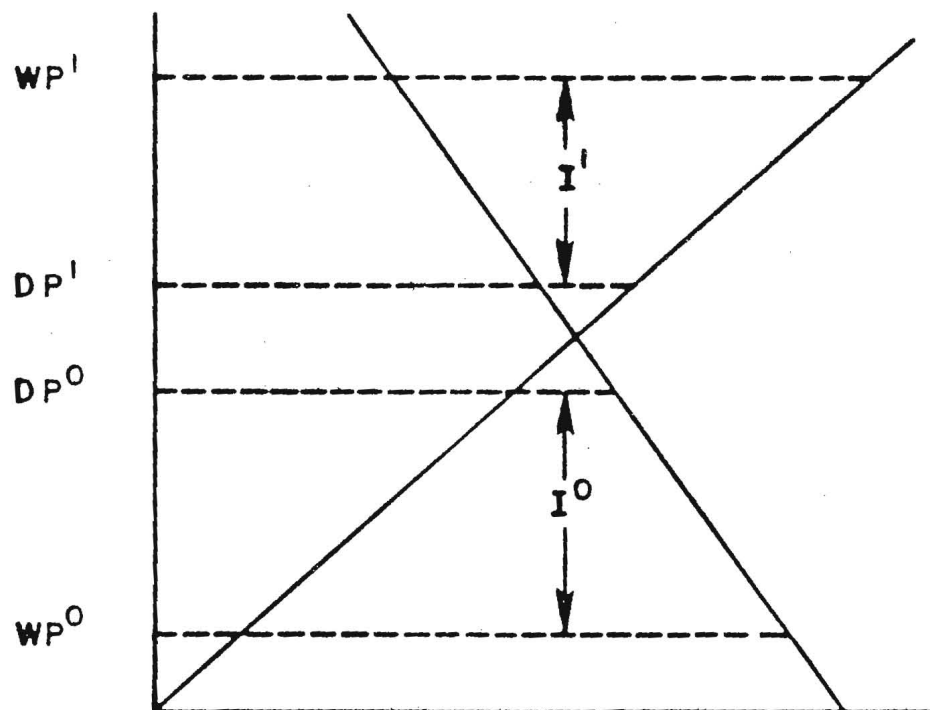


FIGURE 1. Domestic-World Price Intervention

Lattimore and Schur have examined Brazilian government intervention in the beef market. They hypothesize that an objective of government policy is to hold down consumer prices, especially those affecting middle-income consumers, who are seen as politically important. The instrument used to accomplish this goal is the overvaluation of the exchange rate for these commodities. The level of intervention is measured by the difference between the world price (expressed in domestic currency evaluated at the free-market exchange rate) and the domestic price, which incorporates the effect of the overvalued exchange rate. This level of intervention is specified as a function of the free market import price, the rate of increase in the general price level, and the overall balance of payments position. Dummy variables are included to separate the effect of changes in policy regimes.⁷

The above policy intervention equation was estimated as an independent block of larger simultaneous model of the Brazilian beef industry. The investigators found coefficients significantly different from zero for both import price and for the rate of increase of the general consumer price level; these results, which are summarized in Table 1, tend to support the hypothesis that the effective subsidy is based on political motivations.

In a similar vein, Hall has investigated the Brazilian and Colombian grain import policies. Postulating goals of increasing self-sufficiency and lower consumer prices, Hall notes that P. L. 480 food aid is an instrument that could be useful in achieving both objectives. By selling P. L. 480 grain at a target consumer price somewhat higher than the cost of the grain, the government could generate revenues to offset producer subsidy expenditures, hence, lower the tax burden on the country as a whole. Her model of supply and demand for wheat, corn, and rice in Brazil and Colombia included an equation for the determination of producer support prices as a function of commercial import quantities and prices, P. L. 480 costs, the consumer price index, and a trend variable. The estimated coefficients support the hypothesis that Brazil used P. L. 480 food aid to increase self-sufficiency in wheat and that Colombia was doing likewise for rice.

3.2.4 *Abbott Policy Analysis.* Abbott (1979a) has attempted to use an endogenous policy-formation model to test a series of hypotheses about government intervention in international grain markets. First, a model of

TABLE 1
Trade Policy Intervention Model

Dependent variable inter-vention	Independent variables								R ₂	D.W.
	World commodity price ^a	Balance of payments ^b	Rate of inflation	Policy shifters ^c						
				D ₁ 1953-1959	D ₂ 1960-1963	D ₃ 1964-1971	D ₄ 1960-1968	D ₅ 1969-1972		
Beef	1.538 (2.75) ^d	0.249 (1.30)	7.900 (2.98)	-218.05 (1.80)	-16.39 (0.10)	-65.41 (0.41)			.73	1.71
Corn	1.105 (2.26)	0.005 (0.31)	0.583 (2.67)	- 17.316 (1.33)	-14.683 (0.80)	-25.334 (1.53)			.75	1.57
Soybeans	1.430 (4.67)	0.036 (3.00)	97.96 (2.43)				-89.2 (3.96)	-126.4 (4.33)	.92	2.10

^aThe world traded prices of these commodities.

^bThe percentage increase in the general price level.

^cPrimary variables representing different political regimes.

^dValue in parentheses below estimated coefficients.

Sources:

For beef, see R. Lattimore and G. E. Schuh, "A Policy Model of the Brazilian Beef Cattle Economy," Chilean J. Econ. 39(1976):51-75.

For corn, see R. L. Thompson and G. E. Schuh, "Trade Policy and Exports: The Case of Cows in Brazil," Department of Agricultural Economics, Purdue University, 1975 (published in Portuguese *Pesquisa et Planejamento Economico*, Vol. 8(3), pp. 663-694, 1978).

For soybeans, see C. Gulliver et al., The Brazilian Soybean Economy--An Econometric Analysis. U. S. Department of Agriculture, Foreign Agricultural Economic Report, FSO-5, 1979.

endogenous determination of the relevant policy instrument levels is specified. Instruments such as consumer prices, producer prices, and stocks released are posed as functions of world prices, domestic production, foreign exchange flows, stocks on hand, and aid in kind. No specific behavioral model is formulated. The model is instead a simultaneous reduced-form representation of some unspecified model of government policy formation.

Substantial government intervention in international grain markets implies that consumer and producer prices will be set in large measure through government action. Market supply and demand should thus show marked responses to changes in government policy. An explicit policy-influenced excess demand function can be derived by substitution of the policy formation relations into the market supply and demand functions.

The behavioral model underlying the policy-influenced excess demand function has implications for the model's parameters that can be used to test several hypotheses about government intervention in international grain markets. In a completely closed market, demand and net import demand price should be completely unrelated. The estimated coefficient of net import demand price should be zero. In a completely free market, the coefficient of net import demand price should equal domestic demand elasticity. If the government is contained to follow a partial adjustment process in its reaction to changes in market conditions, the coefficient of demand price should fall somewhere between the preceding values. A constant tariff may drive the demand price parameter above domestic price elasticity in absolute value. Abbott's framework does indicate an upper bound for the estimated coefficients. Similarly, the domestic production coefficient should lie between zero and one, with a value of one implying the standard response of excess demand to domestic supply and zero a complete lack of response.

Some of Abbott's results are shown in Table 2. The hypothesis that a partial adjustment mechanism exists is borne out in a number of cases, especially among the developing countries. This evidence lends support to the contention that maintaining stable domestic prices is an important policy consideration for many of these countries. Such a conclusion does not, however, rest on a strong statistical foundation. The standard errors of the estimates are rather large, and a fair number of the estimated coefficients either have perverse signs or exceed the hypothesized upper bound.

TABLE 2
Abbott Empirical Results

Country	Trade price elasticity estimation for selected countries								Effect of production shortfalls on net imports for selected countries			
	Wheat				Feed grains				Production coefficient for:			
	d^a		$(-e)^b$	$(-e + v_n)^n$	d^a		$(-e)^b$	$(-e + v_n)^n$	Wheat		Feed grains ^c	
Brazil	-2.48	(2.04) ^d	0.2	0.27	0.25	(0.17) ^e	0.3	0.60	1.03	(0.976)	0.159	(0.600)
Mexico	1.54	(0.596) ^d	0.4	0.51	-0.32	(0.23)	0.5	0.80	0.612	(0.463) ^e	0.483	(0.251) ^c
Colombia	-0.52	(0.49)	0.2	0.23	1.90	(1.15) ^d	0.4	0.59	-0.314	(0.769)	0.687	(0.826)
India	-0.69	(0.146) ^d	0.5	0.69	0.71	(0.147)	0.2	0.40	0.367	(0.169) ^e	0.947	(0.234)
Thailand	1.60	(0.78)	0.5	0.50	0.76	(0.51) ^d	0.2	--	--		0.232	(0.208)
Philippines	0.15	(0.76)	0.5	0.50	-0.033	(0.125)	0.4	0.58	--		0.00051	(0.228)
Egypt	1.17	(0.41) ^d	0.2	0.35	0.42	(0.75)	0.3	0.40	0.526	(0.929)	0.308	(0.921)
Ghana	-0.87	(4.22)	0.4	0.40	0.91	(0.54) ^d	0.2	0.30	--		0.152	(0.276)
United States	-0.16	(0.67) ^c	0.2	0.73	0.012	(0.057)	0.4	0.72	--		0.073	(0.058) ^b
Canada	0.56	(3.47)	0.2	1.60	-2.30	(1.12)	0.5	1.08	0.148	(0.115)	0.433	(0.270) ^e
Australia	9.61	(9.84)	0.1	2.34	1.56	(1.28)	0.1	0.57	-0.079	(0.171)	0.065	(0.114)
Japan	0.069	(0.280)	0.33	0.35	-0.60	(0.20)	0.7	0.71	0.231	(0.241)	1.102	(0.860)
France	-0.46	(0.43)	0.3	--	0.27	(0.41)	0.5	--	0.221	(0.136) ^e	0.204	(0.206)
West Germany	-0.047	(0.323)	0.3	--	-0.25	(0.21)	0.5	--	0.387	(0.147) ^e	0.067	(0.224)
Italy	0.024	(0.112)	0.3	--	0.066	(0.224)	0.5	--	0.131	(0.224)	1.574	(0.630) ^e
USSR	-0.016	(0.060)	0.2	0.39	-0.11	(0.13)	0.4	0.58	0.121	(0.092)	0.049	(0.145)

^a d^a is the consumption elasticity, which equals $-PW_0/XC_0 \Delta X/\Delta PW$. Negative signs indicate perverse results.

^b e is the domestic demand price elasticity, v is the fraction of consumption produced domestically, and n is the domestic supply elasticity reported by the U. S. Department of Agriculture.

^cThe production coefficient equals $(-\Delta XY/\Delta XP)$ and can be interpreted as the fraction of production shortfalls made up by imports.

^dStandard errors of estimates are presented in parentheses after the estimates.

^eSignificantly different from zero at a 10 percent level of significance.

Source: P. C. Abbott, "Modeling International Grain Trade with Government-Controlled Markets," *Amer. J. Agr. Econ.* 61(1979a):22-31.

Abbott's method of estimation raises certain conceptual problems. Substitution of the policy determination equations into the market excess demand function gives a reduced form whose estimation is valid only for periods in which policy set and instrument selection process remains constant. As policy features change, the policy formation process undergoes structural change with the implications that the reduced form parameters are unstable. During the period 1951-1973, from which Abbott's data are drawn, some of the countries examined did, in fact, undergo significant policy changes. The estimation performed then is not valid as the necessary assumptions it requires do not hold. This limitation can be corrected, of course, by directly estimating a structural model of the policy formation process.

3.2.5 Lattimore and Zwart Policy Analysis. Lattimore and Zwart have incorporated endogenous determination of government policy into their forecasting model of the world wheat market. Using specifications derived from Lattimore and Schuh and from Abbott, they set up an estimating model for the determination of producer prices and consumer prices. These empirical results are outlined in Table 3 for Canada, the six original countries of the EEC, and Japan. The domestic price instruments, in local currencies, are postulated to be related to a world price (again, in local economy), the exchange rate as a proxy for the shadow rate of foreign exchange, the rate of inflation, and opening stocks. As expected, the results show the very weak relationship between the world price and the EEC 6 prices and the Japanese producer price. A much closer relationship is found with the Canadian and Japanese consumer prices. These equations were incorporated into a spatial equilibrium framework which in turn was used for forecasting. Since the model was only used for forecasting, few implications for the policy formation are offered, and no direct tests of the underlying specification are conducted.

3.2.6 Other Policy Analysis Studies. Josling also contains estimated relationships between national and international wheat prices for a number of countries but over a shorter observation period (1969-1976) with quite different results. These differences appear to be explainable in terms of the different observation periods. Nevertheless, the apparent conflict raises serious questions regarding the stability of policy when using such equations for forecasting or policy reaction purposes. Specifically, Josling

TABLE 3
Lattimore and Zwart Policy Analysis: Estimated Price-Determining Functions

Equation	Variable						R ²	D.W.	Observation period
	World price (domestic currency)	Stocks (t - 1)	Dummy	Other 1	Other 2	Intercept			
<u>Canada</u>									
Domestic milling price	.490 (14.29) ^a					37.66	.93	1.17	1958-1974
Off-board price	.020 (8.75)	-.030				.67	.88	1.64	1958-1974
Total pool price	.93 (22.26)	-.21 (.68)				9.28	.98	1.80	1958-1974
<u>EEC 6</u>									
Consumer price	.070 (1.71)		-1.21 (.51)	1.88 ^b (8.38)		-28.16	.94	1.81	1958-1974
Producer price				.620 ^c (.55)	.03 ^d (.55)	24.85	.70	1.81	1958-1974
<u>Japan</u>									
Consumer price	.400 (4.20)			5.020 ^e (1.66)	91.37 ^f (2.59)	-10,704.0	.72	2.05	1961-1974
Producer Price	.050 (12.5)				154.24 ^b (20.9)	8,341.1	.99	1.05	1961-1974

^aNumbers in parentheses is t-value.

^bTime trend.

^cConsumer price EEC 6.

^dThe difference between the consumer price and the world price (U. A.).

^eIndex of prices, Japan.

^fJapan-U. S. exchange rate.

finds a much closer relationship between world wheat prices and, for example, EEC prices, than is shown in Table 3. Whether this was due to a change in EEC policy over the 1969-1976 period or simply a result of the increasing world price over the latter period remains unanswered.

The alternative approach to explaining EEC price instruments is taken in a study by Heidhues et al. In this study, the authors attempt to explain farm price differences in the EEC on the basis of differences between community members. A simple indexing procedure is used rather than a formal econometric model.

3.2.7 *Summary and Synthesis.* The behavioral equation estimation approaches examined here have been successful in extending understanding of the policy formation process, especially with respect to verifying the endogeneity of government policy decisions. They also support the conceptual link between policy choice and interest group preferences. Apart from these general considerations, however, little progress has been made. It seems unlikely that advances will be forthcoming at the low level of a priori specification used in the models considered here. On the contrary, greater analytic content can be purchased only at the cost of more detailed assumptions on the underlying structure.

Two directions for further investigation seem possible. First, the development of theoretical models of the policy choice process can be used to give more specific meaning to the estimated reduced-form coefficients. Such specifications will allow more precise interpretation of the estimated coefficients and thus yield more information on the policy choice process than heretofore has been available. Second, theoretical models of policy formation can be used to generate hypotheses which are empirically testable through their implications for the reduced-form coefficients in terms of sign, specific values (zero, for instance), etc. The information derived from such tests would be especially useful in helping to focus future investigation on factors which have been shown to have been of particular importance on the basis of actual evidence.

These approaches can be applied in the context of a market analysis with an integrated government sector or to an analysis of policy choice under market and technical constraints. In either case, it is essential to be able to distinguish the choice variables in government policy from factors

entering through the constraint structure. Use of theoretical policy formation models as the basis of estimation seems the most promising way to make progress in this area.

4. *Concluding Remarks*

On the conceptual front, a number of formulations have been advanced to characterize endogenous governmental behavior. We have divided these conceptual formulations into four major categories: (1) the liberal-pluralist frameworks, (2) the theory of state frameworks, (3) the theory of economic regulation frameworks, and (4) the rent-seeking interest group and conflict resolution frameworks. Each of these frameworks is geared to a particular focus; some concentrate on the election process, some on the legislative choice process, some on the bureaucratic choice process, and some on a mixture of various choice processes. The theory of economic regulation frameworks, for example, concentrate on the election process; the liberal-pluralist frameworks concentrate on the legislative choice process with some reference to the election process; the rent-seeking and conflict resolution frameworks concentrate on the election and bureaucratic choice processes; and the theory of state frameworks attempt to concentrate on the election and legislative choice as well as the bureaucratic choice processes. For the case of governmental intervention in agriculture and food systems, we have argued that the bureaucratic choice process is crucial; that is, our concern is with the selection of alternative levels of given policy instruments (policy implementation) rather than the discrete choice of available instruments from the universe of all possible instruments (policy setting).

Empirical analysis can proceed by directly estimating policy instrument behavioral equations or by estimating the governing policy preference or criterion functions. Given the constructed criterion functions and an appropriate constraint structure, policy instrument or choice equations can be derived. In our survey of empirical approaches, we have distinguished between the specification and estimation of policy criterion functions and the specification and estimation of policy instrument behavioral equations.

None of the criterion function approaches surveyed seem entirely adequate for estimating the effects of power exertion on the final determination of policy and the relationship between policy alternatives and the generation of political effort. Given a focus on the underlying criterion function, we

have argued that, to operationally endogenize governmental policy formulation, new procedures will be necessary. In subsection 3.1.6, we have suggested two alternative frameworks that might be fruitfully pursued. Both frameworks are offered as vehicles for shedding light on the parameters of the bargaining game underlying governmental policy formation. Both frameworks incorporate multiple objectives and uncertainty in an appealing fashion. Moreover, they attempt to synthesize the strengths of the various approaches that have been advanced in the literature. Their principal limitations are the amount of *a priori* structure that must be imposed.

The behavioral equation estimation approaches that have been surveyed support the conceptual link between policy choice and interest group preferences. This work has extended our understanding of the policy formation process, especially with respect to the potential of endogenizing governmental behavior. Unfortunately, the conceptual base for much of this work leaves much to be desired. We have argued that conceptual models of the policy choice process must be combined with the usual estimation of reduced form coefficients. Moreover, specific empirically testable hypotheses should be emphasized in future work on the estimation of behavioral policy equations.

Two distinct types of hypotheses are of interest. On the one hand, it should be possible to derive testable hypotheses from alternative bargaining game formulations and to test them using reduced form estimations. Such a procedure should yield the qualitative characteristics of the underlying bargaining game, e.g., whose interests are actually represented in the set of existing outcomes. Measures of farmer subgroup interests could be specified and incorporated into a larger commodity-demand, policy-formation system; coefficient restrictions implied by the specification could be derived and tested via estimation of the reduced form. Of special interest are formulations which allow nesting of alternative bargaining game specifications. In such formulations alternatives can be compared directly and evaluated on the basis of common evidence.

A second significant aspect of policy analysis is evaluation of policy. In other words, how efficiently does implemented policy meet its goals? Are the methods chosen by government to implement policy the most efficient means of meeting the stated or unstated goals of that policy? Is the redistribution of income and wealth implicit in government intervention in food and agricultural systems achieved efficiently by the selected set of

policy instruments? In effect, is society on some political-economic frontier? Given the set of goals, it should be possible to specify such a political-economic frontier and to then test the efficiency of policy via reduced form estimation. Empirical evidence on efficiency of redistribution may also confirm, or fail to confirm, the predictions of various models of the policy formation process and, hence, aid in the attempt to refine the specifications of policy determination models. The Zusman and Peltzman frameworks, for example, imply that policy will always be efficient in the sense of lying on the political-economic frontier. Tests of efficiency can thus be construed as tests of these models and, hence, can be of positive as well as normative use.

We have made specific recommendations for future advancement of both criterion function and behavioral equation estimation approaches. For criterion function approaches, these recommendations appear in subsection 3.1.6; and for the behavior equation approaches, they appear in subsection 3.2.7. We have stressed the importance of developing a more rigorous methodology for positive empirical analysis of government behavior. In this context, improving the formal analysis of policy formation seems the most fruitful direction for future research. Of particular importance in this regard are the consistency and robustness of empirical results. In other words, for an empirically constructed criterion function and constraint structure, is the implied behavior of choice equations consistent with the directly estimated behavioral equations? Consideration should be given to the use of both the criterion function and behavioral equation approaches to determine their consistency for the same set of data. Since each of the approaches advocated for future development requires a heavy dose of *a priori* structure, formal sensitivity analysis should be conducted with respect to the imposed structures to assess the robustness of the empirical results.

In the final analysis, it has been the view of this paper that normative or traditional welfare analysis must give some emphasis to implementation. Operationally, meaningful policy analysis must incorporate positive notions of policy formation. As our examination strongly implies, this will require the explicit recognition of political markets and their role in redistribution. Ultimately, an operational policy focus should lead to an integration of normative and positive analysis of endogenous government behavior.

Footnotes

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¹Another variant of the Pareto-optimal income redistribution model specifies donors of taxes deriving utility from the consumption of particular commodities by the recipients of transfers. Buchanan relies upon this notion to generate predictions that transfers will take the form of income-in-kind or vouchers that are earmarked for specific items of spending. Pauly uses this form of the interdependent utility function model to develop predictions about modes of tax transfer redistributions. This model incorporates a group of potential recipients of transfers who have a low or zero consumption level of some commodity and a group of potential donors in whose utility functions there appears the level of consumption of some paternalistic good by members of the potential recipient group. These variants suffer from the same disenfranchisement as the Hochman-Rodgers formulation. Once potential recipients are allowed some weight in the political process, their preferences have to be offset against the preferences of the donors and, under these circumstances, no clear-cut predictions follow.

²This framework relies on "social judgments" or social norms. It differs from Thurow's (1971) earlier formulation which treats the entire distribution of income as a pure public good. This pure public good appears as an argument in each person's utility function.

³As Williamson has noted, the inequality in income distribution within the United States declined during the Civil War and World War I periods but increased significantly following the cessation of hostilities. In fact, the rebound during the early 1920s was especially rapid with inequality rising to its highest peak in 1929. Hence, Thurow's explanation works particularly well for one war but fails to offer a reasonable explanation for two earlier wars.

⁴An aberrant observation with which the theory of state formulation must cope is the plethora of interest groups, each one of which can be seen to be pressing its case with the government of the day, independent of other such groups. O'Connor has recognized that such interest group activity is "inconsistent with the survival and expansion of capitalism . . . [what is needed is] a class-conscious political directorate [in order to] plan the economy as a whole" (O'Connor, p. 67). The device for achieving such central, coordinated planning as part of the developing "class consciousness" of the owners of capital is the national budget.

⁵This assumption leads to some rather peculiar consequences. To illustrate, consider the case of governmental intervention in water resource development. Specifically, suppose alternative scales of a water resource reservoir are under examination. Following the Peltzman formulation, define n as the number of potential voters in the beneficiary group, N as the total number of potential voters, g as the alternative scales of the water resource system, $B(g)$ as the benefits emanating from water reserve system scale g , $C(g)$ the cost associated with water reserve system of scale g , f as the probability that a beneficiary will grant support, h as the probability that members who are taxed to support the project oppose, and M is defined as the "majority." Given these definitions in the Peltzman framework, the appointed governmental official wishes to maximize:

$$(a) \quad M = n f \frac{B}{n} - (N - n) h \frac{C}{N - n}.$$

This criterion function is entirely consistent with the Peltzman framework except that there are no "education" or cost of forming a coalition, and B is not equal to C. Necessary conditions for a maximization of M are

$$(b) \quad M_g = f' B' - h' C' = 0$$

$$(c) \quad M_n = f + h - f' \frac{B}{n} - h' \frac{C}{N - n} = 0.$$

Condition b can be used to establish a relationship between the net social benefit-maximizing scale (q^*) and the majority-maximizing scale (q'). In particular, assuming as Peltzman does that $B' > 0$, $C' > 0$, $B'' < 0$, $C'' > 0$, $B > C$, and the "few winners" assumption, viz., that $N - n \gg n$, we obtain the result that the net social benefit-maximizing scale will be larger than the majority-maximizing scale. In particular, the net social benefit-maximizing scale is given by $B'(q^*) = C'(q^*)$ for $q' > q^*$, $B'(q) < C'(q)$. By the few winners assumption and the assertion that $B > C$, $B/N \gg C/N - n$, i.e., the winners gain more per man than the losers lose, it follows that, over a wide range $f' (B/n) < h' (C/N - n)$ and if q^* should fall in this range, (b) implies that $B' > C'$ and thus $q' < q^*$.

⁶Such activities may be constrained by "due process" considerations but generally not to the point that a uniform tax must be levied.

⁷These dummy variables, for the periods 1953-1959, 1960-1963, and 1964-1971 correspond to different governments in power with varying development strategies. In particular, there were major adjustments in trade policy in 1960 and 1964.

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