

Chapter 3. The Political Economy of Market Interventions

3.1. Introduction

Technical barriers clearly effect the volume and direction of international trade, providing both externality-based and economic-based protection. Despite GATT rules designed to limit the misuse of technical barriers, continued disputes among trading partners indicate that this type of regulatory measure can not always be justified on the basis of unambiguous scientific evidence. The purpose of this chapter is to describe the economic and political incentives for governments to intervene in agricultural markets using technical barriers.

Economic theory addresses the concepts of externalities and market failure in international trade and provides an externality-based justification for the use of technical barriers to increase allocative efficiency in an economy. Welfare analysis provides a basis for assessing the net and distributional impacts of such regulatory decisions. Changes in consumer and produce surplus from enacting technical barriers can be exposted, for example, in a partial equilibrium analysis.

Political incentives for governments to intervene in a market economy, even when net national welfare is decreased, provide an explanation for the provision of economic-based protection. Since policy decisions have both efficiency impacts and distributional impacts within an economy, affected groups have incentives to lobby for specific regulatory outcomes. The preferences of policymakers, and even the decision-making process itself, can provide insights into the effective influence of competing interests. The resulting regulatory levels in the economy are thus determined endogenously.

Each of these topics (the theory of externalities, welfare economics, and the political economy theory of regulation) is the subject of a vast literature in economics. In this chapter, these topics are introduced and used specifically to analyze the basis for enactment of technical barriers to agricultural trade. Efficiency and distributional effects from the use of technical barriers in a market economy with externalities are discussed in Section 3.2. An overview of the political economy paradigm is presented in Section 3.3. The theoretical and empirical literature exposting the political economy paradigm for agricultural and trade policies are reviewed in Section 3.4 and 3.5, respectively. A summary and conclusions are presented in Section 3.6.

3.2. Economic Efficiency and Distributional Effects of Intervention

Technical barriers that correct externalities arising from international trade and provide protection for a nation's citizens or environment can (but don't always) increase allocative efficiency in the economy. Even with an increase in overall efficiency, individual agents may

become better or worse off as economic conditions change. Welfare analysis provides a basis for comparisons of the net and distributional effects among economic outcomes.

3.2.a. Efficiency Effects of Intervention

In textbook terms, an externality is an action of one economic agent that influences either the production possibilities (production externality) or utility function (consumption externality) of another agent (Varian 1992). Although externalities can be either positive or negative, the purpose of technical barriers is the correction of negative externalities associated with the international trade of goods. The presence of a pest or disease indigenous to one country can have negative impacts on the production possibilities of agents in another country, where it is not indigenous, if the organism is transmitted across the border. Consumers in one country may prefer a product attribute that is not preferred by consumers in another country. If the attribute is not easily detected, and the product is exported, the utility function of consumers in the importing region may be negatively impacted. If a production input is packaged or designed to be compatible with the processing requirements of one country but not another, the production possibilities in the second country may be adversely affected.

There have been several alternative definitions proposed to formalize the concept of an externality, each focusing on somewhat different aspects. Using a policy-oriented approach, Meade (1973) defined a negative externality as “an event which inflicts an appreciable damage on some person or persons who were not fully consenting parties in reaching the decision or decisions which led directly or indirectly to the event in question” (p.15). Cornes and Sandler (1990) criticized this definition as being too broad since Meade does not specify an institutional framework and does not draw any implications for inefficiency or market failure. However, the Meade definition does emphasize the point that externalities have an impact on agents who are not fully consenting parties to the decision. With the international trade of goods, the production and consumption decisions of citizens in one nation may have consequences for citizens in other nations who are not consenting parties.

Arrow (1970) proposed an alternative definition for externalities where the distinguishing feature is an absence of markets. In this framework, the indirect utility and profit functions can be characterized by the following equations:

$$V^i = V^i(P, \Omega^i, A^i)$$

$$\Pi^j = \Pi^j(P, T^j, A^j)$$

where V^i = the indirect utility function of agent i

Π^j = the profit function of agent j

P = a vector of competitive prices associated with every quantity that any individual cares about

Ω^i = exogenous endowment of commodities for agent i

T^j = exogenous technology available to agent j

A^i = vector of endogenous behavior of other consumers that impact agent i

A^j = vector of endogenous behavior of other firms that impact agent j .

Arrow emphasizes that markets do not exist for A^i and A^j which prohibits the establishment of a competitive price for these commodities.

In a competitive economy, where no externalities are present, the market equilibrium is Pareto optimal or efficient.²¹ However when market failures exist, competitive economies do not achieve Pareto efficient outcomes and either too little or too much of the non-market commodity is provided (Henson and Traill 1993). The reasons for a lack of efficient market solutions have been well-documented and can include the lack of well-defined property rights, high transaction costs, non-convexity in agents feasible sets or preferences, and the unequal distribution of information in an economy (Cornes and Sandler 1996).

Much of the literature on externalities deals with evaluating equilibrium market outcomes and determining if some form of intervention through alternative institutional arrangements can increase economic efficiency. Government intervention provides one alternative institutional arrangement. Two potential methods of intervention are implementation of a pecuniary measure or a quantitative constraint on agent actions.

One example of a pecuniary measure is the Pigouvian tax, which has been widely explored for correcting externalities within the domestic environmental sector.²² It is more difficult, but not impossible, to apply pecuniary measures optimally when externalities involve sanitary or phytosanitary risks. Paarlburg and Lee (1998) developed a pecuniary measure linked to an externality associated with the presence of a risk from infectious foot-and-mouth disease in the international trade of beef. They calculated a tariff linked to the specification of risk from infection and the expected magnitude of loss due to a disease outbreak. The tariff becomes prohibitive as risks and/or expected losses increase.

As an alternative to pecuniary measures, quantitative restrictions are more often used by policymakers to offset technical risks. Technical barriers are one type of quantitative restriction designed to correct inefficiencies arising from trans-border externalities associated with international trade. By mitigating the externality, government intervention impacts equilibrium conditions in the market and hence, agent well-being. When externalities are present it is possible, but not inevitable, for government intervention to result in a Pareto improvement (Cornes and Sandler 1996).

When technical barriers are imposed, not only is the impact of the externality mitigated but the domestic economy is also partially insulated from conditions in the world market. Once a regulatory measure has been enacted, it has some characteristics of an impure public good.

²¹ An economic outcome is Pareto optimal, or efficient, if it would be impossible to improve the well-being of one agent without harming at least one other agent. A Pareto optimal outcome is not necessarily unique since changing the initial allocation of goods among agents may alter the final distribution.

²² The Pigouvian tax is a fee linked directly to the source of the externality that could possibly be used to compensate those agents who bear the burden of the externality. Applications in the environmental arena would include effluent fees, input, output, or consumption taxes.

The benefits of the regulation's existence are nonrival and only partially excludable.²³ The provision of technical barriers will produce both protection from the international externality and economic-based protection for domestic producers as joint products. If the externality is very small, or nonexistent, the technical barrier will result in relatively more economic-based than externality-based protection. In cases where the effect of the externality is large, the technical barrier will produce relatively more externality-based than economic-based protection, assuming the measure is implemented according to GATT guidelines. Thus, there are multiple outputs from the regulatory action and each may be considered a "good" or a "bad" as it affects the production possibilities or utility function of individual agents.

3.2.b. Distributional Effects of Intervention

Even if there is an increase in economic efficiency due to a change in regulatory policy, different groups within the economy may become better or worse off as the market equilibrium is changed. Economic welfare analysis provides a basis for distributional comparisons of economic outcomes, as well as for measuring net effects. Welfare impacts are often measured in a static, partial equilibrium model, allowing comparison of outcomes for a market with and without the imposition of a policy intervention. Price, production, consumption, and trade effects of policy in a particular market can easily be identified with this approach. Related measures of welfare are consumer and producer surplus. Consumer surplus is calculated as

$$CS = \int_0^Q D(Q)dQ - D(Q)Q$$

where $D(Q)$ is the price given by the inverse demand curve for output level Q . Although consumer surplus provides an exact measure of welfare only when preferences are quasilinear, it is a reasonable approximation of welfare for other forms of a utility function (Varian 1992). Similarly, producer surplus is calculated as

$$PS = S(Q)Q - \int_0^Q S(Q)dQ$$

where $S(Q)$ is the price given by the inverse supply curve for output level Q . Consumer and producer surplus are altered as regulatory measures are applied to a market resulting in movement along supply and demand curves and possibly shifts of these curves.

The distinguishing feature of technical barriers is their dual character, in which both externality-based and economic-based protection can be available from a given barrier. There will be equilibrium impacts from both types of protection, and the net welfare effect from a given measure will depend on the relative magnitude of these two impacts. When considering a

²³ A good is nonrival when a unit of consumption by one agent does not decrease the amount available for consumption by other agents. A good is nonexclusive when benefits of the good are available to all agents once the good has been provided. The benefits of a pure public good are both nonrival and nonexclusive. In contrast, the benefits of a private good are fully rival and exclusive. An impure public good is one where the benefits are partially rival and/or partially exclusive.

technical barrier, the change in welfare is dependent on whether the externality is present, the magnitude of any resulting shifts in supply and demand, and the elasticities of the domestic supply and demand curves.

Examples of intervention through technical barriers affecting production and consumption externalities are exposted below in a partial equilibrium framework.²⁴ Results are illustrated under the assumptions of certainty for a small-country facing a fixed world price. The implications of relaxing these assumptions are discussed after the two examples.

3.2.b.1. Production Externality

For a small country, facing a fixed world price, Figure 3.1 shows the partial equilibrium effects of a technical barrier that is universally applied to all exporters and potentially corrects a production externality; for example, the ban of a product that could introduce an exotic pest or disease to the domestic production sector. The domestic country has supply (S) and demand (D) curves as shown in Panel A. In the autarky situation, with the ban in place and no trade occurring, domestic equilibrium occurs at point a . The price in the domestic market, P_d , is higher than world price, P_w , and the quantity produced and consumed is equal to Q_d . This is the domestic equilibrium if a product ban is enforced. In this autarky solution, producer surplus equals areas II, III, IV, and V and consumer surplus equals areas I and VI.

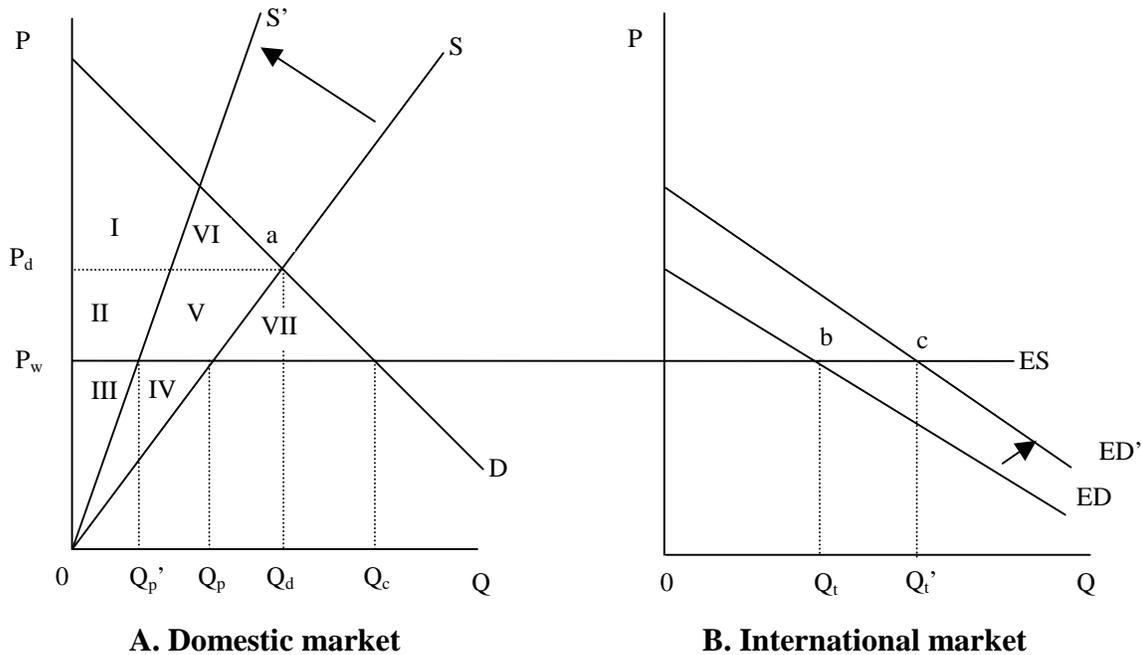


Figure 3.1. Impact of a Production Externality.

²⁴ Roberts, Josling, and Orden (1998), which was used as a basis for these two examples, provides a more detailed description of such a partial equilibrium framework for the analysis of technical barriers.

Once the ban is lifted, the incidence and effect of infestation, and availability of imports, will determine the net and distributional welfare effects. In Figure 3.1, if no externality was present and the ban was only a disguised economic-based trade barrier, the domestic economy will have excess demand ED as shown in Panel B. Given the small country assumption, the domestic economy faces a perfectly elastic world excess supply curve (ES). The equilibrium in the international market is found at point b and the quantity imported is Q_t in the international market. In the domestic market, production is Q_p , domestic consumption is Q_c and the difference ($Q_c - Q_p = Q_t$) is the amount of imports. The domestic price is equal to the world price at P_w . In this case, total welfare will increase once the ban is lifted. Producer surplus decreases by areas II and V but consumer surplus increases by areas II, V, and VII. There is a net gain in welfare equal to area VII.

If there was an externality present that was corrected by the ban and an infestation occurs when the ban is lifted, domestic costs of production will rise. The domestic supply curve will shift or rotate, as represented by S' in Figure 3.1. Rotation of the supply curve results in a corresponding shift of the excess demand curve in the international market to ED' . The new equilibrium in the international market is found at point c and domestic price remains equal to world price P_w , but now the quantity traded increases to Q_t' . In the domestic market, production falls to Q_p' , domestic consumption remains at Q_c , and the difference ($Q_c - Q_p' = Q_t'$) is the amount of imports. If the ban served a legitimate externality-based role and a supply shift, or rotation, occurs once it is lifted, the net welfare effect is indeterminate. Consumer surplus is still increased by areas II, V, and VII but now producer surplus is decreased by areas II, IV and V. Net change in welfare is measured as area VII minus area IV. The elasticities of the domestic supply and demand curves, as well as the magnitude of the shift in supply will determine the relative size of these areas and the sign of the resulting change in net welfare.

3.2.b.2. Consumption Externality

The partial equilibrium effects of a technical barrier that corrects a consumption externality are shown in Figure 3.2; for example, the ban of a food product that contains an undesirable component. The change in welfare is now dependent on whether the externality was present and a shift in demand occurs. Assuming that the domestic country has supply (S) and demand (D) curves as shown in Panel A, in a free-trade solution with no externality present and no ban in place, the importing country has excess demand, ED, as shown in Panel B. Again the small country faces a perfectly elastic world supply curve (ES). The initial equilibrium is found at point c and the quantity traded is Q_t in the international market. In the domestic market, production is Q_p , domestic consumption is Q_c , and the difference ($Q_c - Q_p = Q_t$) is the amount of imports. The domestic price is equal to the world price at P_w . Producer surplus equals area IV and consumer surplus equals areas I, II, III, and VII.

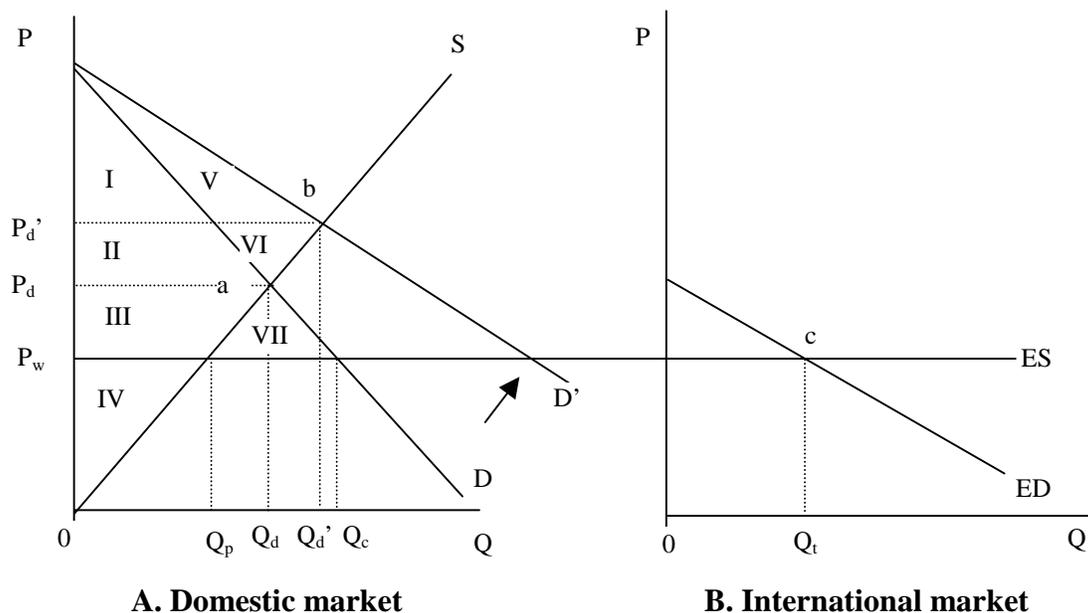


Figure 3.2. Impact of a Consumption Externality.

If a ban is imposed to prevent entry of the undesirable commodity, the domestic economy will move to an autarky solution. There will be no change in the international market price, but adjustments are made in the domestic economy. The reaction of consumers will determine the net and distributional effects. If there was no externality present, and the ban is only a disguised economic-based restriction on trade, the domestic equilibrium will shift to an autarky solution at point a. With no trade occurring, the price in the domestic market, P_d , is higher than world price, P_w , and the quantity produced and consumed is equal to Q_d . At point a, there is a corresponding loss in total welfare compared to the free-trade solution. Producer surplus increases by III but consumer surplus decreases by III and VII. Net loss in welfare is equal to area VII.

If the ban does correct an externality, the domestic economy will move to a different autarky solution, point b, if consumers increase their willingness-to-pay as they are assured the undesirable component is absent and shift their demand from D to D'. The shift in demand does not result in a corresponding shift in the excess demand curve, as the international good still cannot enter the market. The domestic price rises to P_d' and the domestic production and consumption quantities increase to Q_d' . If the ban is legitimate, and a shift in demand occurs, the net welfare effect is indeterminate compared to the free-trade solution. Consumer surplus increases by area V but decreases by areas II, III, and VII. Producer surplus increases by areas II, III and VI. Net change in welfare is areas V and VI minus area VII. The magnitude of the shift in demand as well as the elasticities of the supply and demand curves will determine the relative size of these areas.

3.2.b.3. General Considerations

The preceding two stylized examples are presented under static conditions given the assumptions of certainty for a small country facing a fixed world price. Generally neither the probability of occurrence for a negative externality or the externality impact on domestic markets are known with certainty. Not only the nature (parallel versus proportional) and magnitude of such shifts in domestic supply or demand, but also the probability of their occurrence must be considered in calculating the expected net and distributional effects of intervention for a specific case. Given the assumption of certainty, the S' and D' curves used in the example were illustrated as representations of expected curves given a probability of one. In a case where risk was introduced, the expected shifts in supply and demand would represent a weighted change given the probabilities of externality occurrence and impacts.²⁵ The risk attitude of agents, government policy response to the presence of an externality once it has occurred, and possible interactions between sectors of the economy will add increasing layers of complexity to the welfare calculations (Romano 1998; Roberts, Josling, and Orden 1998).

In addition to the risk considerations associated with technical measures, government decisions to implement technical barriers in agricultural markets are more commonly made under conditions of uncertainty about the realization of externalities (MacLaren 1997).²⁶ The GATT/WTO requirement for SPS standards more stringent than those of recognized international organizations to be based on a risk assessment allows for conditions of uncertainty. When the assumption of a small country facing a fixed world price is relaxed, the economic impacts of a technical barrier will be determined by the specificity versus universality of the measure imposed among importers and exporters (Roberts, Josling, and Orden 1998).²⁷ If both the number of possible suppliers and importers is small, either group can avoid the cost of compliance of the technical regulation by trading elsewhere in the world economy, as described in Table 3.1. In these cases, the regulation becomes a potential, rather than an actual, barrier. If either the number of importers imposing the barrier or the number of exporters affected by the barrier is small, that group will bear the cost of compliance. If both groups are large they will share the cost of compliance, as the barrier affects the world price (this is the large country case).²⁸

²⁵ Romano (1998) provides a detailed literature review and discussion of the economic evaluation of risk reducing regulations.

²⁶ Under risk, probabilities are known but outcomes are unknown. Under uncertainty, neither probabilities nor outcomes are known.

²⁷ Since technical barriers are not constrained to be most-favored-nation policies, the number of trading partners affected by a given measure can range from one (specificity) to all possible suppliers (universality). In addition, the number of countries restricting products from a particular supplier can range from one (specificity) to all possible importers (universality).

²⁸ A country is considered "large" if potential changes in either its exports or imports are sizeable enough to cause changes in the relevant world price.

Table 3.1. Burden of compliance with technical barriers

	Regulation Imposed on One Exporter	Regulation Imposed on All Exporters
Regulation Imposed by One Importer	Either can avoid compliance costs by selling to or buying from other markets. “Potential” rather than actual trade impediment.	Importer bears cost of compliance as this cost becomes built into the selling price by all exporters.
Regulation Imposed by All Importers	Targeted exporter bears the cost of compliance as importers can choose to buy from other sources.	Importers and exporters share the cost of compliance as the world market price adjusts to the cost. Price goes up to buyers and down to sellers.

Source: Roberts, Josling, and Orden (1998)

3.3. Political Incentives for Intervention

In addition to economic incentives, there can also be political incentives for government interventions such as technical trade barriers. Earlier theories of political intervention focused on government setting policy in a public interest or social planning capacity. The more recent political economy theory focuses on the economic and political interactions of agents and government within society that give rise to endogenous policy determination.

In the 1950s and 1960s, economists often used public interest theories to explain regulatory interventions in markets. In these theories, the government assumes the role of an omniscient benevolent dictator who supplies intervention to alleviate market failures. Policymakers are agents of public interest and their goal is to move the economy towards Pareto efficiency. The two fundamental assumptions were that economic markets are prone to operate inefficiently without intervention and that government regulation is virtually costless (Posner 1974).

In a public interest framework, regulatory agencies enact technical barriers only in those cases where negative externalities are present. However, the empirical evidence has not tended to support these theories. Posner (1974) pointed out that many years of empirical research had not shown a positive correlation between the presence of externalities and regulatory measures. A growing number of economists thus found the assumptions of the public interest theories inadequate to explain the role of regulatory measures in economic analysis (Peltzman 1976).

An alternative classical paradigm for analyzing regulatory intervention is one based on social justice considerations. Similar to the public interest theory, policymakers act as agents of public interest but now their goal is to maximize a specified net social welfare function, constructed given some weighting of individual utility functions. The resulting solution is Pareto

efficient, but there are explicit equity or other value considerations included in the weighting method that is selected. Arrow (1963) showed that it is not possible to devise a rule for the consistent social ordering of individual preferences without resorting to a dictatorship.

In response to the recognized shortcomings in the public interest and social justice theories, more recently a methodology has developed for analyzing government behavior that explicitly considers both the economic and political incentives that affect policy formation. In such a political economy paradigm, policy choice is endogenous based on the neoclassical behavior of producers, consumers, and government decision-makers acting as rational maximizers. The political economy paradigm incorporates political constraints with economic criteria in evaluating policy formation, and has been judged by proponents as more successful than the public interest or social planning paradigms in explaining the continued existence of net welfare decreasing policies (Swinnen and Van der Zee 1993; Rodrik 1995; Barkley 1996).

A schematic representation of the political economy paradigm is shown in Figure 3.3. Market outcomes are equilibrium price and quantity solutions that arise from the neoclassical behavior of agents within an economy where producers maximize profits and consumers maximize utility. Market outcomes have net and distributional welfare implications for individual agents within society and since individuals are rational, they have a set of preferences over the market outcomes. These agents seek to maximize their own self-interest through economic and political processes. Given their preferences, and the ability to achieve effective political influence on government decisions, agents translate their preferences into a demand for direct market and/or regulatory intervention. Market outcomes also have implications for policymakers who are working to maximize their political support. Given their preferences, and the institutional structures of the society, decision-makers supply direct market and/or regulatory interventions. The levels of these policy measures are thus endogenous variables in the economy, which in turn impact market outcomes. Equilibrium occurs in this iterative system when no agents are able to improve their well-being given the market forces and the political behavior of all other agents.

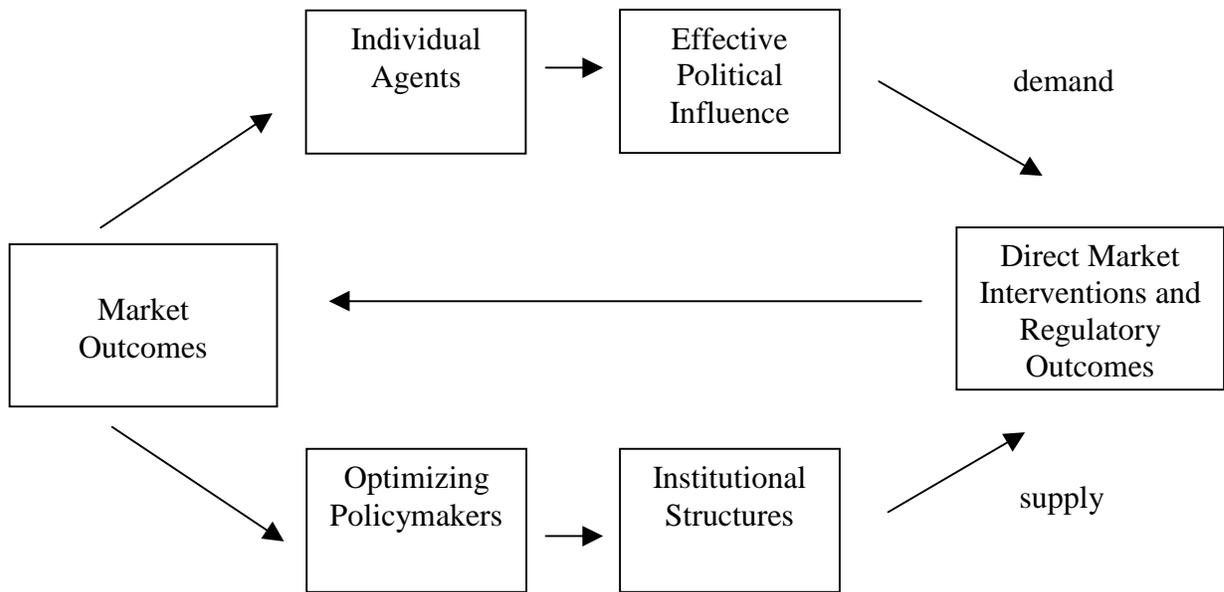


Figure 3.3. A Schematic Representation of the Political Economy Paradigm.

The political economy paradigm, as depicted in Figure 3.3, can be used to analyze technical barrier interventions in agricultural markets. Political economy can explain the provision of economic-based protection through technical barriers even in cases when net national welfare is reduced. It can even more easily explain externality-based protection when welfare may be enhanced.

To illustrate some political economy considerations, the following example, based on the export of fresh apples from the U.S. to Japan, describes the interactions between science, economics, and politics that give rise to technical barriers and that can lead to disputes over agricultural trade.²⁹ The complexity of such interactions, shown here for one dispute, has limited previous analysis quantifying the aggregate economic effects of technical barriers.

The Japanese apple industry is concentrated among high-cost operations producing a high-quality product, primarily for the fresh market. There was a slight (nine percent) decline in Japanese production between 1990 and 1995. U.S. apple production averaged 6.5 billion pounds between 1970 and 1975, and increased to an average of 10.4 billion pounds between 1990 and 1996. Meanwhile, U.S. consumption has been relatively stable (approximately 19 pounds per capita) since the mid-1980s. Therefore, the export market became more critical to the U.S. industry, which was the world's second largest fresh apple exporter in 1995/96.

²⁹ This example is drawn from Johanson and Bryant (1996) and Krissoff, Calvin, and Gray (1997). Other case studies which could be used to illustrate the political economy paradigm include technical barriers applied to nursery stock imports to the U.S. (Romano and Orden 1997), avocado imports to the U.S. (Roberts and Orden 1997), meat product exports from New Zealand (Johnson 1997), banana imports to Australia (James and Anderson 1998), and tuna exports to the U.S. (Körber 1998).

Before 1994, U.S. apple exports were banned from Japan, ostensibly while risk management strategies for combating possible codling moth and fire blight infestations from abroad were established.³⁰ The market outcome, with the ban in place, was a Japanese domestic apple price 20-30 percent higher than the U.S. price for comparable apples. Less than one percent of Japanese apple consumption was derived from imports from any source.

Producers in both Japan and the U.S., acting in their own self-interest, worked to influence the apple import policy through the political process. Japanese producers were highly organized and pressured the government to maintain the economic-protection provided by the ban. The U.S. apple industry began pressuring USDA for access to the Japanese market as early as the 1970s. Although Japanese consumer welfare was decreased by the ban, consumers were ineffective in exerting political influence to have it revoked.

An intense debate over acceptable scientific risk management strategies developed between regulatory agencies in the two countries. In the early 1980s, a systems approach for codling moth control was developed. USDA scientists argued this approach would provide the same or greater level of protection as an alternative fumigation method required by the Japanese government. The systems approach was rejected by Japanese regulatory authorities and in 1985 the Reagan Administration requested that USDA try to develop an acceptable fumigation treatment. The Japanese Ministry of Agriculture, Forestry, and Fisheries requested additional large-scale tests for codling moth treatment and development of acceptable protective measures against the risk of fire blight infection in 1985, in 1989, and again in 1992. By mid-December 1992, USDA had submitted all of the required information to Japanese officials. Still a timetable for Japanese inspection of lab tests and field procedures could not be reached. In March 1993, the U.S. Ambassador to Japan stated that “continuation of a technical dialogue with the Ministry of Agriculture has proven to be feckless when what we are dealing with in reality is a politically driven non-tariff trade barrier” (Johanson and Bryant 1996, p.16).

By 1994, the U.S. government increased political pressure by threatening retaliatory action under Section 301 of U.S. trade law.³¹ In addition, due to the impending Uruguay Round changes in the GATT/WTO institutional structure and dispute settlement procedures, the U.S. was able to more effectively threaten to challenge the ban in a WTO dispute panel. In response, the Japanese government lifted the ban and implemented a set of highly restrictive technical protocols for apple imports.³² Only Red and Golden Delicious varieties from the states of Washington and Oregon are allowed entry. In addition to applying a chlorine dip for fire blight and cold treatment and fumigation for codling moths to imported apples, a 500-meter buffer

³⁰ Codling moths are pests that cause serious damage to apples. Japan claims to be free of codling moth. Fire blight is a bacterial disease that affects apple trees. Once fire blight has been established there are a wide variety of both cultivated and wild hosts. Japan claims to be free of fire blight in its apple producing areas.

³¹ Section 301 is a provision of U.S. trade law that allows the threat of unilateral trade retaliation on targeted countries where the U.S. trade representative [USTR] finds that foreign trade practices have an undue burden on U.S. commerce. Section 301 of the 1974 U.S. Trade Act gave the president power to retaliate bilaterally to “unfair” trade practices. In 1988 amendments to Section 301 gave the USTR authority to retaliate against an offending country by raising U.S. tariffs.

³² “These phytosanitary requirements are commonly viewed as the most restrictive of any country, short of an outright ban on apple imports” (Krissoff, Calvin, and Gray 1997, p. 44)

zone must be established around each exporting orchard. Growers are required to pre-register orchards for physical inspections. Three inspections by USDA/APHIS personnel and one by Japanese inspectors are required before exports are approved. The Japanese inspector is required to examine every tree for evidence of fire blight and certification must be renewed every year. In contrast, for apple exports to other countries the U.S. imposes a systems approach consisting of good commercial production practices, grading and sorting to further eliminate fruit with any infestations or damage, and visual inspection for pests (Krissoff, Calvin and Gray 1997).

The change in regulatory policy had very little impact on the apple market equilibrium. After the Japanese ban was lifted, 8500 metric tons of U.S. apples were exported to Japan in 1994/95. The quantity of exports fell to 106 metric tons in 1996/97, and there were no orchards registered for the export program in 1997/98. Krissoff, Calvin, and Gray (1997) list several reasons for the failure of U.S. apple exports in the Japanese market. First, U.S. producers marketed a cheaper apple to compete with low-grade Japanese apples and not high-quality specialty apples. Japanese producers responded by marketing apples as fresh that had previously been used for processing. In addition, U.S. exports were limited to Red and Golden Delicious apples which are not the preferred varieties in Japan. Imports of Fuji and Gala varieties, the sweeter apples preferred in Japan, remain banned subject to additional testing. Finally, compliance with the restrictive technical protocols is risky and expensive. The estimated additional cost to U.S. growers for compliance with the Japanese protocol was \$10 per carton in 1995 and there was no guarantee that an orchard would be approved for export once the extra costs were incurred. Krissoff, Calvin, and Gray (1997) calculated the tariff rate equivalent of the Japanese import protocol on Fuji apples to be 58 percent in 1994/95 and 24 percent in 1995/96.³³ According to the authors' estimates, if the variety limitations were removed and U.S. systems approach accepted, Fuji apple exports to Japan would have averaged 49.5 metric tons for a value of \$90.37 million between 1994 and 1996.

The market outcomes under these currently enforced technical barriers have welfare and distributional consequences for agents in both countries who continue to exert political influence. In June 1997, in response to renewed pressure from producers, the U.S. requested a formal WTO consultation to discuss the Japanese apple protocol. In part, the U.S. argues that extensive re-testing requirements before additional varieties of apples are approved for entry to Japan constitute a misuse of technical barriers. The Japanese government has argued that varietal testing is necessary to ensure adequate protection against the risk of pest and disease infestation. Policy decisions in the apple market have clearly arisen from a combination of scientific, economic, and political factors and the dispute over this technical measure has still not been resolved.

³³ Variation in the tariff equivalent is caused from changes in U.S. and Japan market conditions and policy. The technical requirements remain the same across both years.

3.4. Theoretical Political Economy Models

Many theoretical models have been developed to describe the specific behaviors and interactions among agents within the political economy paradigm.³⁴ The schematic depiction in Figure 3.3 is purposefully broad in order to provide an overview of the paradigm that encompasses many of these models. The following sections provide an introduction to several of the theoretical approaches to political economy, to show how they fit into the overall paradigm, and to draw implications for the analysis of technical barriers implementation. For purposes of exposition, the models are divided into those that focus on the demand for intervention and those that focus on the supply of intervention, corresponding to the upper and lower lines of Figure 3.3.

3.4.a. Demand for Intervention

Individual agents in the economy acting in their self-interest generate the demand for intervention. Since market outcomes have net welfare and distributional consequences for producers and consumers, individuals have preferences over alternative policies and their market outcomes. Agents must translate their preferences into demands for intervention by exerting political influence. They are constrained in exerting influence by the structure of governance which can determine the ways agents are able to be effective.³⁵

Two broad conceptual models have been developed in the political economy literature to identify how agents achieve effective political influence; an interest group model and a voting model. Pure interest group models focus on the ability of individuals to organize and compete for influence over policymakers with no role for voters, politicians, or political parties. Pure voting models focus on the number of individuals who support a particular policy outcome through their voting behavior, with no room for lobbies or political parties.

In interest group models, the focus is on the ability of agents to organize. It is often assumed that fewer firms increase the political power of an industry by decreasing the costs of organizing, preventing free-riding, and more effectively mitigating opposition. Seminal early analysis by Olson (1965) hypothesized that there are inherent difficulties in the organization and maintenance of interest groups. Since a policy, once enacted, has some characteristics of a public good, individuals have an incentive to act as free-riders and undersupply time and/or

³⁴ Surveys of the political economy literature are available for trade policy (Baldwin 1984; Marks and McArthur 1990; Rodrik 1995); agricultural policies (Swinnen and Van der Zee 1993); agricultural trade (Carter and McCalla 1990; Young, Marchant, and McCalla 1991); interest group models (Potters and Sloof 1996); the theory of regulation (Caillaud, Guesnerie, Rey, and Tirole 1988; Romano 1998); institutional influences (Barnett, Hinich, and Schofield 1991); consumer interests (Destler and Odell 1987); and rent-seeking contests (Nitzan 1993).

³⁵ Kalt and Zupan (1984) separate the demand for intervention by individual agents into the interest of agents in influencing outcomes and the ability of agents to influence outcomes.

money to the interest group to achieve the policy.³⁶ Olson concluded that large interest groups can only be sustained if they can enforce membership or if they also provide private goods.

Stigler (1971) represented interest groups by producers and consumers. Producers were able to dominate the decision process due to larger per-capita stakes in the outcome and relatively smaller group size. Stigler concluded that producers would eventually control, or “capture” decisions of government agencies. Stigler’s model was generalized by Peltzman (1976) who clarified that the essential commodity being transacted is a transfer of wealth between competing groups in the economy.

Posner (1974) analyzed the function and motivation of interest groups. He noted that policies were enacted in response to the competing demands of groups whose motivation was to maximize member incomes. Therefore, regulation served the private interests of interest groups that were politically effective. As in Stigler’s analysis, since producers are fewer in number and stand to gain relatively more per entity from protection than (numerous) consumers lose per capita, producers have higher incentives to lobby for a particular outcome. Additional analysis showed that other factors, besides group size, influence the success of interest groups. These factors included the ability to influence outside voters, the degree of competition for the regulatory outcome, economic power, and quasi-monopoly of information (Bernholz 1974).

Krueger (1974) focused on regulatory intervention as a source of rents for competing interest groups. Resource expenditures by groups seeking to capture available rents represent a deadweight loss to society. Bhagwati (1982a) defined these expenditures as “directly unproductive profit seeking [DUP] activities.” Later other researchers concluded that an increase in deadweight loss would decrease the equilibrium level of intervention, all else equal (Becker 1983; Gardner 1983).

In his seminal model of political competition among interest groups, Becker (1983) also emphasized that the political influence of any group is not fixed but can vary with changes in expenditures of time and money. Equilibrium is obtained when all groups maximize their incomes by spending the optimal amount on political pressure given the productivity of their expenditures and the behavior of other groups. The presence of externalities has an influence on political decision making. In the presence of externalities, intervention policies can increase economic efficiency in the economy even though there is a cost for some groups. Since these policies produce net gains, the groups who benefit have an intrinsic advantage compared to the groups who are harmed. Policies that raise net efficiency are more likely to be adopted than policies that lower net efficiency. In this context, technical barriers are one type of policy that can result in a net efficiency increase. Therefore, domestic producers may have an intrinsic advantage over consumers when lobbying for implementation of a technical barrier which corrects a negative externality, even when consumer welfare is decreased.

³⁶ Free-riding occurs when one individual relies on the public good supplied by another. In this case, individuals have incentives to reap the regulatory benefits from political pressure applied by the interest group as a whole, while failing to reveal their true preferences by undersupplying their own contributions to the group.

Gardner (1983) argued that the relevant “price” paid for an income redistribution through intervention was the deadweight loss associated with the policy measure. He modeled the supply of regulation as a function of both the price paid for redistribution (deadweight loss) and the redistribution level. The social cost of a policy decision was calculated as the deadweight loss per dollar of income transferred.

Krueger (1990) notes that there is a visibility factor associated with political influence. Regulators may favor those groups where they know more about the individual involved. However at some point, the visibility factor is overcome by the decreased votes represented by the smaller interest group. So the impact of interest group concentration on a cross-sectional basis can be ambiguous.

In contrast to these interest-group models, voting models focus on the number of individuals who support a particular policy outcome. As early as 1957, Downs postulated that governments act to maximize their probability of re-election based on the number of voters who favor a particular policy position. In response to Olson’s interest group theory, Wagner (1966) argued that even unorganized groups would influence regulatory outcomes as politicians seek to please the largest number of voters. Wagner’s work led to development of the voting model which, in contrast to interest group themes, de-emphasized organization. Stylized assumptions of voting models are that constituents directly determine policy outcomes according to a formalized voting rule, one policy issue is to be decided within the given time frame, constituent tastes are identical and homothetic, and there is perfect information (Baldwin 1976).

The institutional structures of society influence the ability of agents to make their political influence effective. For example, the median-voter model is one example of a deterministic voting process for a direct democracy where voters choose the policy outcome through a majority-voting rule. Mayer (1984) showed that the median-voter theorem could be used to determine the level of intervention that would be imposed as long as voters differ only in a single dimension. If voting is costless, intervention is determined as if the policymaker maximized the utility of the median voter.

Rodrik (1995) criticized voting models as being unrealistic since policy is rarely determined by majority voting.³⁷ Proportional voting models partially alleviate this criticism by allowing voters to indicate the intensity of their support. Instead of each individual having a single vote, responses are weighted on the intensity of the individuals’ support for a particular measure (Swinnen and Van der Zee 1993).

Regardless of the framework used for individual agents to translate their preferences over market outcomes into political influence, the result is a demand for direct market intervention and/or regulatory outcomes. Often political economy models divide interest groups, or individual agents, into homogeneous producers and consumers. Yet, agents are rarely

³⁷ There are instances where policy has been directly determined by constituent voting procedures. The 1906 British general election was seen as a decision on free versus restricted trade (Irwin 1994). More recently, on June 7, 1998 voters in Switzerland rejected a proposed measure to severely restrict genetic research that was publicized as a measure to preserve natural, gene-tech-free food and to protect the environment (FAS 1998).

homogeneous. Individuals may play different roles in the economy simultaneously and there is overlap between voters, producers, and consumers (Needham 1982).

The problem associated with differentiating among interests within an economy is amplified when technical barriers are the policy under consideration. Since technical barriers provide both externality-based and economic-based protection, the pressures applied by interest groups, such as producers and consumers, may complement, rather than offset, each other. For example, when an undetectable additive is present in an imported food product, consumers may apply pressure for intervention in the interests of increasing food safety. Producers may apply additional pressure for regulatory intervention to provide economic-based protection for the domestic industry.

In these cases, agents in the economy will have additional opportunities to act strategically in providing information to motivate both regulators and competing interest groups. To continue with the food safety example, Henson and Traill (1993) have shown that the available information on the risks associated with food commodities is the critical factor influencing consumer demand for safety. Since information is costly and imperfect there is an investment of time and/or money required for individuals or groups to be informed. As consumer demand may reinforce producer demand for technical barriers, there can be an incentive for producers to bear the cost of information in some cases.

3.4.b. Supply of Intervention

Market outcomes also have an impact on optimizing policy makers. These policymakers, acting in their own self-interest and, given the governance structures, generate the supply of intervention in the political economy paradigm as shown in the bottom line of Figure 3.3. The government can use technical barriers to gain political support by redistributing economic surplus in the economy.

Again there are several theoretical approaches that have been developed to describe the government maximization problem. The supply-side models can be roughly classified as political support function (sometimes called political preference function) models and contributions models. Political support function models focus on surplus trade-offs between agents within the economy. Contributions models include some direct indicator of government welfare, usually a measure of financial contributions made to policymakers.

In a survey of political support function models, Rodrik (1995) found that the policymaker is susceptible to pressure from individual agents but also cares about the distributive effects of intervention. The government trades off changes in producer, consumer, and taxpayer welfare; for example, according to some set of exogenous weights reflecting the politician's preferences over the three groups. Econometrically, these models are usually solved as a revealed preferences problem where *ex post* observations on government behavior are used to infer values for the relative political weights assigned to pressure groups. The revealed weights are then often used to subsequently predict future intervention levels (Swinnen and Van der Zee 1993).

Corden (1974) argued that policymakers use trade policy to maintain the status quo. Constituents are protected from income loss and therefore the regulator assigns different weights to economic gains and losses.

Using a political support function model, Peltzman (1976) found that each equilibrium change had distinct political and economic components. He argued that policies favoring pure competition or monopoly conditions were not stable equilibria since the regulator would be able to gain a large marginal increase in political support with a small change in regulation at these extreme points.

Krueger (1990) also recognized the trade-off that regulators must face. Although policymakers maximize their chances of re-election by pleasing the largest number of voters, they cannot satisfy all voters on all issues. Therefore, they attempt to identify the voters that care the most about a particular issue and that are most likely to change their vote based on the outcome. When trade policy decisions are considered in these models, it is usually assumed that workers in import-competing industries will be most heavily represented in voting. Politicians tend to make choices in favor of voters with known identities, and labor groups are often most visible. Krueger calls this “identity bias” and argues that it tends to favor continued protection once it has been established.

The political support function models have been criticized for obscuring the actions taken by individual agents to influence policymaker decisions (Swinnen and Van der Zee 1993; Rodrik 1995). Partially in response to this criticism, the contributions models expand on the political support function framework to make explicit a self-interested component of the government’s welfare function. In these models, the behavior of agents is represented through their direct contributions to policymakers.

In a theoretical framework that Rodrik (1995) has called a “campaign contributions” approach, Magee, Brock, and Young (1989) include the action of lobbies in influencing the choice of elected official. Two political parties, with clearly stated opposing pre-selected regulatory positions, compete for votes. The probability of winning an election increases with campaign contributions but decreases with the levels of intervention promised. Interest groups take the positions of candidates as given and use contributions to get their favored candidate elected. Politicians balance the marginal impacts of money from special interest contributions and appeal to voters on their ability to be elected. Criticisms of this campaign contributions model are that it artificially restricts politicians to pre-determined party platforms composed of opposing positions on a single issue.

An alternative framework that includes government welfare is the “political contributions” approach, as represented by the Grossman-Helpman (1994) model.³⁸ In this model, a single policymaker maximizes a weighted sum of aggregate welfare and total political contributions. Policy is not pre-selected by the candidates or opposing political parties, but results from the maximization process of the policymaker. One advantage of the Grossman-Helpman model is that policies are derived from first principles based on the lobbies’ campaign

³⁸ Schleich (1997) provides an analysis and some theoretical extensions of the Grossman-Helpman model.

contribution schedules in a non-cooperative principal-agent game. Therefore, the preferences of both the individual agents and policymakers are represented in the solution. One disadvantage is that the model fails to capture the pressure from non-financial lobbying activities (Rodrik 1995).

Regardless of the factors considered in the policymaker's maximization process, preferences must be translated into outcomes given the domestic or international institutional structures in place.³⁹ Examples of domestic structures are the legal system and voting rules of a society. Examples of international structures are multilateral agreements, such as WTO/GATT obligations, or regional or bilateral trade agreements.

If regulators respond solely to the demands of interest groups they will be able to resist capture by specific producer interests only to the extent that opposing groups exert their own political interests. Since interest groups favoring trade protection are often perceived to be better organized than those who might benefit from a more open economy, one result has been called "protectionism bias." Salvatore (1993) points out that there are several factors that can neutralize protectionism bias. In particular, he notes that the institutional structure governing regulatory decisions, the overall focus of the trade policy agenda, and the growth in multinational corporations have been useful in limiting potential capture of decision-making by protectionist interest in the U.S. system.

Institutional structures can also include less formalized governance, cultural, social, or ideological considerations. For example, in an examination of export promotion versus import substitution strategies for developing countries, Meier (1990) recognized the need to move beyond strict neoclassical vote-maximizing behavior when non-democratic countries are considered. He emphasizes the opportunities for administratively conferred benefits or sanctions and argues that cultural, social, and psychological conditions also act as policy determinants.

Even in a representative democratic system, there is room for preferences of the regulator to influence the policy outcome. On a specific issue, individual ideas about what constitutes the public interest leaves room for regulator ideology to influence policy outcomes. Ideology can arise from a combination of altruism among either constituents and regulators, or imperfect information on specific issues among constituents (Kalt and Zupan 1984).

Since voters may not be able, or willing, to directly monitor and control the votes of a policymaker once he is elected, a principal-agent problem can arise. Voters will select candidates based on a bundle of positions and thus remain rationally ignorant of the decision on any one issue. This allows room for altruistic (and not so altruistic) motives to influence policymaker decisions and implies that politicians may not use interest-group pressure or vote-counting as the sole criteria in making decisions on a given issue (Anderson and Blackhurst 1992).

The principal-agent problem is exacerbated when decisions are made, not by elected officials, but by regulatory agencies. Agency administrative hierarchies are generally only

³⁹ Inclusion of an exogenous institutional structure that cannot be changed rapidly as a constraint on policymaker behavior has been called "New Institutionalism" (Kalt 1996).

subject to imperfect citizen influence through appointments, budgets, oversight hearing, judicial rulings, and other agency directives and incentives. In these cases there is room for additional “slack” between the elected officials and their agents, the regulatory agencies and their staff (Roberts and Orden 1997).⁴⁰

3.4.c. Equilibrium

In the political economy paradigm, market intervention and/or regulatory decisions are endogenous outcomes resulting from equilibrium of the demand and supply for such measures. The demand and supply for intervention arises from agents and policymakers acting in their own self-interest given their preferences. Direct interventions and regulations then have impacts on the market outcomes. Eventually, an equilibrium is established when no agent can make themselves better off given the market forces and political behavior of other agents.

Policy formation is a dynamic process yet political economy models generally rely on comparative statics to draw conclusions about government intervention. Grilli and Sassoon (1990) argued that both cyclical and structural determinants affect the equilibrium level of intervention over time. They suggest that the state of the economy and movements in real exchange rates will explain some of the dynamics in policy formation. Barkley (1996) specifically addressed the problem of static analysis by incorporating descriptive dynamics into the model of agricultural policy analysis. The capitalization of program benefits into asset values and the influence of asset values on regulatory decisions are the two dynamic characteristics of farm policy that are included in a model of “rational addiction” to producer protection. Results support the observed rigidity in U.S. farm policy and the jumps in levels of protection in times of economic stress.

3.5. Empirical Evidence on the Political Economy of Trade and Agricultural Policies

Much of the empirical political economy analysis is concentrated on reduced-form equations explaining a policy outcome or policy decision from a set of independent variables that serve as proxies for the measures specified in theoretical models of the types described above. Bollen (1980) discussed the fallibility of single proxy measures for political economy variables due to limited sample and temporal coverage and proposed the use of multiple proxies as a way to increase the reliability, sample size, and temporal coverage of the estimates. The implementation of technical barriers, like all policy decisions, has multiple determinants. Although the political economy paradigm has not been examined empirically for technical barriers, political economy has been used as the basis for numerous empirical studies of other trade and agricultural policy decisions.

⁴⁰ Slack is the ability for an agent to act independently, outside the control by the principal, because the mechanisms of control are imperfect. In this example, there is room for slack between the voter and elected officials and additional slack between elected officials and the regulatory staff devising policies.

In this section, proxy variables used in the empirical political economy literature are discussed. The section is divided into four parts corresponding to the components of policy decision making as depicted in Figure 3.3: individual agents, effective political influence, optimizing policymakers, and institutional structure. In general, the link between the empirical analysis of government intervention and political economy is not as strong as the link between the theoretical models and the paradigm. The focus of the empirical studies is not to test the theoretical models but to identify the likely determinants of observed regulatory levels (Brooks, Cameron, and Carter 1998).⁴¹ Such a positive analysis can then be used as a basis for making predictions about future behavior.

3.5.a. Individual Agents

Most variables included as proxies for the net and distributional impacts of policy decisions on individual agents relate to the stake of an individual in alternative market outcomes. In the empirical literature these are usually measures of the size of potential economic gains or measures of comparative advantage.

Ray (1981) modeled an index measure of the incidence of non-tariff barriers in a PROBIT framework and also in a set of simultaneous equations with tariffs and non-tariff barriers as the dependent variables. Results indicate that protection was greater in industries where the U.S. was at a comparative disadvantage. Non-tariff barriers were concentrated in industries producing fairly homogeneous products, products with relatively capital-intensive technology, and in industries where production was less concentrated geographically. Bhagwati (1982b) argued that the pressure from import competition could be viewed as an additional sign of shifting comparative advantage due to either shifts in factor costs or technological changes in competing countries.

Nominal protection coefficients (NPCs) were calculated by Honma and Hayami (1986) for ten industrial countries between 1955 and 1980. They used OLS to estimate a quasi-reduced form equation explaining the variation in these measured levels of agricultural protection. Explanatory variables representing individual agents included the comparative advantage of agriculture in the economy. Anderson and Hayami (1986) expanded on Honma and Hayami's results by including a wider range of countries to highlight the relationship between protection for agriculture and the level of economic development. Their results supported the previous research, protection increased as comparative advantage shifted away from agriculture and as the terms of trade moved against agriculture.

A partial equilibrium, political-support function model was estimated by Gardner (1987) to explain differences in the commodity protection provided by U.S. farm programs between 1910 and 1982. Political elements generated the demand for policy intervention and economic

⁴¹ Brooks, Cameron, and Carter (1998) note that theory can be tested only if an alternative hypothesis is offered and there is no ambiguity about the expected sign of the regression coefficients on the independent variables. The use of proxy measures can sometimes give ambiguous results and lead to problems of interpretation (Potters and Sloof 1996).

constraints determined the cost of intervention. Protection increased with increased stakes to the producer interest groups and with increased exposure to international trade. Gardner hypothesized that as the size of the average production unit increased, the size of potential gains from a regulatory policy for each individual also increased. Results showed a positive relationship between the average size of a production unit and the level of protection provided.

Grilli (1988) estimated the demand for protection through non-tariff barriers in the U.S. and EU. He divided the explanatory variables into three sets of economic factors; those related to the state of the economy, those related to the competitiveness of domestic production, and those related to shifts in comparative advantage. Empirical results show that demand depended positively on changes in the real exchange rate and the rate of unemployment, and negatively on the level of production. Grilli and Sasson (1990) also emphasized that exchange rate policy can have an impact on agent preferences for policy intervention. Currency appreciation will decrease the external competitiveness of tradeable goods (and increase import competitiveness) unrelated to changes originating in either specific product or factor markets.

Leamer (1990) used a general equilibrium framework to estimate the impact of trade barriers on a cross-section of commodity imports across countries. Based on the results of these models, Leamer concluded that the effects of non-tariff barriers were difficult to detect relative to tariff effects. Two broad groups of models were estimated. The first group used a series of dummy variables to control for differences in commodities and countries. Leamer found some evidence of trade diversion from non-tariff barriers; as countries increased the use of non-tariff barriers trade was diverted to new outlets. The second models included GNP as a measure of economic size, and GNP per capita and per hectare of arable land as measures of available resource supplies. As expected, trade was positively related to economic size; an increase in relative per capita GNP increased trade. Ratios of capital and land to labor were included to explain differences between the levels of unrestricted trade among countries. An increase in available land decreased imports of land-intensive commodities. An increase in labor in the economy increased imports of capital-intensive commodities.

Direct democratic voting on trade policy was examined by Irwin (1994) in an analysis of the 1906 British general election. The maintained hypothesis of the study was that support for political party coalitions in each parliamentary district was closely related to the economic interests of the district's constituents. Economic interests were measured as the distribution of workers among occupational categories. Results indicate that opposition to free-trade was predominant in districts where import competition adversely affected a majority of constituents. Support for free-trade was predominant in districts characterized by export-oriented and nontraded goods sectors.

3.5.b. Effective Political Influence

In the empirical literature, the variables included as proxies for effective political influence usually include measures of political power or direct support. In a survey paper, Potters and Sloof (1996) distinguish between cases where data on interest group activity and

structural characteristics is available, and cases where only data on the structural characteristics are available to serve as proxies for political activities.

Pincus (1975) found empirical evidence to support both the conceptual interest group and voting models. He measured the effectiveness of pressure groups in obtaining protection through the U.S. Tariff Act of 1824. Effectiveness was represented as tariff formation and nominal rates of protection were calculated for a cross-section of U.S. industries. Pincus found that protection increased with low proprietorial income, low income share, geographic concentration of firms, and increased concentration within the industry. However, because a coalition of political interests was required to enact legislation, groups which represented many firms with dispersed sales were more successful in obtaining protection.

Baldwin (1976) specifically examined the role of pressure groups in forming U.S. trade policy. He analyzed congressional voting decisions on the 1974 U.S. Trade Act to test the influence of interest groups. Results indicate that the proportion of workers employed in import-sensitive and export-oriented industries in each regulator's district, political party affiliation, and the level of campaign contributions from unions opposed to the trade bill all had a significant impact on policymaker decisions.

Three models of political choice were compared by Caves (1976) in an examination of tariff policy for Canadian manufacturing industries. Variations in economic structure were used to explain levels of tariff protection for a cross-section of industries in 1963. The adding-machine model was a voting-model where government maximized the probability of re-election by selecting policies supported by the largest number of voters in a geographically representative electorate. An interest-group model emphasized the incentives, costs, and benefits of group organization. A third model was based on national policy where government acted to shift resources in support of a pre-determined collective preference structure. Like Pincus, Caves found that geographic concentration of an industry had a positive impact on protection. In addition, more protection was provided to labor-intensive industries (as a measure of the number of voters).

Honma and Hayami (1986) found evidence to support the premise that developed countries tend to protect the agricultural sector, while developing countries tend to tax agriculture. As economies develop, farm population declines relative to urban population. Drawing on the theoretical work of Olson, they hypothesized that it may be easier for the smaller number of agricultural producers to organize and lobby effectively for protection. At the same time, the higher urban wages and smaller relative expenditures on food in developed countries lower the political cost of higher food prices or taxes resulting from agricultural subsidization. In addition, the spatial dispersion of agricultural production and low levels of education and infrastructure in rural areas may keep agricultural interests from organizing and lobbying effectively in low-income countries.

In Gardner (1987), both the costs of political pressure and the social costs (deadweight loss) of redistribution were found to be statistically significant indicators of regulatory levels. Proxies for the cost and efficiency of organized political pressure included the number of producers, geographic concentration of production, variability of production within a region, rate

of output growth, output per farm, and relative farm income. Gardner found an inverted u-shaped nonlinear relationship between the number of producers of a commodity and the level of support obtained, with less support when there were either relatively few or relatively numerous producers. Protection increased as farm income decreased relative to nonfarm income in the immediately preceding years. Supply and demand elasticities, the share of commodity exports, and the share of land in production costs represented social costs. Results indicate that relative support increases systematically when the supply and demand for a commodity are less elastic, as this increases the effectiveness of supply controls and lessens the deadweight loss caused by the market interventions.

Carter, Faminow, Loyns, and Peters (1990) replicated Gardner's analysis for Canadian agricultural policy. Consistent with the earlier results, regional concentration of producers increased protection and as farm income increased relative to nonfarm income protection decreased. The authors found that net trade balance was a better indicator of political influence on Canadian farm policy than either export or import share measured separately.

A politician-voter interaction model was used by de Gorter and Tsur (1991) to explain the political support provided to the agricultural sector across 18 developing countries. Similar to the voting model, political influence was measured as the probability that citizens supported the government through votes. However, instead of focusing on the ability of interest groups to organize, de Gorter and Tsur measured citizen support as determined by relative income effects and redistribution of income motives. Statistically significant relationships were found to exist between the nominal rate of protection and relative urban to rural income levels, the influence of net trade, and endowments. The authors argue that the main determinant of agricultural protection is the decrease in farm income relative to incomes in the rest of the economy.

In a review of empirical political support function models for agricultural policies, Swinnen and Van der Zee (1993) found that, in general, policymakers tend to assign higher weights to agricultural producers in industrial economies than in developing countries. These results support the earlier Honma and Hayami finding that developed countries tend to protect the agricultural sector.

3.5.c. Policymaker Preferences

In the theoretical political economy models, policymakers optimize preferences over some mix of producer, consumer, taxpayer, and government welfare to maximize political support. The independent variables included in the empirical models act as proxies for these measures. In addition some econometric analyses have included variables representing ideological preferences of the decision-maker and direct financial contributions.

In an early policy preference function model Rausser and Freebairn (1974) derived the revealed weights on producer and consumer interests for U.S. beef policy between 1959 and 1969. The authors estimated a quadratic function equation specifying policy outcomes and observed policy trade-offs between aggregate consumer meat costs and the gross margin of beef producers.

Similarly in an early analysis of sugar policy in Israel, Zusman (1976) modeled policymaker trade-offs between consumer and producer surplus. Equilibrium in the theoretical model was developed as the joint solution to a cooperative game between agents in the economy and government. Results from the empirical estimates indicate that consumers had greater total influence over policymaker decisions. However, at the equilibrium, producers had a greater marginal influence on policy outcomes.

Bullock (1992) criticized the earlier models for focusing on policymaker constraints and neglecting policymaker objectives. He argued that net welfare transfers, and not absolute welfare levels, should be considered. Empirical analysis of the direct program costs of U.S. corn, cotton, and wheat policies showed that producer gains were greater when their relative income levels were lower. Further analysis found no significant impact in yearly fluctuation in potential transfer efficiency (deadweight loss) on the level of support for agriculture.

Ellison and Mullin (1995) used congressional voting on sugar tariff reform in 1912 to compare four theories of constituent influence on trade policies. They looked at the relative importance of producer interests which were sub-divided into farmers, laborers, processors, and shareholders. Results indicate that raising the visibility of the issue strengthened less concentrated producer interests and that the policymakers placed great weight on preservation of the status quo. While the less concentrated groups with relatively low long-run stakes in the outcome had very little impact on the origin of the tariff, they had relatively larger influence on the perpetuation of the policy once it was established.

Several studies have addressed the role of ideology in policymaker preferences. In an early empirical paper, Kalt and Zupan (1984) included ideology in a model of U.S. Senate voting on strip-mining regulations. They used a pro-environment rating scale based on past voting history as the proxy for ideology and conclude that ideology may help explain why some policies are enacted that lower the welfare of relatively more organized, powerful interest groups.

Potters and Sloof (1996) note the ambiguity that exists in the literature concerning ideology. If a legislator's ideology is a primary influence on policy, there is less room for the influence of other agents. However if there is no room for legislators to pursue their own goals there is no room for influence from other agents.

The relationship between money and representative voting on a particular policy was examined by Abler (1991) in an analysis of U.S. House of Representative's votes on sugar and dairy amendments to the 1985 farm bill. He found that producers were unable to use campaign contributions to essentially buy votes from representatives. On the other hand, producers were more successful in using contributions to help elect people who were *a priori* sympathetic to their position.

Stratmann (1995) argued that it is the cumulative effect of campaign contributions that influences voting behavior. He analyzed votes on amendments to the 1981 and 1985 U.S. farm bills. Political action committee contributions were included from the current period and the previous two years. Results show a positive relationship among contributions from various agricultural groups. Contributions given closer to the time of the vote had a greater effect on

voting decisions, but ignoring previous periods resulted in underestimation of the impact of contributions.

Brooks, Cameron, and Carter (1998) consider the effects of offsetting contributions from interest groups with opposite positions on a policy. They use simultaneous equations to model Congressional votes on sugar policy reform in 1985 and 1990. Equations represent congressional voting, and the propensity of sugar and sweetener-using interests to contribute campaign funds. In contrast to Abler's results, they conclude that contributions have a marked impact on votes. Results also indicate that contributions, as a measure of political pressure, have more influence on voting decisions than policymaker ideology.

3.5.d. Institutional Structures

Institutional structures include both domestic and international arrangements affecting policy decisions. Institutional arrangements will also determine the amount of regulatory slack in the decision-making process and may limit the overall trade strategies followed by policymakers, such as policy substitution or retaliation. As the slack between elected officials in a multi-party system and the actual regulators making or implementing policy decisions increases, accountability decreases and the opportunities for capture may be greater (Hillman 1991). In the international sector, institutional structures can limit deviations in trade behavior from the established rules, but may not be sufficient to ensure strict conformity (Grilli and Sasso 1990).

Beghin and Kherallah (1994) emphasized that while political institutions are important in explaining agricultural protection in the theoretical models, they are rarely included in the empirical models. They expand on the Honma and Hayami framework to include political institutions and to also address the revenue motive for government policy-decisions. Producer subsidy equivalents [PSEs] and other measures of protection are calculated for 25 countries and 22 commodities from 1982 to 1987. Results indicate that pluralistic political systems are associated with higher agricultural protection but movement from a no-party to a multi-party system does not have a linear effect on the amount of protection governments provide. In most open political systems, the accountability of policymakers limits the protection provided to specific interest groups. Democracy provides an opportunity to influence outcomes but also a limit on the influence of any one group.

Gawande (1995) extended the work of Leamer to measure the retaliatory nature of U.S. non-tariff barriers applied to imports from nine developed countries. He incorporated Bayesian methods in a TOBIT framework and included variables to capture the three distinct theoretical models expounded by Caves. Results indicated that import penetration had a significant positive impact on the level of non-tariff barriers and Gawande concludes that there is evidence to support the claim that U.S. barriers include a significant offensive component, particularly in food products.

In a review of empirical studies on the political economy of trade policy, Rodrik (1995) notes that several studies indicate that tariff and non-tariff barriers are complements in single

equation estimations comparing protection across industries. However, when trade policies were compared over time, non-tariff barriers were found to be substitutes for tariffs.

Kherallah and Beghin (1998) used a system of two PROBIT models in an examination of U.S. Section 301 cases to identify the economic and political determinants of trade wars. Trade wars occurred when both the U.S. and foreign government stood firm behind their initial positions. Results indicated that the U.S. was less likely to use policy as a retaliatory measure when there was greater economic dependence on the targeted country. When retaliatory threats were public, the political costs of backing down were higher and a trade war was more likely. The threat of retaliatory actions was only effective if the foreign country remained passive.

In an analysis of agricultural trade between Mexico and the U.S. after implementation of NAFTA, Romano (1998) did not find evidence to support the hypothesis that the enactment of controversial SPS regulations was a consequence of other changes in the institutional structure associated with a more liberal trade regime. There was no evidence that SPS regulations acted as substitutes for lower tariffs. He did, however, find evidence to support the hypothesis that the regulatory agencies were susceptible to capture and that SPS policies were used as retaliatory measures.

3.6. Conclusions

The ability of technical barriers to provide both externality-based and economic-based protection makes the analysis of their effects more complicated than for tariffs or more traditional non-tariff barriers. Technical barriers can increase net efficiency in the economy by correcting negative externalities associated with pest or disease infestation, harmful components of foodstuffs, environmental degradation, or information asymmetries. When regulatory intervention occurs, the impact of the externality may be mitigated. At the same time the economy is partially insulated from conditions in the world market. Thus, there is an opportunity for technical barriers to be used as a means of providing non-transparent economic protection for domestic producers. If the externality is small, or nonexistent, the technical standard that is set will result in more economic-based protection than externality-based protection, and the result can be a decrease in net efficiency in the economy.

The economic theory of welfare analysis provides a basis for comparison of the net and distributional effects of alternative policies and market outcomes. The net welfare effects are shown to be indeterminate in a static partial equilibrium analysis of technical barriers when an externality is corrected in the economy. Even in the small country case, where the opportunity to exert monopoly power over terms-of-trade effects is negligible, technical barriers can increase national welfare. However, if no externality is corrected, imposition of a technical barrier decreases net welfare in a small economy, just as tariffs or other non-tariff barriers.

Political economy is a paradigm that explains government intervention in markets, even when the result is a loss in net welfare. Policy choice is an endogenous variable determined by producers, consumers, and government decision-makers acting as rational maximizers. Market

outcomes have both net and distributional welfare implications, so individual agents seek to maximize their own self-interest through the economic and political process. These agents translate their preferences into demand for intervention by exerting effective political influence given the decision-making institutional structures of society and the actions of other agents. Policymakers, acting to maximize their political support given their preferences and the institutional structures of society, supply direct intervention or regulatory outcomes.

A number of competing theoretical models explaining the behavior of agents and policymakers have been postulated in the political economy paradigm. Interest group and voting models address the organization and political influence of individual agents. Political preference function and contribution models focus on the way policymakers optimize their political support, either as a weighted sum of the welfare of different agents in the economy or to include some measure of financial contributions received directly by the government. That policymaker actions are constrained by an exogenous institutional structure is recognized in the framework of new institutionalism.

While the political economy paradigm of technical barriers has not been examined extensively in quantitative empirical studies, such an approach has been the basis for studies of numerous other trade and agricultural regulatory decisions. These studies have utilized a large number of proxy measures to capture the effects of agent preferences, political influence, policymaker preferences, and institutional structure on policy outcomes. Bollen (1980) showed that multiple proxies can increase the reliability, sample size, and temporal coverage of econometric estimates for political economy variables due to the fallibility of single measures.

Proxies for agent preferences, or the desire of agents to influence policy, are typically measures designed to capture the stake of individuals in the outcome. The size of potential gains, measures of comparative advantage, and import competition were generally found to be significant determinants of policy.

The effective political influence of agents is typically measured by variables representing the ability of agents to organize given the structures of society and the number of agents in favor of a particular policy. Many studies have found evidence to support an Olsonian argument, when concentration is measured by geographical dispersion. However, when the number of individuals is considered, there is also empirical evidence to support the hypothesis that a larger number of voters will increase influence on policy determination. Gardner (1987) resolved some of the ambiguity in this relationship by identifying an inverted u-shape relationship between the number of producers and the level of support obtained. Other empirical results indicate that the number of workers employed in an industry has a positive influence on the level of economic protection received.

Empirical studies usually model policymaker preferences by measures of surplus, financial support, or ideology. Direct measures of surplus are generally not available, but results indicate that when the deadweight loss from intervention increases, the amount of intervention decreases. Financial support is often measured as campaign contributions. Although it is clear that contributions play a role in policy outcomes, there is some debate in the literature whether the influence is greater on politician election or direct influence over a particular vote. Other

studies have found that raising the public visibility of a policy issue, and can partially offset the effects of financial contributions from special interest groups on the outcomes. Kalt and Zupan (1984) make a strong case for the inclusion of ideology to explain the adoption of policies that lower the welfare of relatively more organized or powerful interests. In contrast, Brooks, Cameron, and Carter (1998) find that campaign contributions have more influence on voting decisions than ideology.

Many studies have addressed the role of institutional structure in determining policy outcomes. Proxies for structure have included domestic, international, and cultural constraints. Tit-for-tat trading strategies and the substitution between tariffs and non-tariff barriers over time have been identified as policy influences in the empirical literature.