Electoral Competition and Agricultural Support in OECD Countries

Jong Hee Park Washington University in St. Louis
Nathan Jensen Washington University in St. Louis

Agricultural trade protectionism in developed countries remains a politically charged issue, yet few studies have attempted to explain the political dynamics behind this important trade issue. We consider agricultural subsidies as a type of distributive policy that targets the agricultural sector at the expense of consumers and taxpayers. Based on Cox (1987, 1990) and Myerson (1993), we argue that electoral systems that encourage politicians to appeal to a narrow constituency tend to have a higher level of agricultural support. We test this theoretical hypothesis using OECD agricultural support data disaggregated by commodity and country. A cross-classified multilevel model is employed to account for complex variation of agricultural support across countries, commodities, and time. Our empirical results show that electoral systems that encourage politicians to target narrow (broad) constituencies are associated with relatively high (low) levels of agricultural subsidies.

While postwar international trade negotiations successfully lowered trade barriers on most manufactured goods, there has been little progress in the liberalization of agriculture. One main reason is that the developed countries that initiated several rounds of tariff cuts have been reluctant to open their domestic markets to agricultural imports. Even after countries agreed to negotiate agricultural barriers in international trade negotiations following the Uruguay Round of Multilateral Trade Negotiations (1986–1994), developed countries are still being accused of lacking the willingness to liberalize their agricultural markets by a set of developing countries as shown by the recent Doha trade round.

Agricultural economists have sought to explain the universal protection of agriculture among developed countries. Anderson and Hayami (1986) propose an important explanation based on Olson (1965). According to Anderson and Hayami, industrialization improves farmers' position in two ways: on one hand, farmers have an organizational advantage over other diffused interests in the process of industrialization because of their reduced number; on the other hand, the total tax burden associated with agricultural protection becomes socially affordable as taxpayers' incomes rise.

However, casual observation of the agricultural subsidies among developed countries reveals a substantial variation as shown in Figure 1. Our goal in this article is to propose a *comparative political explanation* for the cross-national variation in agricultural protection among developed countries.

We consider agricultural subsidies as a type of distributional politics that targets the agricultural sector or agricultural commodity producers at the expense of consumers and taxpayers. There is vast literature in political science and economics which explains politicians' varying incentives to respond to pressures from interest groups under different political systems (Bawn and Thies 2003; Grossman and Helpman 2005; McGillivray 2004; Persson and Tabellini 2002; Rogowski and Kayser 2002). That is, even though farmers are well organized across most industrialized countries, politicians' responsiveness to farmers' demands can vary depending on the structure of political competition. In this article, we

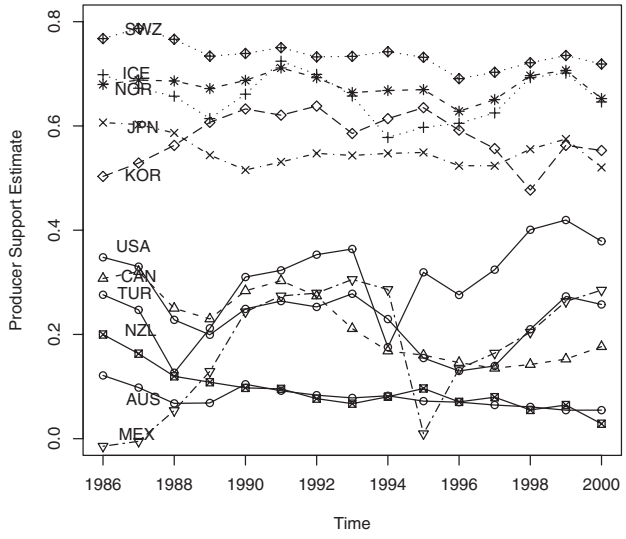
Jong Hee Park is a Ph.D. candidate in political science, Washington University in St. Louis, Campus Box 1063, One Brookings Drive, St. Louis, MO 63130 (jhpark@artsci.wustl.edu). Nathan Jensen is assistant professor of political science, Washington University in St. Louis, Campus Box 1063, One Brookings Drive, St. Louis, MO 63130 (njensen@artsci.wustl.edu).

Earlier versions of this article were presented at the 2004 Midwest Political Science Association Conference and at the 2005 Political Methodology Conference. We would like to express our appreciation for helpful comments from Ethan Bueno de Mesquita, Marc Busch, Hee Jin Cho, Brian Crisp, Gyung Ho Jeong, Quan Li, Andrew D. Martin, Bumba Mukherjee, David Park, Stephanie Rickard, Katie Ridgeway, and Andrew Sobel. Funding for the data collection was provided by the Weidenbaum Center on the Economy, Government, and Public Policy at Washington University in St. Louis.

American Journal of Political Science, Vol. 51, No. 2, April 2007, Pp. 314–329

 ISSN 0092-5853

FIGURE 1 Variation of the Producer Support Estimates



Note: The producer support estimates show the estimated proportion of public support to farmers' incomes. Each line indicates country means of the producer Support Estimates across 12 commodities. Included commodities are beef and veal, eggs, maize, milk, oilseeds, other grains, pig meat, poultry, rice, sheep meat, sugar, and wheat.

focus on electoral competition. Specifically, based on Cox (1987, 1990) and Myerson (1993), we argue that electoral systems that encourage politicians to appeal to narrow constituencies tend to have higher levels of agricultural support.

To test this hypothesis, we use an OECD data set of the Producer Support Estimate, which measures direct and indirect evidence of agricultural support among OECD countries. This data covers 11 countries, 12 agricultural commodities, and the time period from 1986 and 2000. Given the disaggregated data structure, a multilevel model becomes a natural choice for empirical analysis. Specifically, we adopt a multilevel model cross-classified both at the country level and at the commodity level to account for complex variations in the data. The availability of the commodity level data is particularly useful in controlling for various commodity-specific factors such as elasticity or the degree of geographic concentration of commodity producers.

Our results show that while electoral systems that encourage divergent policy positions among competitors are associated with relatively high levels of agricultural subsidies, electoral systems with convergent equilibrium tend to have lower levels of agricultural subsidies on average over time.

Political Institutions and Agricultural Protection

There is little doubt that the majority of the population in industrialized countries would benefit from the reduction of agricultural support.[1] First, various price support programs maintain the domestic prices of agricultural products above the world market level. Thus, consumers pay higher prices even though there are cheaper products available. Second, in the cases where governments subsidize agricultural production, consumers benefit from lower prices of agricultural goods at the cost of high levels of taxation. Third, most countries use price-related policy means to support agriculture rather than direct payments to farmers, which inhibits the reallocation of resources while encouraging rent-seeking activities. Finally, the high levels of agricultural protection have depressed world prices of agricultural commodities, which has harmed agricultural exporting countries and stalled multilateral trade talks as we saw in the collapse of the Doha round.

On the other hand, agricultural support in industrialized countries benefits a small subset of population: agricultural producers, firms which supply products to agricultural producers, and firms which use subsidized products as inputs. As Gardner (1992) explains, it is understandable why governments intervened in agricultural markets in the early twentieth century when the farm population was one-fourth to one-third of the population and farm incomes were lower than national averages in most industrialized countries. Why are industrialized countries so resistant in reducing government assistance to the agricultural sector as the farm population decreases and farm incomes grow?

Economists argue that the answer lies in the politics of interest groups. Olson (1965) provides an important theoretical foundation in this regard: farmers are well organized compared to consumers or taxpayers and hence more successful in mobilizing resources and votes. Anderson and Hayami (1986) use this logic to explain a dramatic difference in the level of agricultural protection between developed countries and developing countries. According to Anderson and Hayami, industrialization improves farmers' position in two ways: on the one hand, farmers have an organizational advantage over

[1] Although agricultural support is a more general term than agricultural protection or agricultural subsidies, we use these terms interchangeably in this article. Agricultural support, agricultural protection, or agricultural subsidies usually consist of tariffs, domestic price support, and export subsidies targeting the agricultural sector.

other diffused interests in the process of industrialization because of their reduced number; on the other hand, the total tax burden associated with agricultural protection becomes socially affordable as taxpayers' incomes rise. Similarly, Bates (1981) explains that *a few* large farmers in African countries are very effective in obtaining government assistance at the expense of *a large number of* small farmers.

The focus on the politics of interest groups is very powerful in explaining the persistence of agricultural support in most industrialized countries. However, *the power of agricultural interest groups hardly explains the variation of agricultural support within industrialized countries* as shown in Figure 1.[2]

Instead of looking at the power of agricultural lobbies, we find an answer to the variation of the agricultural support within industrialized countries by exploring politicians' varying responsiveness to demands for agricultural support. That is, although farmers are well organized in most industrialized countries, politicians' incentives to respond to farmers' protectionist demands at the expense of consumers' interests vary under different political systems. In particular, electoral competition plays a key role in forming politicians' incentives to curry the favor of protectionist interests (Grossman and Helpman 2001; Hansen 1991; Magee, Brock, and Young 1989). Then, the question is how different electoral systems affect politicians' incentives on the policy issue of agricultural support.

There is vast literature which investigates this question in the broad context of distributive politics. These studies typically use a majoritarian-proportional dichotomy or majoritarian-mixed-proportional trichotomy. For example, Rogowski and Kayser (2002) argue that majoritarian systems have a pro-consumer bias, and hence are less likely to support organized interests, because of *a large seat-vote disproportionality*. As far as the argument goes, "the greater the percentage increases in seats produced by a one percent increase in votes, the more policy will favor consumers" (Rogowski and Kayser 2002, 529). Similarly, based on Denzau and Munger's (1986) work, Bawn and Thies (2003) argue that legislators in majoritarian systems are more responsive to diffused interests, as opposed to organized interests, than legislators in proportional systems. One of the main reasons is that legislators in majoritarian systems rely heavily on their own reputation in both selection and election processes while legislators in proportional systems rely mostly on their parties' reputation for their electoral success. In short, according to these scholars, *distributional policies that target a small sector of the population are less likely in majoritarian systems than in proportional systems.*

However, another group of scholars use the same institutional dichotomy but reach the opposite conclusion. Persson and Tabellini (1999) argue that distributional policies targeting only a small sector of voters are more likely in majoritarian systems than in proportional systems because marginal districts are more important in majoritarian elections. Also, Grossman and Helpman (2005) show that industrial protection targeting specific sectors is higher in majoritarian systems because weak party discipline in majoritarian systems makes it easier for legislators to deviate from the (free trade) party positions to serve their heterogeneous constituencies. In short, these scholars predict that *distributional policies that target a small sector of the population are more likely in majoritarian systems than in proportional systems.*

What explains these contradictory results? We argue that most scholars tend to ignore the fact that majoritarian systems and proportional systems consist of quite heterogeneous groups of countries. Moreover, the distinction is getting hazier as more and more countries have adopted hybrid electoral formulas since the 1990s (Shugart and Wattenberg 2003). To summarize, it is useful to look at how the electoral competition structures politicians' incentives to favor small, organized interests under different settings. But the existing literature based on the dichotomy or trichotomy of electoral institutions is not satisfactory both theoretically and empirically. In the next section, we propose a better way to characterize politicians' varying incentives to represent marginal interests based on game-theoretic comparisons of electoral systems by Cox (1987, 1990) and Myerson (1993).

The Cox-Myerson Model

Both Cox (1987, 1990) and Myerson (1993) emphasize elections as an important input process of final policy outcomes; candidates compete for voters' support by taking policy positions (Cox 1987, 1990) or by promising policy benefits (Myerson 1993). The policy or distributive positions candidates advocate in elections are the outcome of *strategic* considerations. That is, their positions or promises are decided based on their rational expectations of other candidates' positions and the entry of new competitors.

Cox (1990) argues that as the number of candidates increases in a district given any voting rule, candidates will realize that the number of votes necessary to win a seat decreases. Thus, as more candidates enter the election, candidates have an incentive to

[2] As we will show later, the cross-national and cross-temporal variation in agricultural support within industrialized countries is still present after controlling for factors related to farmers' organizational strengths such as the level of industrialization, the size of rural population, and the size of agricultural production.

cultivate narrower constituencies, and hence the ideological distance between candidates widens. For example, in a single-member district system, once the number of candidates exceeds 2, candidates' ideological positions become divergent from the median voter's ideal point. The opposite tendency toward wider target constituencies is found as voters have more votes to distribute over different parties or candidates. In general, "centrist outcomes [. . .] can be promoted by: (1) decreasing the number of candidates; (2) increasing the number of [noncumulative] votes per voter; (3) disallowing partial abstention [. . .] (4) decreasing the district magnitude" (Cox 1990, 919).[3] These findings are, according to Cox, equally applicable to proportional representation systems.[4]

Myerson (1993) extends Cox's model to distributive competition among candidates. Under strictly limited public resources, candidates need to think about what would be the best distributive strategy given the structure of electoral competition. Myerson operationalizes candidates' strategies by the variance of distribution after fixing the support of the distribution to half of the voting population. For example, in a two-candidate race within a single vote system, candidates adopt uniform offer distributions in equilibrium. No candidate has an incentive to deviate from this strategy unilaterally. However, if there were a third candidate in the race, the variance of the offer distribution should be smaller. In other words, distributive promises become more unequal as the number of candidates increases. The general prediction is the same as in Cox: the equilibrium distribution departs from the uniform distribution more dramatically as *the number of competitors* increases and *the number of noncumulative votes* decreases. The conclusions of both models can be best summarized by the concept of the Cox threshold (Myerson 1993, 858).[5]

$$\bar{s} = \sum_{v=1}^{m} s_v / m \qquad (1)$$

where v is the number of noncumulative votes, m is the number of competitors, and s is a scoring rule.[6]

Myerson defines the Cox threshold as "the largest minority group that may be ignored by all candidates in the election" (1993, 867). However, it would be unrealistic to apply this interpretation in an absolute sense. For example, nobody would agree that interest groups smaller than half of the voting population would be ignored in Australia, which has a Cox threshold score of 0.5 because of its alternative voting rule. Instead, we prefer to interpret scores of the Cox threshold *in a comparative sense*. That is, Myerson's model predicts that electoral systems with low Cox thresholds tend to protect small, organized interests more than electoral systems with high Cox thresholds. For example, holding voting rules constant, politicians in a multiparty system tend to target narrower constituencies than politicians in a two-party system. In this way, the Cox-Myerson model allows us to rank-order various electoral systems based on their effects on politicians' equilibrium positions with regard to the scope of distribution within and across countries.[7]

In applying the Cox-Myerson model to the case of agricultural subsidies, it is important to make clear and justify the assumption that electoral institutions that privilege marginal interests will benefit agricultural producers relative to consumers and taxpayers. One possible objection is that the same electoral institutions that allow agricultural interests to push for favorable policies also allow interests opposed to agricultural protection, such as consumer organizations, to forward their favorable policies. Although this is theoretically plausible, the costs of agricultural subsidies are diffused while the benefits are concentrated in a small and highly organized agricultural sector. Also, consumer organizations are generally not as effective as farmer associations, agricultural cooperatives, or agribusinesses in organizing votes, money, or public opinion (Hansen 1991). This is a classical example of the collective action problem argued by Olson (1965) and applied to agricultural policy by a number of scholars.[8] Thus, generally speaking, centrifugal electoral competition provides organized supporters of agricultural protection with more favorable political conditions than centripetal electoral competition.

[3]Cumulative voting allows voters to concentrate multiple votes for one candidate or party.

[4]Standard assumptions of spatial model are employed in Cox (1987, 1990): unidimensional policy space, single-peaked preferences, constant turnout, and vote- or seat-maximizing competitors.

[5]Myerson's maximal offer distribution is the inverse of the Cox threshold for rank-scoring electoral rules. Under alternative voting the offer distribution can be less unequal than what the inverse of the Cox threshold ($\frac{1}{2}$) indicates. That is, the scope of interests can be broader than the median voter's interests (negative plurality). Despite this difference, we decided to use the Cox threshold because (1) the Cox threshold is simple for empirical operationalization and easy for interpretation, and (2) the results of the analysis do not change much when we exclude Australia from the data set.

[6]Cox (1987) generalizes various voting rules as a function, s, that assigns an m-vector of scores, $s(m) = (s_1, s_2, \ldots s_m)$, to m candidates. For example, plurality voting is a rank-scoring rule where $s_1 = 1$ and $s_j = 0$ for all $j > 1$.

[7]Similarly, Rickard (2006) explains a cross-national variation in the composition of redistributive transfers by looking at the effect of district magnitude on the number of political parties.

[8]For a study on the ability of the agricultural lobby in the United States to push for agricultural protection, see Lopez (2001).

To summarize, game-theoretic comparisons of electoral systems suggest that the electoral competition that encourages divergent policy positions in equilibrium also encourages politicians to target narrower constituencies such as agricultural producers.

H1: *As the Cox threshold decreases, politicians, on average, will provide higher levels of distributive policies that target a small subset of voters (agricultural subsidies).*

Data and Method

The OECD publishes a cross-nationally comparable data set on agricultural support, dating back to 1986.[9] The key indicator of agricultural support in OECD data is the Producer Support Estimate (PSE). The Producer Support Estimate is measured from two different sources. First, it captures policy measures that maintain domestic prices at levels higher than those at the country's border (Market Price Support). Second, it reflects budgetary payments to farmers based on various criteria (Budget Transfers). Thus, the Producer Support Estimate is *a weighted average of indirect evidence of protection (price difference) and direct protection (budget transfers)*. This is an important reason the Producer Support Estimate is an excellent cross-national measure of agricultural protection across countries. For example, while the United States supports its wheat farmers' income by government payments (budget transfer) for each ton of wheat produced, Japan uses import tariffs (price support) on wheat. Although support policies take different forms depending on whether the country is a net exporter of wheat or not, wheat farmers in both countries receive higher incomes than the market would provide without government intervention. Thus, in order to compare the level of agricultural support across countries, we need to examine *how low the market price would fall in the absence of the subsidy.* This is what the Producer Support Estimate does.

Another important advantage of the Producer Support Estimate data is that subsidies are measured at the commodity level as well as at the country level. The availability of the commodity-level data is critical in controlling for various commodity-specific factors such as elasticity or geographic concentration. For example, Busch and Reinhardt demonstrate that geographic concentration of industry affects incidence of industrial protection significantly, "regardless of how the political map is drawn" (Busch and Reinhardt 2005). But the problem is that it is extremely difficult to directly measure the geographic concentration of agricultural commodities across different countries. We tackle this issue in a different way. We consider various commodity-related factors of agricultural protection not as something we should estimate but as something we should control for. In this regard, the disaggregated data structure provides us an opportunity to factor out those commodity-related confounding factors from our regression analysis. How does this work?

It is well known that the geographic concentration of a commodity is largely determined by the character of commodity production. For example, once harvested, sugar cane or sugar beets are highly perishable and must be processed quickly, but transportation is very costly. Thus, the sugar industry (including downstream activities) is geographically concentrated near the production (Mitchell 2005). We can assume that *the unmeasured effects of commodity-specific factors such as elasticity or geographic dispersion on the subsidy would follow a known distribution* such as Normal distribution or student *t* distribution. Then, these commodity-specific effects can be easily controlled for by including an additional error term at the commodity level in the empirical model. In the same way, we can control for various unmeasured or immeasurable country-specific factors by including an additional term in the model.

We summarize the cross-national and cross-temporal variations in the Producer Support Estimate in Figure 1. The differences in the levels of agricultural spending are striking. Countries are clearly clustered into two groups: Australia, New Zealand, the United States, Turkey, and Canada as one group and the rest of the countries as the other. Among the first group, Australia and New Zealand stand out as economies consistently with the lowest levels of agricultural protection during the sample period. On the other hand, a group of countries like Korea, Japan, Norway, Switzerland, and Iceland exhibit persistently higher levels of agricultural subsidies.

Operationalization of the Cox Threshold

While Cox and Myerson focus on the electoral competition at the district level, we are interested in explaining the effect of electoral competition on policy outcomes at the national level. Thus, we treat the national parties as electoral competitors in most electoral systems except the case where there is a high level of intraparty competition.

First, for electoral systems where political parties are effective players in elections like in closed-list proportional representation systems, we count the effective

[9]The OECD has made this data available since 1998.

number of electoral parties to measure the number of electoral competitors because parties are nationally organized and run the election based on national platforms.

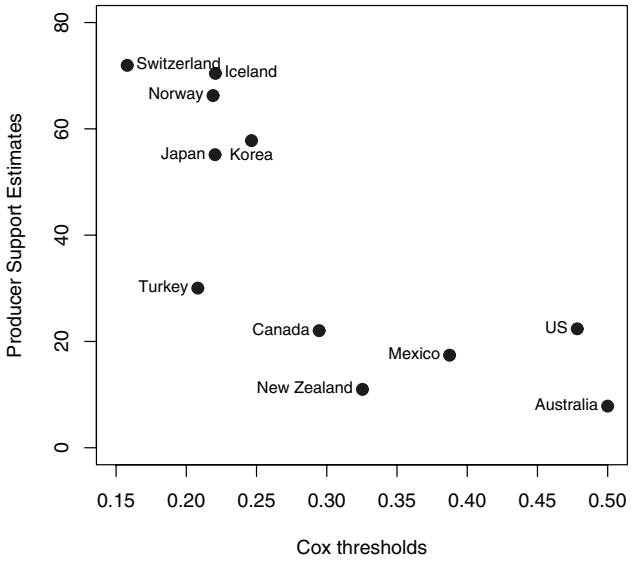
We divide electoral systems where candidates are recipients of votes into two types based on the intensity of intraparty competition. As the intraparty competition increases in the candidate-voting systems, candidates (or factions) are more likely to cultivate personal constituencies apart from party constituencies (Carey and Shugart 1995). In other words, candidates in multimember districts have a greater incentive to diverge from national party lines than candidates in single-member districts. In this regard, looking at the number of parties may be misleading in explaining the actual extent to which the electoral competition determines the scope of distributive promises in electoral systems with multiple seats. Thus, we use the average number of *district candidates* in pre-1995 Japan to count the number of electoral competitors.[10]

By contrast, in single-member districts, voters' support for candidates is *inseparable* from voters' support for parties. The electoral success of candidates depends partly on their parties' national reputation in single-member districts because they are the sole agent of their parties in districts. As a result, partisan control over individual candidates' promises tends to be stronger in single-member districts than multimember districts. Thus, we count the effective number of electoral parties to measure the number of electoral competitors in single-member districts.

Figure 2 displays the bivariate relationship between the Cox threshold and agricultural support in 11 OECD countries. If our hypothesis were correct, we should observe an inverse relationship between the Cox threshold and the level of the Producer Support Estimate. Figure 2 clearly shows there is a (bivariate) relationship that supports the hypothesized relationship between the scope of electoral competition and agricultural support. Three European countries and two Asian countries have both low Cox thresholds and high levels of agricultural support. By contrast, Australia, the United States, and Mexico have high Cox thresholds and low levels of agricultural support. Since there is a chance that other factors drive this bivariate correlation, we need to include several covariates of agricultural support to control for these potential confounding factors in the analysis.

[10]Since we cannot obtain all the district election data in pre-1995 Japan, we use the M (district magnitude) + 1 rule to proxy for the average number of district candidates. Niemi and sheng Hsieh (2002) show that $M + 1$ is a good predictor of the effective number of candidates in Japan. The substantive conclusion from the results does not change when we count the number of parties as electoral competitors for pre-1995 Japan.

FIGURE 2 A Scatter Plot of the Cox Thresholds and Producer Support Estimates



Note: The Producer Support Estimates show the proportion of public support to farmers' incomes. The Cox thresholds increase as electoral competition encourages politicians to appeal broadly.

Control Variables

Reflecting the multilevel data structure, control variables are introduced at different levels. See the appendix for the sources of data.

- *Production (Consumption)*: We expect that the level of production (consumption) of commodity i in country j in year t affects the agricultural subsidy of the commodity i in country j in year t. One might think that the level of production should be regarded as a *response* to, rather than a *predictor* of, the level of agricultural support. According to this conjecture, the correlation between the production of a commodity and the agricultural support must be positive; the higher agricultural support is, the more the commodity is produced. However, the correlation is *always negative* in our data set. Given this, a more compelling story is that as the production of one commodity in one country declines, the level of subsidy for the commodity in the country tends to rise because producers of the commodity or their representatives become more politically active.
- *GDP*: Anderson and Hayami (1986) show that the level of industrial development is one of the most important predictors of the level of agricultural support. We use

GDP per capita to measure the level of industrial development.

- *Land per Labor*: The Heckscher-Olin theory of international trade predicts countries with an abundance of land relative to labor will have a comparative advantage in agricultural production.[11] We compute an endowment of arable land per labor by dividing the total hectare of arable land by the total labor force in the economy.[12]
- *Agricultural Share*: This is a share of total agricultural production in each country's GDP. *Agricultural Share* is a measure of comparative advantage in agriculture in this OECD sample. That is, a large share of agricultural production in GDP among industrialized countries indicates the comparative advantage in agriculture. Thus, we expect the size of agricultural production to be inversely correlated with agricultural support. Also, this measure captures how short-run factors, such as natural disasters, affect the level of agricultural production. Note that while *Production* measures the level of production of a certain commodity in a certain country, *Agricultural Share* measures the level of total agricultural production in a country in a given year.
- *Rural Population*: It would be more difficult to cut agricultural subsidies in a country with a larger rural population than in a country with a small rural population. Cutting subsidies affects farmers directly by decreasing their incomes and rural residents in general by decreasing regional economic activity. Farmers are affected by declines in their income and mobile individuals leave rural areas, decreasing the demand for various services and housing in rural areas. For example, Scheve and Slaughter (2001) show that homeowners around declining industries have strong protectionist preferences even though their labor and capital are not directly employed in the declining industries. We expect that countries with a larger rural population will provide higher levels of agricultural subsidies.
- *Political Constraints*: As mentioned above, the puzzle of agricultural support in industrialized countries is the persistence of government assistance to agriculture. One possible answer to this puzzle can be provided by looking at how hard it is to change the status quo in agricultural policies in a given political system. Specifically, there have been external and internal pressures to change the status quo in agricultural policies since the 1980s. The external pressure started during the Uruguay Round of Multilateral Trade Negotiations in 1986 and the internal pressure came from public concern for government debt in most industrialized countries after the 1980s. Following Tsebelis's (2002) theoretical insight, we use a measure of the "feasibility of policy change (the extent to which a change in the preferences of any one actor may lead to a change in government policy)" from Henisz (2000). The measure captures not just the veto point but also homogeneity of party preferences within an opposition. *Political Constraints* scales from 0 to 1; 0 indicates complete political discretion and 1 indicates no political discretion.
- *Personal Vote*: We include a rank ordering of electoral institutions on the degree to which electoral institutions encourage personal vote-seeking incentives among candidates (Carey and Shugart 1995). Scholars of legislative politics argue that personal vote-seeking incentives are associated with fractionalized parties and fractionalized parties generate a high level of particularistic distribution such as agricultural subsidies as opposed to public goods (Cain, Ferejohn, and Fiorina 1987; Grossman and Helpman 2005; Mainwaring 1991). However, even though the relationship between electoral institutions and party strength holds, the strength of party leadership itself works for or against the oversupply of particularistic distribution.[13] Instead, we argue that legislators (party leaders) maximizing their personal (party) reputation can work for organized interests or work for diffuse interests *depending on the structure of electoral competition.* Although we do not have a consistent prediction

[11] Trefler (1993) made an important modification to the Heckscher-Olin theorem by considering productivity differences across countries. The basic idea is that we should consider *productivity differences* in comparing the factor endowment across countries. Following this idea, the United States should be considered as labor abundant because one person-year of U.S. labor is equivalent to several person-years of foreign labor with inferior technology. Following Trefler's (1993) productivity-augmented Heckscher-Olin theorem, we multiplied *Land per labor* with agricultural productivity obtained from the 2003 World Development Indicator. Since the data on the agricultural productivity is not available for Switzerland for all periods, we construct the measure for only 10 countries. However, the correlation between *Land per labor* and the productivity-augmented land endowment is highly correlated and the regression results using the corrected measure are almost the same as the original results besides some marginal changes in coefficients. Thus, in this article we decided not to use this productivity-augmented measure to save observations from Switzerland. We thank Andrew Sobel for this comment.

[12] We thank an anonymous reviewer for pointing out that land per labor is a better measure of the Heckscher-Olin theory than land per person. The reviewer also advised us to include a measure of the capital endowment to labor, but it was dropped for the lack of statistical significance.

[13] Comparing the Brazilian Senate with the Chamber of Deputies, Desposato (2006) argues that the effect of electoral institutions on legislative party strength is quite limited.

across countries, we include Johnson and Wallack's (2006) database of personal vote to control for the impact of personal vote on agricultural subsidies.

Empirical Model

Most time-series cross-sectional models in political science assume a nested hierarchical structure. However, unlike ordinary time-series cross-sectional data, two higher levels in our data, country and commodity, are not nested. This type of nonnested structure is called cross-classification and is heavily studied in educational studies (Raudenbush 1993; Raudenbush and Bryk 2002). Just as collapsing grouped data is problematic in ordinary statistical analysis, it is also troublesome to ignore one of the levels in cross-classified data. In other words, it is not realistic to assume that agricultural subsidies are generated by the *identical* process across countries and across commodities.[14]

One way to account for the cross-classified structure in the data is to use a hierarchical model reflecting the complex correlation in the data. In the case of the Producer Support Estimates data, it is natural to assume that subsidies are correlated within the same commodity, within the same country, within the same country-year, and within the same year. Note that we distinguish time-varying cross-national variations (country-year) from time-invariant cross-national variations (country). Substantively speaking, agricultural subsidies in the United States in 1997 might have been affected by a new farm bill legislated in 1996. This type of unobserved country-year factor should be considered separately from time-invariant country-related factors such as culture, natural endowment, or geography.

With respect to the cluster of time, we detrend our dependent variable to account for a downward trend in the dependent variable. Since we do not find any symptom of serious contemporaneous shocks after detrending, we do not include dummy variables for each year.[15]

The cross-classified multilevel model with varying intercepts for OECD agricultural support can be written as follows.[16]

$$y_{ijt} = \alpha_1 x^1_{ijt} + \cdots + u^{country-year}_{it} + u^{commodity}_{j} + \varepsilon_{ijt}, \quad \varepsilon_{ijt} \sim \mathcal{N}\left(0, \sigma^2_{\varepsilon}\right) \tag{2}$$

$$u^{country-year}_{it} = u^{country}_{i} + \beta_1 z^1_{it} + \cdots + \eta_{it}, \quad \eta_{it} \sim \mathcal{N}\left(0, \sigma^2_{country-year}\right) \tag{3}$$

$$u^{country}_{i} = \gamma_0 + \xi_i, \quad \xi_i \sim \mathcal{N}\left(0, \sigma^2_{country}\right) \tag{4}$$

$$u^{commodity}_{j} = \delta_0 + \zeta_j, \quad \zeta_j \sim \mathcal{N}\left(0, \sigma^2_{commodity}\right) \tag{5}$$

where i denotes the country-level variation, j denotes the commodity-level variation, and t denotes the time dimension. x indicates lower-level predictors which vary across country, commodity, and year, and z indicates country-level predictors which vary across country and year.

$$\begin{aligned}
\beta_k &\sim \mathcal{N}(0, 100), \quad k = 1, \ldots, 12 \\
\sigma^2_{country} &\sim \mathcal{I}G(0.01, 0.01) \\
\sigma^2_{country-year} &\sim \mathcal{I}G(0.01, 0.01) \\
\sigma^2_{commodity} &\sim \mathcal{I}G(0.01, 0.01) \\
\sigma^2_{\varepsilon} &\sim \mathcal{I}G(0.01, 0.01)
\end{aligned}$$

For Bayesian estimation, we impose diffuse priors on the parameters because we want our parameter estimates to be dictated by the data, not by our prior knowledge. We fit the above cross-classified random intercept model using `WinBUGS`. We standardized all nonbinary data to make Marcov chains converge quickly.

Empirical Findings

Before discussing results from our structural model, it is useful to decompose the total variation in the dependent variable into three components: (1) variation among countries ($\sigma^2_{country}$ and $\sigma^2_{country-year}$), (2) variation among commodities ($\sigma^2_{commodity}$), and (3) variation among individual subsidies (σ^2_{ε}). Estimates of the variance components are available in Model 1 of Table 1.[17] The country-level variance accounts for about 56% of the total variance

[14] Technically speaking, data are called exchangeable when the joint probability density is invariant to permutations of the indexes (Gelman et al. 2004). The assumption of exchangeability becomes unreasonable when observations are correlated within the same cluster even after relevant predictors are taken into account.

[15] When we include year dummies without detrending, results are almost the same and all year dummy variables show negative signs, which corroborates a downward trend in the dependent variable.

[16] We could not allow slopes to vary because of the relatively small sample size in higher units.

[17] We can write an unconditional model as follows:

$$\begin{aligned}
y_{ijt} &= u^{country-year}_{it} + u^{country}_{i} + u^{commodity}_{j} + \varepsilon_{ijt}, \quad \varepsilon_{ijt} \sim \mathcal{N}\left(0, \sigma^2_{\varepsilon}\right) \\
u^{country-year}_{it} &= \alpha_0 + \eta_{it}, \quad \eta_{it} \sim \mathcal{N}(0, \sigma^2_{country-year}) \\
u^{country}_{i} &= \beta_0 + \xi_i, \quad \xi_i \sim \mathcal{N}(0, \sigma^2_{country}) \\
u^{commodity}_{j} &= \gamma_0 + \zeta_j, \quad \zeta_j \sim \mathcal{N}(0, \sigma^2_{commodity})
\end{aligned} \tag{6}$$

Note that the intercept is dropped since we centered data at their global mean.

TABLE 1 Posterior Summary of the Producer Support Estimate

	Model 1 Unconditional Model				Model 2 Conditional Model			
Predictor	**Estimate**	**St. Dev**	**Lower**	**Upper**	**Estimate**	**St. Dev**	**Lower**	**Upper**
Production_{ijt}					−0.6096	0.0667	−0.7195	−0.5002
Consumption_{ijt}					0.6527	0.0902	0.5051	0.8031
$\text{Agricultural Share}_{it}$					−0.1630	0.1129	−0.3471	0.0239
GDP_{it}					0.2892	0.1963	−0.0221	0.6174
$\text{Land per Labor}_{it}$					−0.1123	0.2241	−0.4473	0.2709
$\text{Rural Population}_{it}$					−0.0421	0.1230	−0.2404	0.1616
$\text{Personal Vote}_{it}$					−0.4916	0.2021	−0.8445	−0.1850
Cox Threshold$_{it}$					−0.9456	0.5051	−1.7970	−0.1384
$\text{Political Constraints}_{it}$					0.1099	0.0548	0.0206	0.2006
Year_{t}					−0.0304	0.0067	−0.0413	−0.0193
Variance Components								
$\sigma_{country}$	0.9651	0.2458	0.6210	1.5650	0.6164	0.2271	0.3471	1.0450
$\sigma_{country-year}$	0.1247	0.0218	0.0818	0.1676	0.1049	0.0208	0.0713	0.1400
$\sigma_{commodity}$	0.3526	0.0860	0.0732	0.5589	0.3512	0.0867	0.2399	0.5115
σ_{ε}	0.5508	0.0110	0.1500	0.5728	0.5334	0.0106	0.5163	0.5510
Obs	1406				1406			

Note: Models 1 and 2 use data from 11 OECD countries. The dependent variable is the Producer Support Estimate. Lower and Upper indicate 90% Bayesian credible intervals for each estimate. Subscripts *i*, *j*, and *t* indicate that covariates vary across countries, commodities, and year, respectively. In order to make mcmc chains converge quickly, all nondummy variables are standardized. 10,000 samples are stored after throwing out the first 1,000 draws.

in the data, and the proportion of variance across commodities is about 18%.

$$\frac{\sigma^2_{country} + \sigma^2_{country-year}}{\sigma^2_{\varepsilon} + \sigma^2_{country} + \sigma^2_{country-year} + \sigma^2_{commodity}} = 0.5582 \quad (7)$$

$$\frac{\sigma^2_{commodity}}{\sigma^2_{\varepsilon} + \sigma^2_{country} + \sigma^2_{country-year} + \sigma^2_{commodity}} = 0.1799. \quad (8)$$

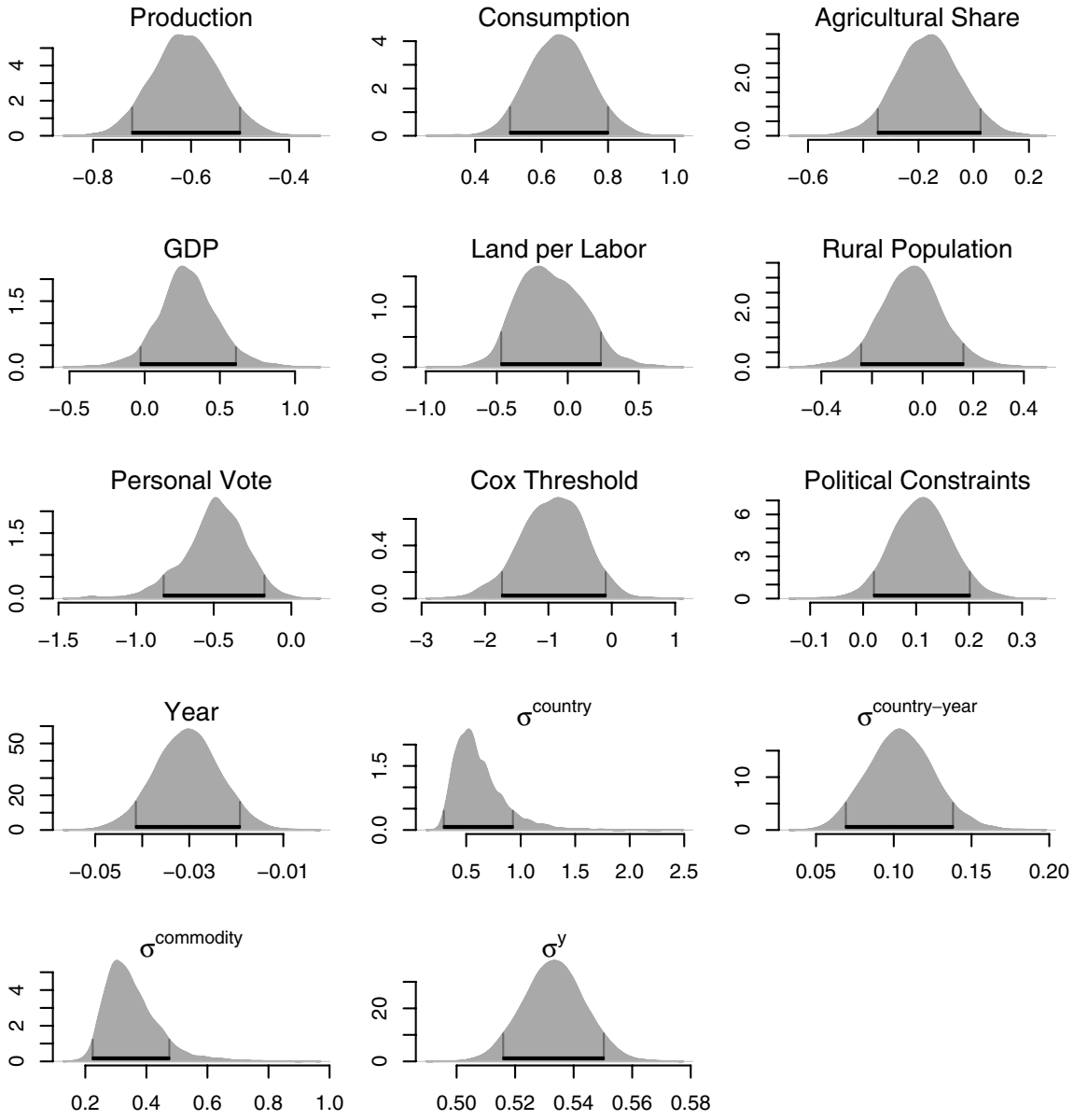
These two variance components consist of 74% of the total variance in the dependent variable. Thus, it is essential to model these higher-level variances separately in the model using corresponding predictors and error terms.

We report posterior estimates of the conditional model in Model 2 of Table 1 and Figure 3. The level of uncertainty in the parameter estimates is expressed by a distribution unlike frequentist confidence intervals. One advantage of Bayesian inference is that we can directly interpret these uncertainties using *probability* terms. For example, negative signs of Upper and Lower for *Production* indicate that the probability of the positive effect of *Production* on the Producer Support Estimates is as large as or larger than 0.90. Figure 3 provides the same information using graphics. Solid bars under each density plot indicate 90% highest posterior density (HPD) interval, which is the smallest interval that contains 90% of posterior distribution.

Most importantly, our results demonstrate that the Cox threshold is negatively correlated the level of agricultural subsidies. We can interpret this result substantively in two ways given the construction of the Cox threshold. On the one hand, *holding voting rules constant, an increase in the number of political competitors increases the average level of agricultural subsidies.* On the other hand, *holding the number of electoral competitors constant, allowing voters more noncumulative votes significantly decreases the average level of agricultural subsidies.* The sign of the Cox threshold is robust to changes in control variables. For example, when we include institutional dummy variables such as president/parliamentary systems and majoritarian/proportional systems, the sign of the Cox threshold remains significant and negative.

Several control variables show expected signs. First, the level of commodity production in a specific country and in a specific year is negatively associated with the level

FIGURE 3 Posterior Distributions of Parameters with Highest Posterior Density



Note: Solid bars under each density plot indicate 90% highest posterior density region.

of agricultural subsidies on average over time. That is, if a country produces large quantities of an agricultural commodity, the country tends to subsidize the producers of the commodity at a low level. From a comparative advantage perspective, this makes perfect sense; countries with a comparative advantage in an agricultural commodity produce large quantities of the commodity. Thus, political demands for protection from the commodity growers are likely to be low in the first place, and politicians find it hard to justify the supply of protection to competitive commodities.

By contrast, the consumption of an agricultural commodity in a specific country-year is positively related to the level of agricultural subsidies. The mechanism linking subsidies and agricultural consumption is less clear. One possibility is that countries are essentially facilitating an import substitution strategy; that is, politicians support industries that have large domestic consumer markets. This story makes sense for rice in Japan and South Korea. Another possibility is that subsidies lower the prices of specific commodities, leading to overconsumption of this commodity. For example, corn subsidies in the United

States lead to low corn prices for consumers and promote substitution effects between sugar and corn syrup for food and beverage producers.[18]

We find that as the importance of personal reputation increases, politicians in industrialized countries are likely to provide a lower level of agricultural support on average. Although we employ an indirect measure of party strength based on Carey and Shugart's (1995) institutional argument, this result runs counter to conventional wisdom in legislative studies (Cain, Ferejohn, and Fiorina 1987; Carey and Shugart 1995; Grossman and Helpman 2005; Mainwaring 1991) that the increase in party strength leads to the decrease in particularistic distribution. The negative sign of the *Personal Vote* supports the conjecture of Bawn and Thies (2003) that politicians who are held individually accountable in elections, having the incentive to build a personal reputation, are less likely to work for organized interests.

Our results show that a country with fewer political constraints (or more political discretion) tends to have a lower level of agricultural subsidies over time. This finding is partly consistent with general claims of veto player argument (Tsebelis 2002). That is, this result implies that political momentum for agricultural policy reform is more likely in political systems with fewer veto players. However, it is less clear why more political constraints (or less political discretion) increase the level of agricultural subsidies. One possibility is that political systems with many constraints may oversupply distributive policies in order to avoid policy deadlock (Cox and McCubbins 2001).

The negative sign of *Year* tells us that there has been a significant downward trend in agricultural subsidies since 1986. There are two possible explanations for this downward trend, one international and one domestic. Internationally, this negative sign might be evidence of effects of international trade negotiation on agriculture which has existed since the Uruguay Round beginning in 1986. In terms of domestic politics, this downward trend reflects a general trend of welfare retrenchment and hard budget constraints in developed countries since the 1980s.

About 85% of parameter estimates of *Agricultural Share* show a negative relationship with the level of agricultural subsidies as we expected. That is, the more a country depends on agricultural production in its economic activity, the lower the agricultural subsidies on average. This negative association should be interpreted with care because our data are collected from industrialized countries in which a share of agricultural production ranges from 1 to 20 with a mean of 6. Thus, a large share of agricultural production in gross domestic production should be seen as a sign of comparative advantage in agriculture rather than industrial backwardness. This is one reason why we do not choose an estimation method that treats data as a random draw of a superpopulation, such as ordinary least squares or maximum-likelihood methods (Western and Jackman 1994).

Figure 3 demonstrates that about 85% of parameter estimates of *GDP* show a positive relationship with the level of agricultural support, which corroborates Anderson and Hayami (1986). However, we could not find a statistically significant relationship in *Land per Labor* and *Rural Population*.

Robustness Checks

Before we reach a conclusion based on the above results, we need to examine the robustness of our findings. We test the robustness of our findings in three different types of sensitivity: model selection, variable selection, and sample selection.

First, one alternative approach to the multilevel model is to include dummy variables for all higher-level units, which will provide "unbiased estimates" of slope coefficients. The basic idea is that slope coefficients will be unbiased if all subject-specific confounding factors are captured within each dummy variable for each subject. However, there are several difficulties in using fixed-effects models in our case. One is that fixed-effects models are not useful to make an inference when our key variables do not have much variation within subject but only have between-subject variation (Allison 2005). The second difficulty of the fixed-effects model is that there are too many dummy variables to be included: 11 country dummy variables, 12 commodity dummy variables, 15 year dummy variables, and 165 country-year dummy variables. A practical approach would be to omit the 165 country-year dummy variables even though agricultural subsidies are highly likely to be correlated within same country-year groups. Lastly, the fixed-effects models provide unbiased but inefficient estimates. Minimizing bias in point estimates often leads to increases in variance in repeated sampling (Gelman et al. 2004). Unbiasedness is a property in the limit of large samples, which does not fit our OECD case. Thus, efficiency is preferred to unbiasedness in this example.

[18] Also, the import quota on raw sugar which increases the U.S. domestic sugar price twice higher than the world price generates artificial demand for sugar substitutes such as corn syrup. As a result,"Archer-Daniels can buy corn for $2.50 a bushel, though it costs farmers $3.50 to produce it. Taxpayers pay the difference to the farmer, subsidizing Archer-Daniels's profits and, in turn, its payments to the politicians who perpetuate the company's special status in the American marketplace" (*The New York Times*, January 16, 1996).

TABLE 2 Fixed-Effects Model of OECD Agricultural Subsidies

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Constant	−1.1357**	0.0839	−0.9005	0.6441	−2.2087**	0.8881	5.9670**	2.6171	1.5975**	0.6521
Production			−0.6122**	0.0681	−0.6074**	0.0676	−0.6059**	0.0676	−0.9054**	0.1194
Consumption			0.6446**	0.0928	0.6372**	0.0921	0.6361**	0.0921	1.1612**	0.1682
Agricultural Share			−0.2323**	0.1154	−0.0711	0.1192	−0.0557	0.1201	0.1386	0.1760
GDP			−0.1442	0.3206	0.3240	0.3325	0.2756	0.3507	0.4232	0.4771
Land per Labor			0.2266	0.2427	0.5780**	0.2628	0.6533**	0.2716	1.3353**	0.5795
Rural Population			−0.0328*	0.0169	0.0019	0.0195	0.0004	0.0206	0.0125	0.0285
Personal Vote					2.7652**	1.3196	2.9809**	1.4033	−1.0003**	0.1649
Cox Threshold					−1.7172**	0.4811	−1.8278**	0.4916	−3.0403**	0.7707
Political Constraints					0.1316**	0.0542	0.1292**	0.0546	0.1090	0.0773
President							0.0967	0.2034	0.1799	0.2473
Majoritarian							−0.0824	0.0872	−0.1266	0.1235
Federal							−8.2246	3.2161	−0.5021	0.9446
Country Indicators					Not reported for the lack of space					
Commodity Indicators					Not reported for the lack of space					
Year Indicators					Not reported for the lack of space					
Obs	1406		1406		1406		1406		815	
RMSE	0.5601		0.5397		0.5354		0.5355		0.6208	
Adjusted R-squared	0.6863		0.7088		0.7134		0.7132		0.6453	

Note: All models are estimated using ordinary least squares. Models 1 through 4 use data from 11 OECD countries and Model 5 uses data from seven OECD countries: Iceland, Japan, Mexico, Norway, South Korea, Switzerland, and Turkey. The dependent variable is the Producer Support Estimate. * indicates p-value < 0.10 and ** indicates p-value < 0.05.

Model 3 in Table 2 shows that the substantive conclusion from the cross-classified random intercept model does not change when we use the fixed-effects model: the effect of the Cox threshold on the level of agricultural support is statistically significant and negative. However, other control variables do not show sensible signs in the fixed-effects model. For example, results show that the size of arable land per labor increases the level of agricultural support. It is difficult to understand why land abundant–labor scarce countries protect agriculture more than land scarce–labor abundant countries. Also, signs of Personal Vote flip when we drop agricultural exporting countries out of the data.

Second, the effect of the Cox threshold remains statistically significant and negative when we include other institutional variables in the model as we see in Model 4 in Table 2. None of these institutional variables is statistically significant.

Last, one might argue that our results are driven by some agricultural exporters which happen to have high Cox threshold scores, such as Australia, Canada, New Zealand, and the United States. We exclude agricultural exporting countries (the Cairns Group and the United States) from the data and fit the same model for seven remaining countries: Iceland, Japan, Mexico, Norway, South Korea, Switzerland, and Turkey. The results are reported in Model 5 of Table 2 for the fixed-effects model. The sign of the Cox threshold is still negative and statistically significant at a 95% level of confidence. Also, we employ a direct measure of agricultural productivity to control for the effect of agricultural exporters in our model.[19] Since agricultural productivity data are not available for Switzerland, we fit our model using the data from the remaining 10 countries. The Cox threshold is still negative and statistically significant at a 95% level of confidence. That is, the negative relationship is not sensitive to the selection of sample.

Overall, Table 2 indicates that the Cox threshold has a consistent negative effect on the level of agricultural support across different models and samples. Among other control variables, only *Production* and *Consumption* have robust effects on the level of agricultural support.

Discussion

What theoretical leverage do we gain by using the Cox threshold? In fact, it is nothing new to students of comparative politics that the number of parties have significant positive effects on the level of government spending by inducing coalition governments or by fragmenting legislature (Bawn and Rosenbluth 2006; Mukherjee 2003; Persson, Roland, and Tabellini 2005; Stein, Talvi, and Grisanti 1998). However, our argument is different from these studies in two ways.

First, while those studies focus on the effect of the number of parties during the post-election process such as government formation and legislative bargaining, we emphasize the effect of the number of competitors during elections on politicians' positions in distributive politics. The logic of electoral survival plays a central role in determining the level of agricultural subsidies in a specific time and space. For example, agrarian parties such as the Finnish Rural Party emerge mostly in multiparty competition where appealing to a tiny segment of voters such as small farmers can be a meaningful electoral strategy. These small parties sometimes manage to be a member of coalition governments in parliamentary systems and wield a large political leverage (Austen-Smith and Banks 1988). However, the policy positions these small parties take are determined mainly by the structure of electoral competition.

The second difference of the Cox threshold is the *conditional* effect of the party system on distributive policy outcomes with regard to voting rules. Australia is a good example in this regard. Since 1918 Australia has had an alternative voting rule that forces voters to express preferences for all candidates. It is well known that this voting rule encourages political parties to align with each other in elections. According to Cox and Myerson, this approval voting is coded 0.5. That is, the Cox threshold predicts that distributive politics in Australia look much like a two-party system although Australia has more than three effective parties in elections.

One policy implication with regard to voting rules relates to the two conflicting goals of political economy: diverse representation and efficient distribution. On the one hand, having the two-party system would be desirable for efficient distribution but less optimal for diverse representation. On the other hand, having the multiparty system would be less optimal for efficient distribution but desirable for diverse representation. One way to avoid this trade-off is to have electoral institutions that encourage multiparty systems and centripetal voting at the same time as in Australia.

Does this framework help us to explain politics of agricultural protection in the European Union? Our empirical analysis excludes the countries of the European Union, where the level of agricultural protection is a function of strategic interactions between domestic governments and supranational actors. We think of the European Union as an organization where numerous diverse interests have the ability to push for policies that benefit

[19] Results are available from the authors.

small groups at the expense of the majority. Yet we believe that the complex pattern of bargaining in the EU that is affected by the formal institutions of the European Union, the formal institutions of the member states, the relative power of the member states, and interest group politics at the national and supranational levels all have dramatic impacts on the common agricultural policy. One fruitful avenue for future research is to draw from both the literature on the determinants of trade protectionism and the literature on bargaining within the European Union to explain the dynamics of agricultural protectionism in the EU. But we stress that domestic political institutions, specifically the degree to which electoral systems encourage candidates to marginalize their constituencies, are still central to explaining the preferences of politicians on agricultural policy.

Conclusion

Countries around the world have signed bilateral and multilateral agreements on the liberalization of the trade of goods. Yet agriculture remains highly protected where a number of advanced countries have maintained high levels of agricultural protection despite cross-national momentum towards trade liberalization. Our main contribution in this article is in uncovering and explaining how agricultural subsidies are systematically tied to political representation in developed countries. Put simply, we show that electoral systems designed to represent diverse interests in a society tend to protect agricultural interests at the expense of broad economic interests such as consumers and taxpayers.

Appendix

Data Sources

Production, Consumption, and Producer Support Estimates Source: OECD (2003). *Production* and *Consumption* are log transformed.

GDP, Agricultural Share, and Rural Population Source: World Bank (2005).

Land per Labor. The relative factor endowment of land to labor is computed by multiplying arable land per person with the share of labor force in the population.

$$\text{Land per labor} = \text{arable land per person} \times \frac{\text{population}}{\text{total labor force}} \tag{9}$$

Source: World Bank (2005).

Political Constraints Source: Witold Henisz's website: http://www-management.wharton.upenn.edu/henisz/.

Personal Vote Source: Johnson and Wallack (2006).

Cox Threshold. The Cox threshold is coded by the authors based on Golder (2005) and IDEA (2005).

Correlation Matrix

TABLE 3 Correlation Matrix

	Agricultural Share	GDP	Land per Labor	Rural Population	Personal Vote	Cox Threshold	Political Constraints
Agricultural Share	1.00	−0.73	−0.23	0.36	−0.61	−0.37	−0.43
GDP	−0.73	1.00	0.13	−0.53	0.36	0.06	0.74
Land per Labor	−0.23	0.13	1.00	−0.42	0.26	0.58	0.42
Rural Population	0.36	−0.53	−0.42	1.00	−0.36	−0.21	−0.43
Personal Vote	−0.61	0.36	0.26	−0.36	1.00	0.25	0.24
Cox Threshold	−0.37	0.06	0.58	−0.21	0.25	1.00	0.05
Political Constraints	−0.43	0.74	0.42	−0.43	0.24	0.05	1.00

References

Allison, Paul. 2005. *Fixed Effects Regression Methods for Longitudinal Data Using SAS*. Cary, NC: SAS Press.

Anderson, Kym, and Yujiro Hayami. 1986. *The Political Economy of Agricultural Protection*. Sydney: Allen and Unwin.

Austen-Smith, David, and Jeffrey Banks. 1988. "Elections, Coalitions, and Legislative Outcomes." *American Political Science Review* 82(2):405–22.

Bates, Robert H. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley: University of California Press.

Bawn, Kathleen, and Frances Rosenbluth. 2006. "Short versus Long Coalitions: Electoral Accountability and the Size of the Public Sector." *American Journal of Political Science* 50(2):251–65.

Bawn, Kathleen, and Michael F. Thies. 2003. "A Comparative Theory of Electoral Incentives: Representing the Unorganized under PR, Plurality and Mixed-member Electoral Systems." *Journal of Theoretical Politics* 15(1):5–32.

Busch, Marc L., and Eric Reinhardt. 2005. "Industrial Location and Voter Participation in Europe." *British Journal of Political Science* 35(4):713–30.

Cain, Bruce, John A. Ferejohn, and Morris P. Fiorina. 1987. *The Personal Vote: Constituency Service and Electoral Independence*. Cambridge, MA: Harvard University Press.

Carey, John M., and Matthew Soberg Shugart. 1995. "Incentives to Cultivate a Personal Vote: A Rank Ordering of Electoral Formulas." *Electoral Studies* 14(4):355–480.

Cox, Gary. 1987. "Electoral Equilibrium under Alternative Voting Institutions." *American Journal of Political Science* 31:82–108.

Cox, Gary. 1990. "Centripetal and Centrifugal Incentives in Electoral Systems." *American Journal of Political Science* 34(4):903–35.

Cox, Gary, and Matthew McCubbins. 2001. *Institutional Determinants of Policy Outcomes*. Cambridge: Cambridge University Press.

Denzau, Arthur T., and Michael C. Munger. 1986. "Legislators and Interest Groups: How Unorganized Interests Get Represented." *American Political Science Review* 80(1):89–106.

Desposato, Scott W. 2006. "The Impact of Electoral Rules on Legislative Parties: Lessons from the Brazilian Senate and Chamber of Deputies." *Journal of Politics* 68(4):1018–30.

Gardner, Bruce L. 1992. "Changing Economic Perspectives on the Farm Problem." *Journal of Economic Literature* 30:62–101.

Gelman, Andrew, John B. Carlin, Hal S. Stern, and Donald B. Rubin. 2004. *Bayesian Data Analysis*. 2nd ed. New York: Chapman and Hall.

Golder, Matt. 2005. "Democratic Electoral Systems Around the World, 1946–2000." *Electoral Studies* 24(1):103–21.

Grossman, Gene M., and Elhanan Helpman. 2001. *Special Interest Politics*. Baltimore: The MIT Press.

Grossman, Gene M., and Elhanan Helpman. 2005. "A Protectionist Bias in Majoritarian Politics." *Quarterly Journal of Economics* 120(4):1239–82.

Hansen, John Mark. 1991. *Gaining Access: Congress and the Farm Lobby, 1919–1981*. Chicago: University of Chicago Press.

Henisz, Witold J. 2000. "The Institutional Environment for Economic Growth." *Economics and Politics* 12(1):1–31.

IDEA. 2005. *Electoral System Design: The New IDEA Handbook*. Stockholm: International Institute for Democracy and Electoral Assistance (IDEA).

Johnson, Joel W., and Jessica S. Wallack. 2006. "Database of Electoral Systems and the Personal Vote." http://dss.ucsd.edu/~jwjohnso/espv.htm.

Lopez, Rigoberto A. 2001. "Campaign Contributions and Agricultural Subsidies." *Economics and Politics* 13(3):257–79.

Magee, S., W. Brock, and L. Young. 1989. *Black Hole Tariffs and Endogenous Policy Theory*. Cambridge: Cambridge University Press.

Mainwaring, Scott. 1991. "Politicians, Parties, and Electoral Systems: Brazil in Comparative Perspective." *Comparative Politics* 24(1):21–43.

McGillivray, Fiona. 2004. *Privileging Industry: The Comparative Politics of Trade and Industrial Policy*. Princeton: Princeton University Press.

Mitchell, Donald O. 2005. *Global Agricultural Trade and Developing Countries*. Washington, DC: World Bank, chapter Sugar Policies: An Opportunity for Change.

Mukherjee, Bumba. 2003. "Political Parties and the Size of Government in Multiparty Legislatures: Examining Cross-Country and Panel Data Evidence." *Comparative Political Studies* 36(6):699–728.

Myerson, Roger B. 1993. "Incentives to Cultivate Favored Minorities under Alternative Electoral Systems." *American Political Science Review* 87(4):856–69.

Niemi, Richard G., and John Fuh sheng Hsieh. 2002. "Counting Candidates: An Alternative to the Effective N (with an Application to the M + 1 Rule in Japan)." *Party Politics* 8(1):75–99.

OECD. 2003. "Producer and Consumer Support Estimates, OECD Database 1986-2003." Organization for Economic Cooperation and Development (OECD).

Olson, Mancur. 1965. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press.

Persson, Torsten, and Guido Tabellini. 1999. "The Size and Scope of Government: Comparative Politics with Rational Politicians." *European Economic Review* XLIII:699–735.

Persson, Torsten, Gerard Roland, and Guido Tabellini. 2005. Electoral rules and government spending in parliamentary democracies. Working paper. Stockholm University.

Persson, Torsten, and Guido Tabellini. 2002. *Political Economics: Explaining Economic Policy*. Baltimore: The MIT Press.

Raudenbush, Stephen W. 1993. "A Crossed Random Effects Model for Unbalanced Data with Applications in Cross-sectional and Longitudinal Research." *Journal of Educational Statistics* 18(4):321–49.

Raudenbush, Stephen W., and Anthony S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Anlaysis Methods*. 2nd ed. Beverly Hills: Sage Publications.

Rickard, Stephanie J. 2006. "Examining the Impact of Electoral Institutions on the Form of (Re)distributive Policies." Presented at the annual conference of the Midwest Political Science Association.

Rogowski, Ronald, and Mark Andreas Kayser. 2002. "Majoritarian Electoral Systems and Consumer Power: Price-Level Evidence from the OECD Countries." *American Journal of Political Science* 46(3):526–39.

Scheve, Kenneth, and Matthew J. Slaughter. 2001. "What Determines Individual Trade-policy Preferences?" *Journal of International Economics* 54:267–92.

Shugart, Matthew, and Martin P. Wattenberg. 2003. *Mixed-Member Electoral Systems: The Best of Both Worlds?* Oxford: Oxford University Press.

Stein, Ernesto, Ernesto Talvi, and Alejandro Grisanti. 1998. Institutional arrangements and fiscal performance: The Latin American experience. Working paper 367, Inter-American Development Bank.

Trefler, Daniel. 1993. "International Factor Price Differences: Leontief Was Right!" *Journal of Political Economy* 101(6):961–87.

Tsebelis, George. 2002. *Veto Players: How Political Institutions Work*. Princeton: Princeton University Press.

Western, Bruce, and Simon Jackman. 1994. "Bayesian Inference for Comparative Research." *American Political Science Review* 88:412–23.

World Bank. 2005. *World Development Indicators 2005*. Washington, DC: World Bank.