

Agricultural Protection and Electoral Systems: An Empirical Investigation

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Abstract

This paper explores the relationship between countries' electoral systems and their levels of agricultural support. Using the theoretical framework in Grossman and Helpman (2005), we examine whether countries with majoritarian systems, which feature legislators able to redistribute income to their home districts, are more likely to protect agriculture than are countries with proportional systems, which would tend to focus on the well-being of the country as a whole. We find majoritarian countries are in fact associated with lower levels of agricultural support. This result contrasts with our findings for non-agricultural products, for which majoritarian countries tend to have higher barriers.

Agricultural policies are an important component of a country's trade policy, as well as a critical element of the world trading system. For one, despite large reductions on tariffs on manufactured products, tariffs and other protective measures for agricultural products remain high. In addition, agricultural policy has become a major area of tension between developed and developing countries. Developed countries often put in place a particularly high level of support for the domestic agricultural industry, a situation that some developing countries may view as harmful to their own economic development interests.

In this paper, we ask whether there is a link between countries' electoral systems and their agricultural support policies. In particular, we are interested in whether majoritarian systems, which would tend to favor specific geographic districts, are more likely to protect agriculture than are proportional systems, which would tend to focus more on the well-being of the country as a whole. The broad theoretical framework is taken from Grossman and Helpman (2005), who suggest a protectionist bias in majoritarian systems, reflecting a tendency for legislators to redistribute income to industries in their home districts.

Examining the relationship between agricultural protection, in particular, and electoral systems is of interest, for a number of reasons. First, in comparison to manufacturing, which may be more dispersed geographically, agriculture, being linked to a particular geographic location (district), would seem to be the most likely sector to exhibit this relationship. Second, countries protect their agricultural industries in a variety of ways, including tariffs, quotas, and "domestic support" (such as payments directly to farmers), and it could be of interest to examine any similarities or differences across these various types of protection. Finally, since agricultural policies play an important role in international trade relations, understanding the relationship between political institutions and agricultural policies could have implications for future efforts

to liberalize trade.

The Existing Literature

Literatures relevant to our own work include those on electoral systems and trade policy outcomes, on electoral systems and other policy outcomes, and on agricultural policies and political characteristics.

Electoral Systems and Trade Policy Outcomes

A small number of papers have considered the relationship between electoral systems and trade policy. For example, Evans (2008) examines the link between electoral systems and overall average country tariffs. Using a panel data set that includes a mix of developing and developed countries between 1981 and 2004, she finds that countries with majoritarian systems tend to have higher average tariffs than do countries with proportional systems. This result is consistent with the predictions of the Grossman-Helpman (2005) paper – “A Protectionist Bias in Majoritarian Politics” – which will be described in more detail below.

Fredriksson, Matschke, and Minier (2008) also incorporate the broad framework of Grossman and Helpman (2005). Building on that framework, they provide a model that predicts that industries concentrated in districts represented by the majority party tend to receive trade protection. Using data on tariffs on U.S. manufacturing industries in 1993, they find results consistent with the predictions of their model.

Hatfield and Hauk (2004) utilize data for 34 Latin American and OECD countries from the 1980s to the 1990s; their analysis shows an association between majoritarian systems and lower tariffs. Using data on 14 countries in 1983 and 1986, Mansfield and Busch (1995) find that countries with proportional systems are associated with higher nontariff barriers.

Electoral Systems and Other Policy Outcomes

A far broader literature has explored the relationship between electoral systems and other policy outcomes. Persson and Tabellini (2003) provide a summary of this literature, as well as extensive analysis of the relationship between both electoral systems (proportional versus majoritarian) and forms of government (presidential versus parliamentary) and various policy outcomes. They find a relationship between electoral system and form of government and, for example, the size of government, the composition of spending, and productivity.

Blume et al. (2007) revisit the Persson-Tabellini analysis. They do not find a relationship between the form of government and the policy outcomes shown by Persson-Tabellini, but confirm a relationship between electoral system and government expenditure, rent seeking, and productivity.

Using panel data, Pagano and Volpin (2005) find that more proportionality in the electoral system is associated with less shareholder protection and more employment protection. This result is consistent with their theoretical model.

Agricultural Policies and Political Characteristics

A number of papers have considered the relationship between countries' agricultural policies and certain political characteristics. For example, Park and Jensen (2007) explore the relationship between the degree to which a country's politicians' focus on narrow constituencies and that country's agricultural support, using the Producer Support Estimate (PSE) at the commodity level as their indicator of agricultural support. They find that countries with electoral systems in which politicians have an incentive to focus on narrower groups tend to have higher levels of agricultural support. Although they do not explicitly focus on the question of majoritarian versus proportional electoral systems, this variable is included as a control in some of their analyses,

with the result of an insignificant coefficient. This study, however, focuses only on 11 OECD countries, between 1986 and 2000.

Olper and Raimondi (2008) explore the relationship between protection for agriculture and a shift into a majoritarian democracy versus a shift into a proportional democracy. Using the World Bank's "Nominal Rate of Assistance" database, they find that moving into a proportional democracy is associated with a much higher level of protection for agriculture than is a shift into a majoritarian democracy.¹

Beghin and Kherallah (1994) consider the relationship between electoral systems and agricultural protection, in the context of analyzing the relationship between agricultural protection and a broader array of political characteristics. Their data span 25 countries for the period 1982 to 1985, at the commodity level. In terms of electoral systems, however, their focus is on the degree of pluralism, rather than the comparison between majoritarian and proportional systems. They find that a greater degree of pluralism is associated with a higher degree of agricultural protection, when the comparison is made between a system with no parties and one with multiple parties. A similar relationship holds when comparing a no party system to one with one dominant party, although not when comparing a no-party system to a one-party system.

The Theoretical Framework

Our approach follows from Grossman and Helpman (2005). They present a theoretical model in which each of three districts elects a representative to the national legislature. Each of these three districts is also home to one of the three industries in the model. There are two political parties, and the party that wins the most seats in the legislature holds decision-making power over the country's policies.

Each individual elected representative seeks to maximize the welfare of his or her home

district through the provision of tariff protection for that district's home industry. Decisions of the legislature as a whole embody the interests of the legislators from the party in power and thus aim to maximize the joint welfare of the districts that have elected representatives from the ruling party.

If all districts choose representatives from the same political party, then that party takes into account the interests of all districts, i.e., the whole country, in making its decisions. As a consequence, the welfare of the nation as a whole is maximized, implying a trade policy of free trade – the first-best outcome for a small open economy. This zero-tariff outcome is represented in the model as:

$$\bar{t}_{\{j,k,l\}} = t_{\{j,k,l\}} = 0$$

where $\bar{t}_{\{j,k,l\}}$ is the mean tariff when the ruling party represents all three districts j , k , and l .

If, rather than the ruling party representing all districts, it holds a majority by having won two of the three districts, it takes into account the interests of only those two districts in making decisions. In this case, the model predicts that the legislature will instead choose a more protectionist policy, i.e. a policy of non-zero tariffs:²

$$\bar{t}_{\{j,k\}} > 0$$

where $\bar{t}_{\{j,k\}}$ is the mean tariff when the party in power represents only two (j , k) of the three districts. This two-district majority outcome occurs with probability $\frac{3}{4}$, and the overall expected tariff in this simplified version of the model may be represented as $\frac{1}{4} * \bar{t}_{\{j,k,l\}} + \frac{3}{4} * \bar{t}_{\{j,k\}} = \frac{1}{4} * 0 + \frac{3}{4} * \bar{t}_{\{j,k\}} = \frac{3}{4} * \bar{t}_{\{j,k\}}$, a deviation above the optimal small-country tariff of zero.

The stylized majoritarian system presented in the Grossman-Helpman model may be contrasted with a proportional system. In one form of a proportional system, the country as a

whole is the electoral district, legislators are elected by this national constituency, and they would be expected to set the optimal zero average tariff. In a proportional system with multiple districts, each district may be represented by more than one party. In such a system, the probability that any one district is not represented by the party in power becomes much lower than in the majoritarian case. As the counterpart to this point, the probability that all districts are represented by the party in power becomes much higher.³ Thus, the overall average tariff would be expected to be lower in a nation with a proportional system than in one with a majoritarian system.

This prediction of the Grossman-Helpman model is supported by the empirical evidence presented in Evans (2008). In this paper, rather than examining countries' overall average tariffs, we choose to examine tariffs (and general government support) within one particular sector – agriculture. The Grossman-Helpman framework makes certain predictions about the level of protection within specific industries. They argue that the majority provides positive protection for industries located in the home districts of their member legislators, as long as the citizens of those districts have a more than proportional ownership interest in those industries. The agricultural sector would seem to be particularly relevant for examining the sector-level support for this prediction of the Grossman-Helpman model. Given the heavy use of land itself as an input, it would seem to satisfy well the requirement of the model that residents of a given district have a more than proportional ownership share in that district's local sector.

As an additional point, note that a number of models of the relationship between electoral systems and policy decisions link a proportional system to programs with more broad-based benefits than majoritarian systems, which are more likely to target benefits to narrower interest groups.⁴ In this regard, to the extent that policies of agricultural protection and support would

tend to protect the narrow group of agricultural interests and push up prices for other groups in the economy, we would also expect that support for agriculture would be higher in countries with majoritarian systems.

The Data

The overall dataset contains observations for 74 countries across 30 years. A number of our measures are available for a limited number of countries and/or years, so the actual countries and years incorporated in the analysis will differ for each specification.

Classification of Democracies

In order to delineate democracies from non-democratic systems, we rely on the *Polity2* measure from the Polity IV project (Marshall & Jaggers 2007). Based on guidance on regime categorizations available from the Polity project, we define all countries with *Polity2* scores greater than 5 as democracies.⁵

Electoral System

The Database on Political Institutions (DPI) contains information on countries' electoral systems (Keefer 2007). We use the 2006 version of this database to divide countries into proportional and pluralitarian/majoritarian systems, as well as to eliminate those countries that have "mixed" systems.⁶

Agricultural Support and Protection

To identify levels of support and protection for agriculture, we use a variable called the "Nominal Rate of Assistance." Developed as part of a World Bank project, the measure is intended to capture the degree to which policy interventions distort the prices of agricultural products. It covers a far broader range of countries and years than most other measures of agricultural protection and support, and also takes into account the myriad ways in which

governments intervene in agricultural markets. As such, this Nominal Rate of Assistance (NRA) is possibly the simplest and most effective measure of general distortion to price incentives and has been recently comprehensively updated by Anderson and Valenzuela (2008). The data are based on very detailed product-specific information on border and domestic assistance for a group of the most important (in terms of distortionary effects) agricultural products, along with an informed estimate, based in part on the NRA for covered products, for the remaining (30 percent) of products.⁷

To understand how the NRA is calculated for the covered products, consider one component of this broader measure of support – border assistance. To explain, suppose a tariff is imposed on an imported agricultural product. In this case, the NRA_{BS} is defined as the unit value of production at the tariff-distorted price minus the value of production at the undistorted free-market price, divided by the undistorted price:

$$NRA_{BS} = \frac{E * P(1 + t_m) - E * P}{E * P} = t_m$$

where E is the domestic currency price of foreign exchange, P is the foreign currency price of the particular product on the world market, and t_m is the ad valorem tariff on imports of the product. Thus, it is a measure of the “wedge” between the world price of a given product and its price within the domestic market, taken as a percentage of the undistorted world price. Using a similar methodology, other distorting measures imposed at the border, such as export subsidies and specific tariffs can be incorporated into the measure of border distortions.

Similarly, policies of domestic price support can be incorporated into a nominal rate of assistance from domestic support, NRA_{DS} . The NRA on output, NRA_O , then consists of the sum of the border-related support (NRA_{BS}) and the domestic support (NRA_{DS}) on the specific product. The final overall NRA_{Ag} measure incorporates this NRA on output (NRA_O), together

with assistance to relevant inputs and other non product-specific assistance.

In our analysis, we use a number of the variables available in this database, each of which is described below.⁸

Nominal Rate of Assistance to All Agricultural Products

This covers all agricultural products, whether or not they are traded, that are part of the core group (i.e., those with the most distortionary policies) included in the World Bank study, as well as other agricultural products. It includes all forms of agricultural support – border-related, domestic, input, and non-product specific assistance. The average is production-weighted across individual products.

Nominal Rate of Assistance to Tradable Agricultural Products

This variable highlights assistance to tradable agricultural products, including both exportable and importable products. It includes both the core products with the most distortionary policies and other agricultural products. It again includes the various types of assistance and is weighted by each country's production of the relevant products.

Nominal Rate of Assistance to Tradable Non-Agricultural Products

The database also includes information on assistance to tradable non-agricultural products. This is calculated for non-agricultural products using methods similar to those used to calculate the NRA for covered products. It is again a production-weighted average.

Characteristics Related to Electoral System

Our primary explanatory variable of interest – a country's electoral system – is determined by a myriad of country-specific factors, many of which are unobserved. Some of these same factors could potentially have an impact on a country's protection for the agricultural sector. In our empirical work, we need to deal with the potential bias introduced by not taking account of these

factors. Failing to do so would imply that the error is correlated with the explanatory variables. Our methods for dealing with this issue are described later. Here, we lay out the factors that we are able to observe and thus incorporate when appropriate.

Legal Origins

Countries utilize legal systems that often stem from a limited number of unique systems historically originated by other countries. The classes that we specify are for systems that have origins in the United Kingdom, France, or former Soviet Union regimes. These data are from Persson and Tabellini (2003).

Colonial History

As with legal origins, we need to control for a country's colonial history, as this could impact both agricultural policy and electoral rules. We identify whether a country has a history as a colony of the United Kingdom or of any other country. These data are also from Persson and Tabellini (2003).

Geographic Location

Geographic location could affect electoral system, as countries may view their neighbors as political examples. Location could also be related to agricultural support and agricultural productivity. We include information on a country's continental location from the United Nations (United Nations Statistics Division 2006). We also include data on a country's distance from the equator, as provided by Persson and Tabellini (2003). Note that Persson and Tabellini suggest that this distance from the equator may be related to electoral systems, as it may be related to the degree of influence from Western Europe, as suggested by Hall and Jones (1999).

Date of Adoption of Constitution

Based on Persson and Tabellini (2003), we incorporate the date in which a country adopted its

constitution, as this variable seems to be associated with a country's electoral system. Thus, we use dummy variables based on these dates as instrumental variables in some of our specifications. These data are from Persson and Tabellini (2003).

Other Factors Affecting Agricultural Policy

We also take into account a number of other factors that could potentially affect agricultural policy.

Resource Structure and Comparative Advantage

The basic version of the Grossman-Helpman model is quite parsimonious, not taking into account factors such as a country's economic structure and role in the world distribution of resources. For example, a country with a sizeable endowment of agricultural land may have a different stance towards agricultural protection than a country with a smaller agricultural territory. Thus, we incorporate a number of variables providing some information about a country's relative resource base, which are described below.⁹

The Heckscher-Ohlin or factor endowments theory of trade posits that countries' comparative advantage in different products is determined by their relative endowments of resources. In the context of the agricultural sector, land is a particularly important resource. Thus, we incorporate a number of measures suggestive of a country's resource base relative to other countries in the world. These include square kilometers of agricultural land per person and distance from the equator, as described above. The data on land per person are derived from the individual variables in the World Bank's World Development Indicators (World Bank (2008)).

Other Political Elements

It is of interest to examine whether other political factors affect a country's policies towards agriculture. For one, if a larger share of the population works in the agricultural sector, there

could be strong support nationwide for policies supporting agriculture. Assuming that those working in other sectors of the economy would not want to see higher agricultural prices, we also incorporate information on the share of employment in services.

Economic Structure

The structure of the economy, i.e. the relative importance of agriculture versus services versus industry may affect agricultural policy. The sectoral employment shares described above capture the relative importance of these different sectors. We also include the level of GDP per capita (on a PPP basis), as a country's economic structure generally varies with the level of economic development. These data are from the World Bank's World Development Indicators (World Bank (2008)).

Summary Statistics

Tables 1.1 to 1.3 show the summary statistics for our dependent variables. In each table, the top panel provides the information for all countries, while the bottom panel contains the data when the sample is limited to democracies. Table 1.1 illustrates that the mean nominal rate of assistance for all agricultural products is larger for proportional and for mixed systems than for pluralities. This same pattern is repeated in Table 1.2, which provides the statistics for all covered and non-covered tradable agricultural products. As Table 1.3 shows, however, this pattern is reversed for non-agricultural products – the mean nominal rate of assistance is higher for pluralities than for mixed and proportional systems.

Empirical Strategy

We analyze the relationship between agricultural support and electoral system using a number of different methods. Initially, we use a very parsimonious OLS of the dependent variable on the electoral system dummy variable and a series of year dummy variables. This simplest approach,

however, has a number of potential pitfalls. Most importantly, our variable of interest – electoral system – varies little over time (as countries only infrequently alter their electoral systems) – and mainly across countries. Relying as we do on this cross-sectional variation, it is critical that we try to eliminate other country-specific factors that could affect both electoral system and agricultural policy. Failure to do so would mean that the error in the regression could be correlated with an included independent variable.

We approach this issue by, first, incorporating in an OLS framework a number of country-specific variables that could be related to both electoral system and agricultural policy. These were described in the previous section and include historical factors, such as colonial and legal-system origins, as well as geographical factors, such as a country’s continent and distance from the equator. By doing so, we hope to reduce the possible effects of omitted variables. Thus, the basic OLS is constructed as follows:

$$NRA_{Ag}^{it} = \beta_0 + \beta_1 Plurality^{it} + \beta_2 X_2^{it} + \dots + \gamma_t' T^{it} + \varepsilon$$

where $Plurality^{it}$ represents the dummy variable denoting a country/year’s electoral system, X_n^{it} represents the set of control variables, and T^{it} a set of year fixed effects, which are incorporated in this basic OLS, as well as in our additional approaches. The standard errors have been corrected for clustering by country.

In our second approach, based on Angrist and Krueger (2001), we use a two stage least-squares instrumental variables approach to dealing with the potential omitted variable problem. The instruments must be variables that are associated with a country’s choice of electoral system, but not related to policies of support for agriculture. Thus, we use the set of dummy variables described above denoting the date when a country adopted its constitution. In these analyses, we also allow the GDP per capita, proportion of employment in agriculture, and proportion of

employment in services to be endogenous, using five-year lagged values, as well as the percent of agricultural land in total land area, as instruments.

Finally, we use a treatment-effects approach that allows a country's electoral system to be endogenous. This is constructed as a two equation model, in which the first equation consists of a probit of electoral choice (i.e., the dummy variable *Plurality*) on three variables – the Europe dummy variable, a country's distance from the equator, and a dummy variable indicating whether a country adopted its constitution after 1981, and a second equation which consists of the agricultural support dummy variable on our basic explanatory variables. The system is solved using maximum likelihood.

Empirical Results

For all of our analyses, we present the three dependent variables mentioned above – all covered agricultural products, all tradable agricultural products, and tradable non-agricultural products together. This allows us to examine and contrast the results among the three.

Base Analysis

The initial analysis is in Table 2. The columns represent our three dependent variables, presented with increasing degrees of stringency on democracy and then increasing degrees of strictness on our measure of majoritarianism. In the first three columns, we include all countries, whether or not they are democracies. In columns 4 through 6, we incorporate all countries that are classified as having a pluralitarian/majoritarian system, no matter the district magnitude, i.e., the number of representatives per district. The next three include only those in which at least one of the legislative bodies is characterized by “single-member districts” (SMD). These are districts with only one elected representative per district. The last three columns contain the result when incorporating only those countries/years for which there are only single-member districts. This

distinction is important because, in cases where there are more than one representative per district, it is possible that a number of parties, rather than one alone, could represent that district. That feature would make that country less representative of the stylized majoritarian system of the Grossman- Helpman model. In addition, a country with such a system could have a situation in which a district is represented by more than one party, thereby weakening the identification of a particular district (and its primary industry) with the party of its one representative.

For the first three columns, the variable of interest, *plurality*, which is one when a country has a plurality system and zero otherwise, is negative and significant for the indicators of agricultural assistance, while it is positive and significant for the non-agricultural tradables variable. This pattern of signs is maintained across the increasingly stringent categories in the remainder of Table 2. Thus, the proposition that majoritarian systems tend to have higher levels of protection is supported by the results for non-agricultural products, but the results for agricultural products suggest the opposite relationship – levels of agricultural support are *higher* for proportional systems. In the remaining tables of the paper, we restrict our analyses to the strictest definition of majoritarian systems, i.e., democracies with only single-member districts.

Incorporating geography, comparative advantage, and resource structure

There are a number of additional country-specific characteristics that we need to control for before interpreting much about the relationship between agricultural support and electoral system. Thus, Table 3 provides the results of incorporating such characteristics of a country, other than the electoral system, that could affect levels of agricultural support. In that table, we control for the set of geography-related, historical, and economic/comparative advantage factors mentioned above. (Note that coefficients on the continent dummy variables are not included for reasons of space.) The results in the first and second columns show that controlling for these

country-specific factors leads to the *Plurality* variable becoming negative and highly significant, suggesting that countries/years with pluralitarian systems are associated with *lower* overall agricultural tariffs. Also interesting, the coefficient on the square kilometers of agricultural land per person is negative and significant, suggesting that countries with a relatively higher endowment of this agricultural resource are associated with less support for the sector. As for assistance to the non-agricultural sector, the coefficient on the plurality variable is positive and significant, suggesting that pluralitarian systems are associated with higher levels of support.

Dealing with Selection Bias Using Additional Approaches

The OLS analysis incorporating the range of country-specific factors was one approach to dealing with omitted-variables bias. An additional approach, as suggested by Angrist and Kruger (2001), is a two-stage least squares approach. These results are in Table 4. We allow the *Plurality* dummy variable, the GDP per capita variable, and the employment shares of agriculture and services to be endogenous, as described above. Doing so, the coefficients on the *Plurality* dummy variable retain the same signs as in Table 3, although the level of significance does fall a bit.

Table 5 shows the results when using the treatment-effects framework described above. Using this methodology, the *Plurality* dummy variable maintains the signs shown above, and the levels of significance are quite high. Thus, pluralistic systems are associated with lower levels of agricultural support, but with higher levels of support for non-agricultural products.

Summary and Conclusion

Policies toward the agricultural sector are an important element of domestic and world trade policy. The recent run-up in global food prices has also highlighted the sensitive nature of the agriculture sector and of domestic availability of a steady and affordable supply of agricultural

products. Our paper has explored the relationship between agricultural policy and electoral systems using a range of countries and years and econometric approaches.

We find that countries with proportional systems in fact tend to have higher levels of support for agriculture. This result holds after controlling for a number of possible explanatory factors, including a country's resource structure, as well as historical factors which could affect its political system. It is also in contrast to our findings for non-agricultural products, for which countries with majoritarian systems tend to have higher barriers.

The apparent differences between agricultural and non-agricultural products is striking. In contemplating a possible explanation, we suggest that the intrinsic nature of agricultural products is likely an important aspect of the explanation. Food represents a critical element of a populace's viability and, indeed, survival. To the extent that importing food places a nation's food supply at risk to other countries' export restrictions or price spikes, the maintenance of domestic food resources may be important. To the extent that support of the agricultural sector is seen as an element of national security and welfare, it may be the case that proportional systems put more emphasis on this element of overall national welfare. We are not able to examine empirically this supposition given our current dataset, so we leave the confirmation (or refutation) of this proposition to future work.

In any case, future research should reveal more about the relationship between electoral systems and agricultural, as well as about differences between agricultural and non-agricultural products.

Footnotes

¹ This “Nominal Rate of Assistance” database, which we also use in this paper, will be in described in more detail in a later section of this paper.

² This result holds as long as districts differ in terms of their pattern of ownership of shares in the three industries and as long as there is convexity of the profit function.

³ See Evans (2008) for more discussion of this point.

⁴ For example, see Persson & Tabellini (2003). Grossman, G., & Helpman, E. (2005) also mention this point.

⁵ The website contains the following statement regarding the *Polity* variable, which is the base for the *Polity2* variable that we use:

“The Polity scores can also be converted to regime categories: we recommend a three-part categorization of "autocracies" (-10 to -6), "anocracies" (-5 to +5 and the three special values: -66, -77, and -88), and "democracies" (+6 to +10);”

⁶ The documentation to the Database on Political Institutions defines the variable as follows: “In “plurality” systems, legislators are elected using a winner-take-all / first past the post rule. “1” if this system is used, 0 if it isn’t.” (See Keefer (2007).) We will use the terms “pluralitarian” and “majoritarian” interchangeably to refer to the pluralitarian/majoritarian broad class of electoral systems. The Administrative Cost of Elections (ACE) Encyclopedia identifies three main “families” of electoral systems – plurality/majority systems, proportional representation systems, and mixed systems. See http://aceproject.org/ace-en/topics/es/topic_index for more details.

⁷ See Anderson, K., Kuurzweil, M., Martin, W., Sandri, D., & Valenzuela, E. (2008a) and Anderson, K., Kuyrzweil, M., Martin, W., Sandri, D., & Valenzuela, E. (2008b) for more information on the methodology.

⁸ See <http://go.worldbank.org/YAO39F35E0>; Anderson, K., Kuurzweil, M., Martin, W., Sandri, D., & Valenzuela, E. (2008a); and Anderson, K., Kuyrzweil, M., Martin, W., Sandri, D., & Valenzuela, E. (2008b) for more information.

⁹ Countries' agricultural policies are likely at least in part attributable to their relative competitiveness in agricultural products. For example, if a nation's agricultural producers operate more efficiently at a lower cost than producers elsewhere in the world, there would seem to be little need to protect them from competition from imports. If, on the other hand, a country wished to maintain an agricultural sector despite adverse climactic or geographic conditions, it may need to put in place protective policies in place in order to do so.

Measures Used in Our Analysis

Measure	Description
nra_tott (AllAg)	Nominal rate of assistance to all covered and uncovered agricultural products
nra_agtrad (AgTrad)	Nominal rate of assistance to all covered and uncovered tradable agricultural products
nra_nonagtrad (NonAgTrad)	Nominal rate of assistance to all tradable nonagricultural products

Table 1.1

Nominal Rate of Assistance to All Agricultural Products – Overall Dataset						
System	N	NCtries	Mean	SD	Min	Max
Mixed	445	22	0.40	0.72	-0.52	4.18
Plurality	600	32	0.04	0.28	-0.74	1.23
Proportional	615	28	0.40	0.55	-0.37	3.19
Total	1660	73	0.27	0.56	-0.74	4.18
Nominal Rate of Assistance to All Agricultural Products – Polity 2 > 5						
System	N	NCtries	Mean	SD	Min	Max
Mixed	363	21	0.47	0.76	-0.52	4.18
Plurality	250	16	0.22	0.28	-0.50	1.23
Proportional	538	27	0.46	0.57	-0.37	3.19
Total	1151	59	0.41	0.60	-0.52	4.18

Table 1.2

Nominal Rate of Assistance to Tradable Agricultural Products - Overall Dataset						
System	N	NCtries	Mean	SD	Min	Max
Mixed	445	22	0.44	0.77	-0.53	4.18
Plurality	600	32	0.01	0.34	-0.92	1.23
Proportional	615	28	0.41	0.55	-0.42	3.19
Total	1658	73	0.27	0.59	-0.92	4.18

Nominal Rate of Assistance to Tradable Agricultural Products - Polity 2 > 5						
System	N	NCtries	Mean	SD	Min	Max
Mixed	363	21	0.51	0.81	-0.53	4.18
Plurality	251	16	0.22	0.30	-0.70	1.23
Proportional	536	27	0.46	0.57	-0.42	3.19
Total	1150	59	0.42	0.62	-0.70	4.18

Table 1.3

Nominal Rate of Assistance to Tradable NonAgricultural Products - Overall Dataset						
System	N	NCtries	Mean	SD	Min	Max
Mixed	434	21	0.08	0.12	0.00	0.82
Plurality	564	29	0.14	0.13	-0.11	0.65
Proportional	560	26	0.07	0.11	-0.04	0.68
Total	1558	68	0.10	0.12	-0.11	0.82
Nominal Rate of Assistance to Tradable NonAgricultural Products - Polity 2 > 5						
System	N	NCtries	Mean	SD	Min	Max
Mixed	360	21	0.07	0.12	0.00	0.82
Plurality	239	15	0.09	0.11	-0.03	0.65
Proportional	495	26	0.05	0.07	-0.04	0.56
Total	1094	57	0.06	0.10	-0.04	0.82

Table 2 — Base Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	All Ag	Ag Trad	Non AgTrad	All Ag	Ag Trad	NonAg Trad	All Ag	Ag Trad	NonAg Trad	All Ag	Ag Trad	NonAg Trad
	All Ctries	All Ctries	All Ctries	All Demo	All Demo	All Demo	Loose Maj	Loose Maj	Loose Maj	Strict Maj	Strict Maj	Strict Maj
Plurality	-0.37***	-0.41***	0.071**	-0.24*	-0.25*	0.045	-0.22	-0.23	0.049	-0.23	-0.25	0.089
	(0.12)	(0.13)	(0.029)	(0.14)	(0.14)	(0.029)	(0.15)	(0.15)	(0.033)	(0.19)	(0.19)	(0.063)
Observations	1215	1213	1124	788	787	734	755	754	701	631	630	577
R-squared	0.180	0.192	0.138	0.149	0.156	0.073	0.135	0.142	0.076	0.130	0.138	0.134

Note: *** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Year dummy variables included in all analyses.

Table 3 — Add Location, Historical and Endowment Controls

	(1)	(2)	(3)
VARIABLES	All Ag	AgTrad	NonAgTrad
Plurality	-0.72*** (0.15)	-0.72*** (0.15)	0.14*** (0.037)
Per Capita GDP, PPP basis, current Intl \$	-9.6e-06 (0.000010)	-9.1e-06 (0.000010)	4.1e-06** (1.6e-06)
UK Colonial Origin	-0.13 (0.22)	-0.13 (0.22)	0.10*** (0.035)
Other Colonial Origin	0.66 (0.43)	0.65 (0.43)	0.044* (0.022)
UK Legal Origin	0.70*** (0.19)	0.70*** (0.20)	-0.14*** (0.036)
Soviet Legal Origin	-0.71 (0.51)	-0.73 (0.51)	0.080*** (0.028)
French Legal Origin	0.0087 (0.094)	0.0066 (0.094)	-0.028 (0.023)
Distance from Equator	1.71 (1.14)	1.70 (1.14)	-0.60*** (0.19)
Sq Km Agric Land Per Person	-27.6* (15.3)	-27.9* (15.5)	7.55*** (2.32)
Perc. Empl. in Agriculture	0.013 (0.016)	0.014 (0.016)	0.0021 (0.0014)
Percent Empl. in Services	0.019 (0.021)	0.019 (0.021)	0.0034 (0.0020)
Observations	388	388	379
R-squared	0.697	0.700	0.758

Note: *** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Year and continent dummy variables included in all analyses.

Table 4 — Alternative Estimation Strategies — 2SLS

	(1)	(2)	(3)
VARIABLES	All Ag	AgTrad	NonAgTrad
Plurality	-1.45*	-1.37*	0.27*
	(0.81)	(0.74)	(0.15)
Perc. Empl. in Agriculture	0.078	0.071	-0.0073*
	(0.058)	(0.057)	(0.0039)
Percent Empl. in Services	0.053	0.048	0.0011
	(0.052)	(0.051)	(0.0044)
Per Capita GDP, PPP basis, current Intl \$	3.0e-06	4.6e-06	2.6e-08
	(0.000018)	(0.000017)	(2.8e-06)
UK Colonial Origin	-1.30	-1.19	0.31*
	(0.87)	(0.80)	(0.15)
Other Colonial Origin	0.71*	0.72*	0.044
	(0.39)	(0.39)	(0.027)
UK Legal Origin	1.54*	1.47*	-0.31*
	(0.79)	(0.72)	(0.16)
Soviet Legal Origin	-1.25**	-1.22**	0.16*
	(0.55)	(0.53)	(0.088)
French Legal Origin	-0.24	-0.23	0.00015
	(0.17)	(0.16)	(0.012)
Sq Km Agric Land Per Person	-7.55	-9.67	5.49
	(27.7)	(26.3)	(5.00)
Distance from Equator	-0.058	0.025	-0.48
	(2.22)	(2.12)	(0.37)
Observations	296	296	287
R-squared	0.662	0.690	0.134

Note: *** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Year and continent dummy variables included in all analyses.

Table 5 — Alternative Estimation Strategies — Treatment Effects

	(1)	(5)	(9)
VARIABLES	All Ag	AgTrad	NonAgTrad
Plurality	-0.63*** (0.23)	-0.64*** (0.20)	0.14** (0.055)
Perc. Empl. in Agriculture	0.014 (0.015)	0.014 (0.015)	0.0021 (0.0013)
Percent Empl. in Services	0.019 (0.020)	0.020 (0.020)	0.0034* (0.0019)
Per Capita GDP, PPP basis, current Intl \$	-9.6e-06 (9.5e-06)	-9.0e-06 (9.6e-06)	4.1e-06*** (1.5e-06)
UK Colonial Origin	-0.13 (0.20)	-0.12 (0.20)	0.10*** (0.031)
Other Colonial Origin	0.66 (0.41)	0.65 (0.41)	0.044** (0.020)
UK Legal Origin	0.69*** (0.17)	0.69*** (0.18)	-0.14*** (0.031)
Soviet Legal Origin	-0.71 (0.49)	-0.73 (0.48)	0.080*** (0.027)
French Legal Origin	0.011 (0.090)	0.0084 (0.089)	-0.028 (0.022)
Sq Km Agric Land Per Person	-27.2* (14.3)	-27.5* (14.5)	7.53*** (2.11)
Distance from Equator	1.68 (1.06)	1.67 (1.06)	-0.60*** (0.17)
Observations	388	388	379

Note: *** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Year and continent dummy variables included in all analyses.

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