INTEREST GROUPS AND ECONOMIC POLICY: EXPLAINING THE PATTERN OF PROTECTION IN THE BRAZILIAN AGRICULTURAL SECTOR

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This article examines the determinants of the pattern of protection across products in the Brazilian agricultural sector from 1969 to 1989. Three key determinants of policy are explored: interest group pressure, government objectives, and structural change associated with economic crisis and a change in political regime. The principal agricultural policies are analyzed, and nominal protection coefficients (NPCs) and producer subsidy equivalents (PSEs) are calculated. When NPCs are used as the dependent variable, econometric results indicate that interest group characteristics such as group size were an important determinant of the pattern of protection. With PSEs, government efforts to raise tax revenues, generate foreign exchange, and control inflation played a more significant role. The results of this paper suggest that future studies of the political economy of protection should pay more attention to the specification of the dependent variable because the conclusions can depend crucially on this choice. (*JEL* O13, Q18)

I. INTRODUCTION

Developing countries tend to discriminate against their agricultural sectors, whereas developed countries usually subsidize them (Anderson and Hayami, 1986; Fulginiti and Shogren, 1992). Recent research has also shown that import competing commodities have fared somewhat better than exports in developing countries (Krueger, 1992; Schiff and Valdés, 1992). Implicit in this stylized scenario is that there must be an evolution from taxation to protection. The evolution, however, is likely to occur unevenly within the agricultural sector. This uneven process is investigated by studying the differentiated pattern of protection across agricultural products in one middle income country, Brazil, over a period of 20 years.

Explanations for the policy shift from discrimination to protection of agriculture have focused on both structural features of the economy and the relative influence of the agricultural lobby. The structural arguments point to reduced opposition to price increases by consumers, industry, and government as agricultural goods decline in importance as a share of consumer expenditures, as the wage bill falls with increasing capital intensity of industry, and as food and agricultural commodity shares of inflation indices decline (Fafchamps et al., 1991; Anderson and Hayami, 1986). The collective action explanation hypothesizes that the relative influence of the agricultural lobby should increase as the costs of controlling free riding fall (Olson, 1965, 1986; Becker, 1983). One of the key factors that reduces organizational costs is the fall in the number of agricultural producers that tends to occur with development. The two approaches should be considered complementary because the structural changes that reduce opposition to agricultural protection contribute to the likely

ABBREVIATIONS

CCPC: Consultative Council of Cocoa Producers
CFP: Production Finance Commission
CEPLAC: Cocoa Commission
CONAB: National Supply Company
DECEX: Department of International Trade
IBC: Brazilian Coffee Institute
ICM: Value Added Tax
NPC: Nominal Protection Coefficient
PSE: Producer Subsidy Equivalent
SEAP: Special Secretariat for Supply and Prices

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success of the agricultural lobby. The relative importance of these explanations is tested in this article.

Most econometric studies of agricultural protection have used nominal protection coefficients as the dependent variable that measures the effects of direct policies on producers (David and Huang, 1996; Fulginiti and Shogren, 1992; Gardner, 1987). This paper differs by using producer subsidy equivalents as well. This is done for two reasons. First, the inclusion of credit subsidies in the dependent variable should be more important for Brazil than for most other countries. The results of an 18-country World Bank study on the political economy of agricultural pricing policy reveal that Brazil was the only country in which credit subsidies were of the same magnitude as export taxation. For the next largest subsidizer, Colombia, credit subsidies only represented a third of export taxation (Schiff and Valdés, 1992). Second, conclusions about the importance of interest group influence can depend crucially on the specification of a dependent variable that measures the impact of policies. This proposition is tested in this article, and the results suggest that future studies of the political economy of protection should pay more attention to this issue.

In the second section of this article, a two-stage bargaining framework is outlined that is hypothesized to explain commodity specific taxation in the agricultural sector. In section III, the principal agricultural policies are analyzed, and several measures of protection are calculated. Finally, in section IV, a reduced-form econometric model is estimated for the 1969–89 period, and hypotheses about the determinants of the pattern of protection are tested. Central to an understanding of this period are commodity-specific characteristics of interest groups, such as group size, developmental goals of the state, and changes in the policy-making environment stemming from the economic crisis and the return to democratic rule in the 1980s.

II. A BARGAINING FRAMEWORK

A. Determination of Indirect Policies: The State, Agriculture, and Industry

In many formal models of agricultural policy determination, the state, agriculture, and industry are conceptualized as having preferences over economic outcomes, which are determined, in part, by a set of indirect policies (Fulginiti and Shogren, 1992; Beghin and Karp, 1991; Fafchamps et al., 1991). The state is assumed to have a multiplicity of goals, ranging from developmental functions, such as building infrastructure, formulating an industrial policy, or ensuring macroeconomic stability, to the self-interested collection of revenue or bribes. The two interest groups, agriculture and industry, care about the welfare of their members resulting from the outcome of the policy choice. Sectoral interest groups allocate resources to influence the policy choice, yet depending on the characteristics of each sector, they are more or less efficient at translating resources into influence. The state chooses a set of indirect policies, taking into consideration its own degree of relative autonomy as well as the relative influence of the two sectors. In this general framework indirect polices, such as the exchange rate, are determined.

The historical record shows that from the mid-1960s through 1982, indirect discrimination against Brazilian agriculture was severe. The exchange rate was overvalued, and industry benefited from tariff protection, tax breaks, and an impressive array of subsidies that all implicitly taxed agriculture. The combined effect of these policies yielded an implicit rate of taxation on the order of 25% (Baer, 1989; Brandão and Carvalho, 1991, 1987; Oliveira, 1986). This suggests that the influence of the agricultural sector was small relative to industry and the military-run state. Changes in exogenous economic variables and the Brazilian political and institutional environment play a key role in explaining the evolution of policy choices in the 1964–1989 period. In particular, the rise in international oil prices and interest rates that characterized the late 1970s and early 1980s dramatically changed the economic environment in which policies were formed. Politically, Brazil was ruled by the military from 1964 to 1984. The 1980s can be viewed as a period of political transition toward a democratic regime. The impact of these indirect exogenous changes on agricultural policy outcomes will be tested in the econometric model that is estimated in section IV.

B. Determination of Commodity Policies: State Agencies and Commodity-Specific Interest Groups

The subgames that are hypothesized to determine policies such as export taxes and quantitative restrictions for each agricultural product involve an agency of the state, the agricultural producers of the commodity, and the other interest groups (such as processors and producers of inputs) that are affected by the direct policies influencing a given commodity's price. For each product, a state agency can be thought of as choosing the direct policies by maximizing a weighted sum of preferences over policy vectors. The weights given to each interest group's preferences represent the influence, or bargaining power, of the group.[1] The interest groups seek to influence the policy choice by allocating resources to lobbying. The process of translating resources into influence depends on the quantity of resources that one group allocates to lobbying relative to another, as well as on the relative efficiency of each group in turning resources into influence (Becker, 1983). A given quantity of resources should generate different amounts of influence as the indirect policies, exogenous economic variables, and institutions change. In section IV, alternative econometric specifications are explored to capture the commodity-specific characteristics and to test for their evolution over time.[2]

III. THE HYPOTHESES, POLICIES, AND PATTERN OF PROTECTION

A. The Hypotheses

The principal hypotheses to be tested focus on the characteristics of interest groups, the goals of the state, and the dramatic economic and political changes that characterized the 1980s.

1. Zusman (1976) shows that under certain assumptions the weighted preference approach to policy making is identical to a Nash bargaining game.

2. Several authors have estimated reduced-form econometric models that permit revealing the implicit influence weights that policy makers assign to interest groups, while others have done this in a bargaining game framework (Zusman and Amiad, 1977; Beghin and Karp, 1991). The approach adopted in this article bypasses the estimation of influence weights and directly relates outcomes to explanatory variables.

The first hypothesis is that the factors predicting the success of producers in organizing effective lobbies can explain the variation in policy across commodities and over time. Successful lobbying depends on the efficient control of free riding, which is facilitated by factors that lower the cost of organizing and maintaining a lobby. These variables should include smaller groups, more geographically concentrated groups, and factors that increase the benefits to each member of the group, such as large average size.[3]

The second hypothesis is that the pattern of protection can be explained in part by examining the political and economic calculus of the state. Three predictions are tested:

1. The foreign exchange objective (short run): The rate of protection of agricultural commodities should rise in response to a deterioration of the trade balance in order to create incentives to generate (or save) foreign exchange;
2. The inflation objective (short run): The rate of protection of agricultural goods should fall in response to an increase in inflation as a means of restraining price increases; and
3. The revenue objective (long run): The rate of protection of agricultural goods should rise as the share of agricultural taxes in government revenue declines, because the economic benefits derived from them fall as the political costs of imposing them rise.

The third hypothesis is that the combined effects of economic crisis and democratization in the 1980s have caused a change in the economic and political environment that is favorable for a majority of agricultural producers (Helfand, 1999; Lopes, 1988). The debt crisis caused two profound changes. It created pressure to reduce indirect taxation by realigning the exchange rate and reducing industrial protection. It also undermined the feasibility of credit subsidies to agriculture, which had contributed to reducing the rural elite's opposition to unfavorable price policy. When credit subsidies were eliminated, large agricultural producers joined forces with the

3. Brandão and Carvalho (1991, p. 88) suggest that "spatial concentration of production has been the most important element in determining the success of agricultural pressure groups," yet they do not formally test their hypothesis.

rest of the producers and focused attention on discriminatory trade and price policy. Simultaneously, Brazil was on the path to returning to a democratic form of government. The opening of the political system greatly facilitated the expression of newly emerging agricultural producer groups. The joint impact of these economic and political changes suggests that both indirect and direct (nominal) taxation of agriculture should have fallen in the 1980s and that producer groups should have increased their influence over agricultural policy.[4]

B. The Institutions and Policies

What follows is a description of how the principal policies affected the formation of agricultural prices in the 1969–89 period. The comments focus on four of the most important traded crops—coffee, cocoa, soybeans, and wheat, which are the products included in the econometric section of this paper. The first three accounted for nearly 70% of primary exports, whereas the latter was the most important agricultural import, representing nearly 40% of all primary and semiprocessed agricultural imports in this period. Unless otherwise indicated, the same set of policies applied to the entire agricultural sector. It will be shown that policies were often contradictory, responding to the pressures of different interest groups and government agencies. Selected evidence obtained directly from interviews with important political participants in the policy formulation process is included to illustrate the tensions that existed.

All agricultural products were subject to a value added tax (ICM), which averaged 13%, plus several other smaller taxes. The average burden of these taxes was approximately 16%. The ICM was collected not only on domestic sales but on imports and exports as well. Since the federal government provided many industrial producers with exemptions or rebates from the ICM when their products were exported as part of a strategy of promoting exports of processed goods, this was one form of taxation that discriminated against agricultural trade. The fact that the ICM is collected by the states and not the federal government has made it exceptionally difficult for agricultural producers to pressure for its reduction or elimination because such a change requires a unanimous decision by all states. The "revenue objective," as concerns the ICM, is thus especially complicated in Brazil because it is a state-level tax. Even though the share of agriculture in trade and production has fallen dramatically, there are still many states that depend on the ICM for a significant portion of their revenue.[5]

Coffee and cocoa were subject to additional taxation. Both were required to pay a "contribution quota" on exports to special funds that, in theory, were to be used in benefit of their sectors. The quota for cocoa was 15% until mid-1972 and 10% throughout the remainder of the period. The proceeds were used to finance CEPLAC, the Cocoa Commission, which was responsible for an ambitious program of research and extension. For coffee, the quota was set in dollars per 60 kilo sack by the Brazilian Coffee Institute (IBC) and often varied weekly. It was not uncommon for the contribution quota on coffee exports to be as high as 50% of the f.o.b. price. In the mid-1980s, both contribution quotas were converted into ad valorem export taxes accruing to the Treasury. By the early 1990s, both taxes had been suspended.

Particularly in the case of coffee, it is difficult to trace exactly how much of the contribution quota was returned to the sector, so some insight can be gained by comparing the perceptions of cocoa and coffee producers as to the fairness of the quotas. Humberto Salamão Mafuz, who was a co-founder in

4. For the third hypothesis, it is essential to distinguish between nominal and effective protection. Nominal protection should have risen due to more favorable trade and price policy. The elimination of credit subsidies, however, implies that the impact on measures such as effective protection coefficients or producer subsidy equivalents is ambiguous. Nevertheless, because the benefits of improved price and trade policies were distributed widely, while the losses due to the elimination of credit subsidies were limited to a minority of predominantly large producers, the hypothesis that the net impact should have been "favorable for a majority of agricultural producers" is justifiable.

5. In 1996, a law was finally passed by the Congress to exempt primary and semiprocessed exports from the ICM. It contained a formula for federal compensation of lost state tax revenue. The law seems to have been a response to the "foreign exchange objective" and not to pressure exerted by agricultural interest groups. The executive branch of the federal government lobbied for this law in an effort to defend the exchange rate—a key anchor of the *real* stabilization plan. Details can be found in *Isto É*, September 4, 1996.

1963 of the Consultative Council of Cocoa Producers (CCPC) and, among many other positions, was president of the CCPC during the periods 1977–79 and 1983–85, argues that most producers supported CEPLAC and the 10% contribution quota.[6] This view was also confirmed by Fernando Rios do Nascimento, president of an organization of cocoa cooperatives in the state of Bahia.[7] The largest producers, however, along with exporters and industry, were opposed to the quota. Large producers had much less of a need for CEPLAC's services. Mafuz summarizes the relationship between the various groups:

> CEPLAC helped small and medium producers. It was a socializing process for them. When the contribution quota fell, and was changed into a tax, the large producers supported this, because it created the possibility that in the future the government would eliminate the tax, and it did.... They [exporters and industrial processors of cocoa] were always against the quota because CEPLAC, with this socializing process and with the process of improving producers' lives, created a better consciousness for producers to defend themselves.[8]

Mafuz's analysis supports the view that most cocoa producers favored the contribution quota. They did not perceive it as an unfair tax and felt that CEPLAC gave them their money's worth.

The coffee contribution quota, on the other hand, was perceived to be a confiscation of producer income. In 1980, José Ary Morales Agudo, director of the São Paulo State Federation of Agriculture and member of the Consultative Council of the Brazilian Coffee Institute (IBC), wrote a blistering attack on the contribution quota in a book entitled *Assault on Coffee: Victim: The Producer*. He traces how the military government marginalized producers from decision making in the IBC. He highlights the inequity of coffee producers having to finance their own support price program, while support prices for all other products were guaranteed by the Treasury. And, most important, he shows how the government was taxing approximately 60% of the f.o.b. price through the contribution quota and ICM.

Agudo's book underscores how coffee's position in the Brazilian economy had changed since the 1930s as the coffee elite progressively lost control and then influence over the federal government (also see Mueller, 1983). The contribution quota for coffee, unlike its counterpart for cocoa, does not appear to have primarily benefited coffee producers. A portion of it was used to finance the IBC and its activities: the coffee support price, government stocks, and so on. But it was also the most recent version of an instrument used to tax hard currency away from coffee producers to the benefit of other groups and other sectors of the economy (Jarvis, 2000). In the 1950s, this was achieved with multiple exchange rates. Coffee, then, is distinguished from the other products due to the existence of a variable contribution quota and to the importance of its export revenue as a source of foreign exchange for the federal government. This role declined in the 1969–89 period, as coffee's share of total exports fell from 36% down to 5%.

In contrast to cocoa and coffee, soybeans only became one of the most important agricultural exports in the 1970s. As a newcomer, without having passed through a crisis of the proportions of the 1930s, it does not have its own institution and, on the surface, experienced relatively less intervention than the other principal exports. The only form of export taxation was the ICM and the other minor taxes mentioned above. Yet soybeans were often subject to unpredictable export quantity restrictions that contributed to depressing producer prices. Since export restrictions also affected cotton, corn, and other products, it is worth exploring the pressures from interest groups and various branches of government that led to these policies.

The policy mix of the 1970s and early 1980s was not only designed to foster import substitution industrialization. There were also numerous incentives to promote nontraditional exports. Among these, agroindustrial exports were seen as particularly promising. Thus, in addition to subsidized credit and tax breaks to stimulate exports, it was essential to ensure an adequate supply of raw materials to these emerging industries. The director of the Foreign Trade Department (presently DECEX, formerly CACEX), Carlos Viacava, commented in 1984 that

6. The CCPC became the National Council of Cocoa Producers in 1980.

7. Interview conducted by the author in Itabuna, Bahia, in February 1993.

8. Interview conducted by the author in Itabuna, Bahia, in February 1993.

pressure from industrial groups that consume agricultural goods frequently led to export restrictions. He observed that "the principal obstacle to the government adopting a policy of free trade for the marketing of agricultural products are the pressures exercised by certain sectors of the economy that want to have a guaranteed supply of cheap raw materials.... Cotton exports were suspended as a result of the textile industry lobby."[9] He also explained that corn exports had been prohibited the previous year due to pressure from cattle and poultry producers. Export restrictions were common until 1988 when a process of significant trade liberalization began.

It would be incorrect, however, to assume that export restrictions were induced only by industrial lobbies. Diverse government agencies were also involved in trying to reconcile contradictory government objectives, such as controlling inflation, the budget deficit, and generating foreign exchange. Milton Dallari, head of the Special Secretariat for Supply and Prices (SEAP) in the Ministry of Finance, provided some insight into the precarious fine-tuning that the different agencies of the government attempted to carry out:

> DECEX wanted to export as much as possible. But this would cause a domestic shortage and would increase the rate of inflation.... SEAP was involved in the decision. But then pressure groups would come and convince the top level of government that it was necessary to do something about exports. So we had to play with the level of exports. On the other hand, the government was forced to authorize exports because it didn't have enough money to finance either the EGF [agricultural marketing credit] or the AGF [government purchases to guarantee agricultural support prices]. So the government ran the risk of permitting exports, only to have to import in the future because it didn't have the necessary volume of resources.[10]

The fact that the Brazilian government intervened extensively in so many markets and attempted to reconcile not only the interests of diverse pressure groups but also of different branches of government provides some insight into why policy was so erratic. In addition, with few limits imposed by Congress during the military period, the executive had the power to make rules and change them whenever it saw fit. Administrative decisions to restrict exports are difficult to document, yet the outcomes should be captured in the measures of protection. These types of policies cause the protection rates to be lower than the explicit tax burden would indicate.

Price controls on final products also contributed to depressing domestic producer prices. The monitoring and/or control of consumer prices was a policy frequently practiced by the agencies connected to the Ministry of Finance in an attempt to control inflation. Price controls underlie the hypothesis that there should be a negative relationship between inflation and protection because as the general inflation rate accelerates the government increasingly seeks to restrain key domestic prices as part of a strategy to control inflation. The result is that agricultural producer prices fall relative to their international counterparts.

Wheat faced a different policy environment than the other crops because it was the only import-competing product in the sample and because all prices were set administratively. The government was the sole purchaser and importer of wheat, and it set the producer, miller, and consumer prices. Equilibrium of supply and demand was achieved through the quantity of imports. For many years there was a consumer and a producer subsidy. The government was forced to balance the trade-offs of several different policy goals: raising the producer price to stimulate production, substitute for imports, and save foreign exchange; raising the consumer price to limit the budgetary cost of the policy; and restraining all wheat prices in order to control inflation. The conflicts implied by these contradictory goals could partly explain the dramatic swings in the level of the producer subsidy for wheat. They also suggest significant negative relationships between inflation and protection and between the trade balance and protection.

The last important policy instrument was credit. Credit policy was set by the National Monetary Council and regulated by the Central Bank. Subsidized agricultural credit was the main policy used in the 1970s to stimulate production, encourage technological adoption, and partially compensate for discriminatory price, trade, and indirect policies. The total volume of credit subsidies averaged 1.92 billion 1992 dollars in the 1969–89 period. The peak was in 1979 and 1980,

9. Quoted in *Informativo Abiove*, p. 8, No. 6, Year 1, December 1984.

10. Interview conducted by the author in São Paulo, June 1992.

with over $5 billion of subsidies in each year (Helfand, 1998). Although special lines of credit and reduced interest rates could differ from one product to another, in general the rules were the same for all goods in the agricultural sector. The biases observed in the allocation of the massive subsidies, with most credit going to large farmers of highly traded goods, appears to have resulted largely from self-selection by crop and farm size, not from explicit manipulation of policy. In effect, credit is a policy instrument inherently biased toward large farms and high-value crops because these farmers have more collateral, education, and access to credit institutions. Dealing with large farms is also less risky and less costly for banks. This suggests that the factors that explain nominal protection across commodities should be different than those that explain the allocation of credit. This can be tested by performing the econometric tests with and without the inclusion of credit subsidies in the dependent variable.

C. The Pattern of Protection

Nominal protection coefficients (NPCs) and producer subsidy equivalents (PSEs) were calculated for three principal exports (coffee, cocoa, and soybeans) and the only significant import (wheat). Details about the construction of the variables and the data sources can be found in the appendix. The calculations use the official average annual border price as the reference price. In all cases, transportation and other intermediate costs, as well as trade and domestic taxes, were deducted from the reference price to create a "free trade equivalent" producer price. This represents the price producers would have received in the absence of government intervention. The price actually received by producers was then divided by this equivalent producer price to create the NPCs. The PSEs were estimated by adding credit subsidies per ton to the NPCs. The PSEs are "partial" in the sense that only credit subsidies were combined with the NPCs. Other quantitatively less significant subsidies were ignored. Values greater than unity indicate positive protection, whereas values less than 1 correspond to taxation.

NPCs provide a reasonable measure of the outcome of the bargaining game over commodity-specific policies. They answer the question of what percentage of the world price a producer group received. Thus, the NPCs indicate the relative success of a producer group in representing its interests. They do not, however, provide any information about the profitability of a particular activity. In the case of export activities that are generally taxed, a high rate of taxation does not necessarily indicate a low rate of profitability. It might simply reflect the fact that the activity has a strong comparative advantage on the world market and that there is an economic rent being appropriated by the government.

Like the NPCs, the PSEs provide a measure of the outcome of the bargaining game over direct policies. In principle, PSEs are preferable to NPCs because, by including input subsidies, they provide a more comprehensive measure of protection. But to the extent that credit was allocated disproportionately to large farmers, credit subsidies did not benefit all farmers of a particular crop.[11] Thus, unlike the price per ton, the average subsidy per ton could be a poor measure of the benefit most producers of a given commodity obtained through credit. This point will be discussed in more detail in light of the econometric results comparing NPCs and PSEs.

Table 1 shows the estimated NPCs and PSEs for the four products from 1969–1989. The NPCs reveal that, as expected, the exports were taxed and the import, wheat, was protected. Coffee was the most severely taxed crop, with the government taking an average of almost 40% of the equivalent producer price. Cocoa producers received about 75% of what they would have been paid in the absence of export taxation, and soybean producers did somewhat better, claiming over 80% of the nondistorted price. The NPCs improved in the 1983–89 period for all of the products except coffee. Protection rates varied significantly from one year to another.

The second item in Table 1 is credit subsidies. Subsidies were significant in absolute terms, averaging 715 million 1992 U.S. dollars per year for the four crops, but their

11. According to census data for the 1970s and 1980s, for example, only about 15% of farms borrowed from formal sources. This percentage varied considerably across crops.

TABLE 1
Measures and Determinants of Protection for Agricultural Products
(Annual Averages for Selected Periods)

Variable	Time Period	Coffee	Cocoa	Soybeans	Wheat	Other
NPC	1969–74	0.62	0.71	0.83	1.13	
(P^d/P^*)	1975–82	0.66	0.75	0.77	1.11	
	1983–89	0.58	0.77	0.87	1.25	
Credit subsidies	1969–74	0.02	0.01	0.02	0.02	
(subsidies per ton/P^*)	1975–82	0.12	0.07	0.15	0.27	
	1983–89	0.03	0.03	0.08	0.15	
PSE	1969–74	0.64	0.71	0.86	1.15	
(P^d +subsidies/P^*)	1975–82	0.78	0.83	0.93	1.37	
	1983–89	0.62	0.80	0.94	1.40	
International price	1969–74	2,610	2,329	401	269	
(1989 US$/t)	1975–82	4,238	3,653	375	253	
	1983–89	2,632	2,010	256	162	
Average value of	1969–74	4,918	6,646	2,420	2,134	
production per farm	1975–82	6,110	10,896	6,841	5,967	
(1989 US$)	1983–89	4,994	5,494	6,666	8,231	
Number of producers	1969–82	424	60	431	216	
(thousands)	1983–89	536	118	419	151	
Geographic concentration	1969–82	0.31	0.91	0.38	0.50	
(Herfindahl index)	1983–89	0.23	0.74	0.19	0.40	
Trade balance	1969–82					−2,043
(millions of 1989 US$)	1983–89					13,232
Inflation	1969–82					47
(annual percentage)	1983–89					567
Agricultural share	1969					0.82
of exports	1989					0.23

Source: See appendix.
Notes: P^d =domestic producer price. P^* = free trade equivalent producer price.

importance is considerably diminished when expressed as a percentage of the free trade equivalent price per ton. Table 1 shows that credit subsidies were quantitatively insignificant prior to 1975. The subsidy program reached its peak in the 1975–82 period, with the subsidy per ton averaging between 7% of the free trade price for cocoa and 27% for wheat. Subsidies were reduced in the 1983–89 period, but continued to represent a significant share of the free trade price for wheat and a moderate share for soybeans. PSEs, the third item in Table 1, capture the combined effect of price policy and credit subsides. The impact of the subsidies is important in the 1975–82 period, while the contradictory effects of more favorable price policy and reduced credit subsidies leave the PSEs largely unchanged in the 1980s for all products but coffee. The remainder of Table 1 provides descriptive data for the explanatory variables used in section IV. It is interesting to observe that the number of producers rises for some crops and falls for others. These changes are due to many factors, including geographic relocation of some crops, increasing scale for others, and the role of the rural sector as a refuge for the poor in a period of economic crisis. In terms of lobbying for protection, these changes highlight the fact that there has not been a uniform decline in the number of producers in the agricultural sector—in fact, the total number of producers rose throughout the period—and it suggests

considerable differentiation within the sector in the ability to lobby.

IV. THE ECONOMETRIC RESULTS

Tables 2 and 3 present the results of pooled cross-section time-series regressions for NPCs and PSEs, respectively. The goal was to test the relative importance of the lobby and government objective variables in explaining the measures of protection across crops and over time. The existence of factors that affected all of the protection rates simultaneously, such as stabilization plans or international oil price increases, suggested the possibility of allowing for contemporaneous correlation in the errors across crops. A Lagrange multiplier test for contemporaneous correlation was conducted for each regression using NPCs and for each one using PSEs; in all cases the null hypothesis of no contemporaneous correlation could not be rejected at a 5% level of significance.[12] Thus, there were no significant gains to be had from allowing for this level of generality in the variance-covariance matrix. Differences in scale across crops could generate heteroscedasticity, and thus a Lagrange multiplier test for groupwise heteroscedasticity was also performed. The test statistic strongly rejected the null hypothesis of a common variance across commodities, and the models were reestimated without this restriction. Finally, Durbin-Watson tests indicated serial correlation of the errors for most crops. Thus, the model that was estimated allowed for cross-sectional heteroscedasticity and first-order autocorrelation of the errors.[13] With the exception of the trade balance, which at times was negative, all variables are in logs and thus the estimated coefficients can be interpreted as elasticities.

The first column of each table reports a benchmark regression for comparison with the subsequent regressions. It involves the pooling of the four commodities and regressing either the NPCs (Table 2) or the PSEs (Table 3) on the three explanatory variables related to government objectives, the international price, and a dummy variable on the wheat intercept. The dummy is included to allow for the fact that wheat was a protected import, whereas the other three products were taxed exports. The intercept dummy is positive and significant in both benchmark regressions. All three variables related to government objectives have a significant impact of the expected sign when the PSEs are the dependent variable, and none of the three are significant when the NPCs are the dependent variable. This result is discussed below. First, the individual variables are analyzed one at a time.

The agricultural share of exports is a proxy for the long-run decline of agriculture as a source of government revenue. From 1969–89, agricultural exports as a share of total exports fell from 82% down to 23%, while unprocessed agricultural exports dropped from 69% to 15%. As the importance of the agricultural sector in trade and in the economy falls, other sources of tax revenue gain importance, and agriculture no longer needs to be taxed more than other sectors to finance industrialization. All six of the coefficients on this variable in Tables 2 and 3 have the expected negative sign, and they are significantly different from zero at varying levels of significance in five instances. The elasticity for PSEs are quite large: a 10% decline in the agricultural share of exports is estimated to increase the PSEs by approximately 3.6%.

The trade balance is intended to capture the short-run effect of the foreign exchange objective. A deterioration in the trade balance is expected to create pressure to stimulate exports and substitute for imports, thus being associated with increased protection. Five of the six coefficients in Tables 2 and 3 have the expected sign, although only in the case of PSEs are they significantly different from zero at least at the 10% level. Because the trade balance is the only variable in levels rather than logs, a sense of the quantitative importance of this variable was obtained by examining the elasticity at the mean. In all cases these elasticities were rather small. The small elasticities, however, mask the impact that the trade balance can have because it is a variable that experienced large percentage changes from one year to the next.

The relationship between inflation and protection was similar to what was observed for the trade balance. All of the coefficients had the expected negative sign, although they

12. The test follows Greene (1993).

13. See Greene (1993, chap. 16) and White et al. (1990, chap. 20).

TABLE 2
Pooled Regression Results
for Nominal Protection Coefficients (1969–89)

	(1)	(2)	(3)
Agricultural share of exports	−0.07	−0.18*	−0.23**
	(−0.66)	(−1.71)	(−2.25)
Trade balance	0.25E−05	−0.14E−06	−.67E−05
	(0.70)	(−0.04)	(−1.58)
Inflation	−0.04	−0.03	−0.03
	(−1.23)	(−0.85)	(−0.94)
International price	−0.14***	−0.13***	−0.10***
	(−4.19)	(−4.76)	(−3.82)
Intercept	0.69***	1.43*	1.16
	(3.13)	(1.83)	(1.46)
Intercept dummy for wheat	0.23**	0.12	0.11
	(2.61)	(1.30)	(1.18)
Number of producers		−0.05	−0.02
		(−1.05)	(−0.41)
Herfindahl concentration index		0.17**	0.23**
		(2.05)	(2.22)
Average value of production per farm		0.00	−0.04
		(0.07)	(−1.09)
Number of producers dummy (83–89)			−0.22***
			(−2.72)
Herfindahl concentration index dummy (83–89)			−0.27**
			(−2.38)
Average value of production dummy (83–89)			0.30***
			(2.77)
Adjusted R^2	0.51	0.68	0.71

Note: *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

were only statistically significant at least at the 10% level for PSEs, and all of the estimated elasticites were quite small. A separate set of regressions (which are not reported here) were run by crop and they identified the strongest relationship for wheat. The explanation is straightforward. Of the four crops, derivatives of wheat were the most important as a share of consumer expenditures, and consequently, of the consumer price index. Thus, throughout much of the period it was common for policy makers to try to use the price of wheat as a tool for controlling inflation. The fact that wheat prices were set directly by the government facilitated it serving this purpose. The export crops sold only a portion of their output to the domestic market and were apparently less affected by price controls to restrain inflation.

The international price is included in Tables 2 and 3 to control for the degree to which domestic prices were isolated from international price movements. A coefficient of −1 would imply a high degree of isolation because a change in international prices that has no effect on domestic prices would be largely transmitted to the NPCs. A coefficient of 0, in contrast, would imply a high degree of transmission from international to domestic prices, leaving the NPCs unchanged. The coefficient on the international price is negative and highly significant in all cases. The elasticity is fairly small, however, suggesting only a moderate degree of policy induced isolation from international prices. Individual crop regressions again identified a certain amount of heterogeneity across crops. Wheat had the largest negative coefficient,

TABLE 3
Pooled Regression Results
for Producer Subsidy Equivalents (1969–89)

	(1)	(2)	(3)
Agricultural share of exports	−0.29***	−0.37***	−0.43***
	(−2.73)	(−3.15)	(−3.47)
Trade balance	−0.60E−05*	−0.78E−05**	−0.88E−05*
	(−1.68)	(−2.06)	(−1.74)
Inflation	−0.06**	−0.06*	−0.06*
	(−2.02)	(−1.76)	(−1.81)
International price	−0.19***	−0.21***	−0.19***
	(−5.40)	(−7.66)	(−6.31)
Intercept	1.07***	2.42***	2.18**
	(4.61)	(2.80)	(2.20)
Intercept dummy for wheat	0.24***	0.12	0.11
	(2.69)	(1.27)	(1.03)
Number of producers		−0.09	−0.07
		(−1.60)	(−1.06)
Herfindahl concentration index		0.09	0.10
		(0.95)	(0.81)
Average value of production per farm		0.00	−0.02
		(0.08)	(−0.41)
Number of producers dummy (83–89)			−0.16*
			(−1.69)
Herfindahl concentration index dummy (83–89)			−0.15
			(−1.10)
Average value of production dummy (83–89)			0.20*
			(1.67)
Adjusted R^2	0.53	0.65	0.65

Note: t-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

indicating a substantial degree of isolation. This reflected the political nature of the price determination process for this crop. Soybeans was second, pointing to a moderate degree of isolation, which was likely the result of intermittent quantitative trade restrictions that ensured an adequate supply of the product to the domestic market. The coefficients for cocoa and coffee indicated a much higher degree of transmission in percentage terms from international to domestic prices.[14]

In column two of Table 2, three variables are included to capture the obstacles and incentives to organizing a lobby: the number of producers, the geographical concentration of producers, and the average value of production per farm. The concentration variable was constructed using a Herfindahl index of the quantity of production in each state. Of the three lobby variables, only the concentration index is significant at the 5% level. Thus, when considering the period as a whole, it can be concluded that geographically concentrated groups were associated with higher levels of nominal protection. As the most concentrated group, cocoa producers suffered least from government intervention in trade, and although producers did pay a 10% contribution quota, it went to a regional institute that provided them with concrete benefits in terms of research, extension, and infrastructure. Coffee, in contrast,

14. There were, however, important differences between these two products. The cocoa market was extremely transparent and the NPCs were quite stable, confined to a narrow range of 0.62–0.88. Coffee, in contrast, had a less predictable policy environment and the NPCs were far less stable, with a range of 0.39–0.99.

was the least concentrated and most severely taxed commodity in the sample.

Column three of Table 2 shows that when dummies are included on the lobby variables to distinguish the democratizing and crisis-ridden 1980s from the earlier years, all three variables have significant coefficients of the expected sign. For the 1969–82 period, geographical concentration had a positive and significant impact on protection. In the 1983–89 period, the importance of proximity was replaced by group size and average value of production. Thus, particularly in the 1980s, smaller groups that were dominated by large producers were associated with higher levels of protection. This result lends support to the hypothesis that the dramatic economic and political changes of the 1980s increased the importance of commodity-based lobbies. It also corroborates the view that when credit subsidies were reduced large producers increasingly focused their attention on discriminatory price and trade policy.

In effect, the economic crisis of the 1980s altered the set of policies that was economically feasible in the short run and sustainable in the long run. Concretely, this led to the need to reduce credit subsidies, to reduce the budget deficit, to liberalize international trade, and, in terms of macroeconomic policy, to depreciate the domestic currency. As a consequence, agricultural policy also needed to be redesigned. The specific choices that were made, however, were influenced by the new decision-making environment and the reformed institutions of interest group representation. For example, there was nothing inherent in the reduction of credit subsidies that necessarily required more favorable agricultural support prices in the mid-1980s. This resulted from negotiations between the government and affected sectors. Similarly, the greater degree of organization of agricultural interests, combined with the increased importance of Congress and the judiciary, led to the creation of a countervailing duty on subsidized imports that could be activated even without the approval of the executive to protect domestic agricultural production from subsidized competition. Thus, in the democratizing 1980s, even though it was the economic situation that forced difficult policy decisions to be made, organized agricultural interest groups played a more important role in shaping policy than in the precrisis period. Consequently, as we observe in Table 2, the factors that predict which groups were more likely to succeed increased in importance.

Columns two and three of Table 2 reveal another interesting change relative to column one. The intercept dummy for wheat becomes considerably smaller and loses its statistical significance. Table 1 confirmed that wheat—an import—was protected while all three exports were taxed, but the inclusion of the variables related to producer lobbies reduces our "ignorance" about why imports are protected and diminishes the importance of a positive shift in the intercept for wheat. Thus, in addition to any argument that might be made about wheat protection stemming from the need to substitute for imports and save foreign exchange, part of the reason for its protection apparently is due to the geographical concentration of the producers: The majority of Brazilian wheat is produced in two states, and the producers tend to be very well organized in cooperatives.

The use of PSEs as the dependent variable in Table 3 leads to a very different picture. Clearly, how the dependent variable is defined matters quite a bit. First, and most important, Table 3 shows that whether the model is specified with or without the proxies for interest group influence, all of the variables related to the government objectives are statistically significant with the expected signs. Among these variables, the agricultural share of exports has the largest elasticity, suggesting that the long-run decline in the economic importance of the agricultural sector turns out to be the most important determinant of protection among the government variables considered. An important conclusion that follows from comparing the results with PSEs and NPCs is that the government appears to have utilized the entire set of policy instruments when attempting to achieve a given objective. Thus, when responding to an increase in inflation, for example, a reduction in credit might be used in addition to price controls. If we ignore credit policy and limit attention to price and trade policy, as in the case of NPCs, we can overlook important relationships.

A second difference observed when PSEs are used is that the importance of the lobby-related variables diminishes. When examining the period as a whole, the results in column two of Table 3 indicate that none

of the three proxies is statistically significant. When dummies are introduced for the 1980s (column three), the number of producers and the average value of production just become significant at the 10% level, yet their impact is smaller than when NPCs are used. A likely explanation follows. Although credit was an important component of the policies used by the government toward the sector and is therefore necessary for explaining government behavior, credit subsidies were not an important target of *commodity-based* lobbies. Credit subsidies benefited a minority of large producers in the agricultural sector, principally in the 1975–82 period. Thus, benefiting from subsidies in the 1970s was more related to differences in farm size than to differences in commodities (Helfand, 1998). In the 1980s, when credit subsidies were being phased out, the growing importance of prices increased the incentives for all producers of a given commodity to join together to influence price policy. The lobby variables consequently do a much better job at explaining NPCs, which measure price policy, than PSEs, which measure price *and* credit policy.

Finally, it is important to recognize that only about two thirds of the variation in the dependent variable is explained in the third regression for both NPCs and PSEs, indicating, among other possibilities, that important variables might not have been included and that the proxies used were far from perfect. Alternatively, given the way that agricultural policy often resulted from administrative decisions designed to balance the pressures from competing interest groups and diverse branches of government, it is not surprising that the outcomes lacked regularity. They indicate the government's dilemma of attempting to pursue a multiplicity of goals while seeking to accommodate what often proved to be irreconcilable demands.

V. CONCLUSIONS

This paper has examined the causes for the differentiated pattern of government intervention in the Brazilian agricultural sector. Surprisingly, the conclusions were sensitive to whether policy outcomes were measured with NPCs or PSEs. This result suggests that future studies of the political economy of protection should pay more attention to the specification of the dependent variable because the conclusions can depend crucially on this choice.

When measured with NPCs, the uneven pattern of protection was shown to depend on interest group characteristics associated with lowering the costs of generating political pressure and increasing the returns per member. Especially in the 1980s, smaller groups that were composed of large producers were more likely to be successful in influencing policy to their benefit. When measured with producer subsidy equivalents, the government's own agenda to raise tax revenue, generate foreign exchange, and control inflation influenced the protection rates from one year to another. It was argued that the inclusion of credit in the dependent variable was essential for explaining government behavior because it was an important component of the entire policy package. The inclusion of credit, however, diminished the explanatory power of interest group characteristics. A plausible explanation for this result is that credit subsidies only benefited a small minority of large farmers and therefore did not represent an accurate measure of the benefits available to groups that were organized by commodity.

While a significant portion of the pattern of protection was explained, policy outcomes were erratic because decisions resulted from a multiplicity of goals and pressures. Adjustments to the debt crisis induced the abandonment of import substitution industrialization policies, and by the end of the 1980s, trade was being liberalized and agriculture was moving into a new phase of reduced taxation. With the return to democracy, the writing of a new constitution, and the passing of an important agricultural law in 1991, there is promise that policy will be designed and implemented in a more consistent fashion. However, continued uneven political power across commodities suggests that the pattern of protection will remain differentiated.

APPENDIX

Nominal Protection Coefficients (NPCs)

The NPCs are defined as P^d/P^*, where P^d equals the price actually received by producers and P^* equals the adjusted reference price. It is adjusted so that it is measured at farm gate without taxes. The observed producer price, P^d, is a weighted average for Brazil, except for cocoa, where it is the price for the state of Bahia. P^d

was obtained directly from the Getúlio Vargas Foundation. The reference price is the f.o.b. price for coffee, cocoa, and soybeans, and the c.i.f. price for wheat (see "International Price" below). For soybeans and wheat, the intermediate cost and tax data were obtained from several studies done at the Production Finance Commission (CFP): Dias and Lopes (1983) and Vasoncelos et al. (1983). These studies were then updated internally by the staff of CFP's successor, the National Supply Company (CONAB). For coffee and cocoa, the intermediate cost and tax data was obtained from Rego (1983). The data were updated through interviews with CEPLAC technicians, the cocoa exporters association, and the coffee exporters association.

Credit Subsidies

A detailed description of the methodology employed to calculate credit subsidies can be found in Helfand (1998). The annual credit values were obtained from the *Anuário Estatístico do Crédito Rural*, Central Bank of Brazil (various issues). Loan periods were based on the studies done by Shirota (1988) and Fagundes (1987) and were modified based on CFP documents and interviews conducted with several banks. Interest rates were taken from National Monetary Council resolutions, as reproduced in Fagundes (1987), and from CONAB for later years. The general price index, obtained from the Getúlio Vargas Foundation, was used for deflating in order to calculate real interest rates. Finally, for investment credit, which is not recorded by crop, the annual subsidies were first estimated by state and then allocated to crops based on their share of the value of crop production in each state. State-level crop shares were calculated from data published by IBGE in *Produção Agrícola Municipal: Culturas Temporárias e Permanentes, Brasil* (various years).

Producer Subsidy Equivalents (PSEs)

The PSEs combine the NPCs and the credit subsidies per ton. They are defined as $(P^d + \text{subsidy per ton})/P^*$.

International Price

The real f.o.b. price was used for coffee, cocoa, and soybeans, and the real c.i.f. price was used for wheat. The nominal prices were obtained directly from the Department of Foreign Trade (DECEX). The price per ton in U.S. dollars was deflated by the U.S. wholesale price index.

Number of Producers

The annual number of producers was estimated linearly from the agricultural censuses of 1970, 1975, 1980, and 1985: IBGE, *Censo Agropecuáurio* (various years).

Geographic Concentration

A Herfindahl index was constructed for each crop and year. The index is based on the share of physical production in each state. It is equal to the sum of squared production shares. The production data is from IBGE, *Produção Agrícola Municipal: Culturas Temporárias e Permanentes Brasil* (various years).

Average Value of Production per Farm

The value of production was obtained from IBGE, *Produção Agrícola Municipal: Culturas Temporárias e Permanentes Brasil* (various years). These were converted to dollars with the official exchange rate, deflated by the U.S. wholesale price index, and then divided by the estimated number of producers.

Trade Balance

The trade balance is measured in millions of U.S. dollars. It is taken from the IMF's *International Financial Statistics* (various years) and then deflated by the U.S. wholesale price index.

Inflation

The average annual rate of inflation, as measured by the general price index, was obtained from the Getúlio Vargas Foundation.

All values in nominal U.S. dollars were deflated with the U.S. wholesale price index, taken from the International Monetary Fund's *International Financial Statistics* (various years).

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