

Conditional election and partisan cycles in government support to the agricultural sector: An empirical analysis

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Abstract

We examine the effect of elections and government ideology on public support to the agricultural sector using a panel model for more than 70 democratic countries for 1975-2009. We find that support increases in case of upcoming elections, while right wing governments redistribute more income to the agricultural sector than left wing governments. Political cycles are conditional on certain factors. First, elections have a stronger effect on support under right wing cabinets. Second, in industrial countries the election (partisan) effect is strongest under majoritarian (proportional) electoral systems. In developing countries the election (partisan) effect is strongest under proportional (majoritarian) electoral systems.

Keywords: Public agricultural spending; Political budget cycles; Government ideology.

JEL codes: E62, H50, Q10

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1. Introduction

Many countries support their agricultural sector through a complex array of policy measures, such as tariffs and subsidies, in order to realize certain economic objectives. In less advanced economies, where agriculture takes up an important share of economic output, the importance of agricultural policy is obvious. However, also in more advanced economies agricultural policy is disproportionately important compared to the relatively small share of agriculture in total output. For example, in the European Union (EU), the Common Agricultural Policy (CAP)—which aims to provide farmers with a reasonable standard of living and consumers with good-quality food at fair prices—absorbed 42 percent of the entire EU budget in 2010 (Swinnen, Olper and Vandemoortele, 2011).

Support to the agricultural sector may also be used for political purposes (Park and Jensen, 2007). Incumbents have powerful incentives to affect voters' behavior by using policy instruments if elections are at hand. Thies and Porche (2007) find a positive and significant effect of upcoming elections on protection of the agricultural sector. Public agricultural spending may also be affected by partisan factors. Left and right wing political parties have different preferences as to the size and scope of government spending (Potrafke, 2011). Likewise, they may have different views on agricultural policy. Some previous studies suggest that right wing governments follow more protectionist policies and provide more support to agricultural producers than left wing governments (Olper, 2007; Swinnen, 2010). However, Bates (2009) reports that left wing governments in unequal societies also support the agricultural sector.

We construct two different measures for agricultural spending. The first measure is based on information provided by the *Agriculture Distortions Dataset* of the World Bank. The so-called Gross Subsidy Equivalent measures direct financial support to agricultural producers. The second measure used is total public agricultural spending reported in the *Government Financial Statistics* of the IMF.

Our paper contributes to the literature as follows. Using these measures of support to the agricultural sector for some 70 democratic countries over the period 1975-2005, we examine whether election and partisan cycles affect support to the agricultural sector. Compared to previous studies, we use more precise measures of political cycles by taking the timing of elections into account and using a more refined proxy for political ideology.

The main contribution of the paper is that we examine to what extent election and partisan cycles in agricultural spending differ across electoral rules (majoritarian vs. proportional systems) and different forms of government (presidential vs. parliamentary systems). As will be explained in more detail in section 2, there are several reasons why the impact of election and partisan cycles will be conditioned by the electoral rules and the form of government in place. However, this conditioning impact may differ across industrial and developing countries (Olper, Raimondi and Swinnen, 2010). In industrial countries the agricultural sector is small, geographically concentrated and organized thereby representing a classic example of a special interest group. In contrast, in developing countries, where the agricultural sector is large and the share of people living in rural areas is often above 50 percent, the agricultural sector arguably represents the broad interests of the population. This suggests that it is important to check whether the

impact of political cycles and their interaction with the political system in place differ across industrial and developing countries.¹

The remainder of the paper is structured as follows. Section 2 reviews previous work and discusses in more detail how our contribution is related to studies on politically motivated support to the agricultural sector. Section 3 describes the data and methodology used. Section 4 shows our results for the influence of election and partisan cycles on support to the agricultural sector and their interaction with the political system in place. Section 5 presents a sensitivity analysis, while the final section offers the conclusions.

2. Previous studies and contribution

Political budget cycle theory focuses on election cycles in public spending and government budget deficits. One line of research emphasizes that the incumbent uses expansionary fiscal policy for re-election purposes although the modelling differs across studies (Nordhaus, 1975; Rogoff and Sibert, 1988; Persson and Tabellini, 2002 and Shi and Svensson, 2006).²

A somewhat different—but in view of Pelzman’s (1992) view of voters as fiscal conservatives perhaps more convincing—explanation of election-motivated public spending is based on the presumption that some pivotal groups of voters are targeted at

¹ Political institutions are by their very nature slow moving. However, our analysis focuses on an election indicator and a partisan variable, which are time varying. In most countries elections occur about every three to four years. In democracies the government is frequently replaced by a new government with a different ideological orientation. So there is variation within a country which we exploit in our panel estimations.

² Pelzman (1992) was among the first to argue against this view, showing that in the US voters punish politicians who let government spending increase, no matter whether this increase is financed by taxes or borrowing. He also finds that especially welfare spending is poisonous politically. Brender (2003) and Brender and Drazen (2008) report similar findings for elections in Israel and a sample of 74 countries, respectively.

the expense of others. Hence, electoral manipulation is present, but does not necessarily show up in aggregate expenditure (Drazen and Eslava, 2006). Some recent studies based on regional data provide support for this argument, i.e. they find no evidence of a cycle in aggregate spending but do find election-motivated increases in spending categories that are visible and easily targeted, such as construction of roads and structures (Gonzales, 2002; Kneebone and McKenzie, 2001, Drazen and Eslava, 2006). Similarly, Potrafke (2010) reports an increase in the growth of public health expenditure in election years, while Thies and Porche (2007) find a positive and significant effect of upcoming elections on protection of the agricultural sector.

If a country is democratic and rural dwellers constitute a large segment of the voting population, like in developing countries, politicians have powerful incentives to cater to the interests of farmers. Especially when people are poor and spend a large portion of their incomes on food, they demand that the government protects their interests by adopting policies that lower the costs of food (Bates and Block, 2011a,b). In industrial countries, the agricultural sector is small and agricultural support only benefits a small subset of the population. Still, also under these circumstances politicians may seek electoral support in the agricultural sector for reasons pointed out by Anderson and Hayami (1986). First, in view of the size of the agricultural sector farmers have an organizational advantage over other more diffused interests such as consumers or taxpayers and may therefore be more successful in mobilizing campaign contributions and votes. Second, lower prices for agricultural products increase taxpayers' real income

thereby making the total tax burden associated with agricultural protection socially affordable.³

The second strand of literature on which we build is partisan theory that focuses on different spending priorities of left and right wing parties. These differences are in line with the interests of the constituencies of the political parties (Hibbs, 1992). Several studies report systematic differences between policies of left and right wing parties (Alesina, Roubini and Cohen, 1997; Hibbs, 1987; Franzese, 2002).⁴ Potrafke (2011) examines partisan cycles in several categories of government spending in a number of OECD countries. He only finds a significant effect on public service spending and education.

Theoretically, the impact of ideology on agricultural protection is not clear. Dutt and Mitra (2009) consider a two-sector specific-factors model with manufacturing and agriculture. They assume that the manufacturing sector uses capital (specific to manufacturing) and labor under constant returns to scale (CRS), while agriculture uses land (specific to agriculture) and labor, also under CRS. Under these assumptions, an increase in agricultural protection increases the real incomes of landowners while it reduces the real incomes of capitalists. If labor is also sector-specific and immobile across sectors, an increase in agricultural protection also reduces the real incomes of manufacturing workers. If labor is mobile across sectors, the effect of agricultural protection on labor's income depends on labor's share of expenditure on agricultural products (food). Presuming—in line with the partisan theory—that a left wing government represents the

³ However, when the rent is shared between consumers and agricultural producers there will be a dead-weight loss for which policy-makers arguably will be punished by rational voters (Brender and Drazen, 2008, Brender, 2003).

⁴ For surveys we refer to Franzese and Jusko (2006), and Drazen (2000: Chapter 7).

interests of workers, it will reduce agricultural protection, notably so if workers spend a large share of their income on food. However, the impact of the partisan cycle may depend on the level of development. As the expenditure share of food varies inversely with per capita income, a left wing government will be more inclined to protect agriculture in rich countries and less so in poor countries (Dutt and Mitra, 2009). What will a right wing government do? Here the answer crucially depends on which constituency the right wing government represents. If it represents the interests of capitalists, as Dutt and Mitra (2009) assume, it will reduce agricultural protection. However, right wing governments may give priority to the interests of farmers, as they constitute an important part of their constituency. There is substantive evidence for industrial countries that farmers vote for right wing parties (see Lewis-Beck, 1977 and references cited therein). In that case, the theoretical set-up predicts that right wing governments will be inclined to support the agricultural sector. The evidence of Olper (2007) and Swinnen (2010) that right-wing governments are more protectionist and spend more on support to the agricultural sector than left wing governments is consistent with this view. In contrast, Bates (1989) finds that left wing governments support the agricultural sector in more unequal societies, like developing and emerging market economies.

The final strand of literature on which we build examines the effect of the political system in place on economic policies, including support to the agricultural sector. There are major differences between majoritarian vs. proportional systems and between parliamentary vs. presidential systems (Person and Tabellini 2000; 2003 and Grossman and Helpman, 2005).

Several institutional checks and balances limit politicians' discretion over economic policies. Importantly, incumbents will find implementing their preferred policies more difficult when the policymaking process is subject to multiple policymaking authorities (cf. Hallerberg and Basinger, 1998; Henisz, 2004). For instance, Persson and Tabellini (1999) show theoretically that accountability is stronger in majoritarian systems with small districts and plurality rule, as the electoral outcome becomes more sensitive to marginal changes in votes. Several studies (Persson and Tabellini, 1999; Lizzeri and Persico, 2001; Milesi-Ferretti, Perotti and Rostagno, 2002) derive the result that proportional elections induce politicians to seek support from larger groups in the electorate via broad spending programs, such as welfare programs. In majoritarian systems an electoral district is generally small and the politician who wins the majority of the votes represents this district in parliament. Such a system gives politicians a strong incentive to target policies towards a particular constituency.

Also the difference between parliamentary and presidential systems may play a role. Presidential systems are characterized by separate and direct elections for both the executive and the legislature. In parliamentary systems, the executive is indirectly formed through the legislature. In the latter systems bargaining between different legislative coalitions is disciplined by the threat of a government crisis. As such a crisis would result in the loss of valuable agenda-setting powers for the government coalition, party discipline and stable legislative coalitions are promoted. As a result, parliamentary governments have larger overall spending, larger broad programs (at the expense of targeted programs) and more wasteful spending in parliamentary regimes compared to presidential regimes (Persson and Tabellini, 2001). In presidential systems the executive

cannot be brought down by the legislature, but it is directly accountable to the voters. Thus, legislators have weaker incentives to stick together and to vote according to party or coalition lines. Moreover, agenda-setting power is generally more dispersed among different committees and there are other checks and balances between the executive and the legislature, like proposal and veto rights to several players. So in a presidential regime, the president is better able to target particular constituencies, such as the agricultural sector, notably if they are well organized.

However, as pointed out by Olper, Raimondi and Swinnen (2010), the implications of the preceding analysis for support to the agricultural sector depend on the nature of agricultural policy transfers. If agricultural policy mainly takes the form of local public goods or specific forms of redistribution, then more support is expected in presidential and majoritarian systems than in parliamentary and proportional systems. However, if agricultural policy mainly takes the form of a national public good or a broad form of redistribution, more support is expected in parliamentary and proportional systems than in presidential and majoritarian regimes. In industrial countries the agricultural sector is small, representing a classic example of a special interest group. In contrast, in developing countries, where the share of people living in rural areas is often above 50 percent, the agricultural sector arguably represents the broad interests of the population.

The results of some empirical studies indicate that political institutions matter for explaining cross-country differences in support to the agricultural sector. For instance, Park and Jensen (2007) find that OECD countries with electoral systems in which politicians have an incentive to focus on narrower groups tend to have higher levels of agricultural support. The results of Olper, Raimondi and Swinnen (2010) sup-

port the notion that a shift from autocracy or a majoritarian democracy to a proportional democracy induces a strong increase in agricultural protection. A similar but weaker effect was detected for transitions to a presidential system.⁵

As said, we examine whether the impact of election and partisan cycles is conditioned by differences in political systems. There is some scant evidence suggesting that differences in political systems matter for the occurrence of political cycles. Potrafke (2012) finds that in OECD countries political cycles are more prevalent in two-party systems arguably because voters can clearly punish or reward political parties for governmental performance.

3. Data and methodology

3.1 Data

We use two measures for public agricultural spending. The first is the Gross Subsidy Equivalent relative to agricultural income reported by the World Bank (Falkowski and Olper, 2010; Park and Jensen, 2007). The Gross Subsidy Equivalent captures policy measures that maintain domestic prices at levels higher than abroad (market price support) and budgetary payments to farmers (budget transfers). This measure is available for 61 democratic countries.⁶ As the theories tested in this paper presume a certain level of democracy, we only include country-years with a Polity IV democracy score of at

⁵ Other studies examining the impact of political institutions on agricultural protection include Olper and Raimondi (2004; 2010) and Henning (2008), Henning and Struve (2007) and Henning, Krampe and Aszmann (2011).

⁶ Table A1 in the Appendix lists the countries included in our analysis.

least six.⁷ The Gross Subsidy Equivalent differs widely across countries. While in Korea, Japan, Norway, Switzerland, and Iceland agricultural subsidies are more than 50 percent of agricultural income, in developing countries the average Gross Subsidy Equivalent is less than 15 percent. For a number of developing countries, like Argentina and Sri Lanka, the subsidy is even negative, i.e. output in the agricultural sector is taxed.

The second measure we use is total public agricultural expenditure provided by the *Government Financial Statistics* of the IMF. We scale total public agricultural spending with total GDP in a particular country-year.⁸ This measure is available for 73 countries (see Table A1 in the Appendix). One advantage of this dataset is that it also includes indirect support for agricultural producers such as construction and operation of flood control, irrigation and drainage systems. However, there is a potential measurement error as this indicator also incorporates spending not aimed at agricultural producers like administration costs on supervision and regulation of the agricultural sector. Total public spending on the agriculture sector is on average more than 57 percent of agricultural income in industrial countries, while in developing countries the average is less than 19 percent. The correlation between the Gross Subsidy Equivalent and total public agricultural spending is only about 0.2. That is, the Gross Subsidy Equivalent and total agricultural spending may provide different information and it therefore makes sense to use both as dependent variable in the regression analysis.

⁷ According to the definition of Polity IV, countries with a score higher than six are regarded as democratic. However, we have also used a cut-off point of a Polity IV score of two, four and seven. This yields very similar results (available on request). We refer to Bates and Block (2011a,b) for a discussion of agricultural support in non-democratic countries.

⁸ As a robustness test we also used agricultural GDP as our scaling variable. This does not affect the main results of the paper (results available on request).

To proxy the political budget cycle, we use an election variable suggested by Franzese (2000) that takes the timing of an election in the course of a year into account. Compared to using a dummy that is one in election years and zero otherwise, which is common in this type of research, our proxy reduces measurement error.⁹ It is calculated as $M/12$ in an election year and $(12 - M)/12$ in a pre-election year, where M is the month of the election. In all other years its value is set to zero. The election data is taken from *electionsource.org* and various issues of the *Political Handbook of the World*. We only include elections if the government has sufficient time to change its fiscal policies. When there are, for instance, elections shortly after the fall of a cabinet, the government may have little opportunity to change fiscal policy. An election is therefore only included if the election is held on the fixed date (year) specified by the constitution, or if the election occurs in the last year of a constitutionally fixed term for the legislature. Also when an election is announced more than one year in advance, it is taken up in the analysis (Shi and Svensson, 2006).

As a preliminary test for the election effect in a country, we compare the levels of agricultural support in election and non-election years. Using the Gross Subsidy Equivalent, agricultural support as a share of income is 31.1 percent in a non-election year and 38.8 percent in an election year. According to a Chi-squared test, this difference is significant at the 1 percent level. Likewise, in an election year total public spending on agriculture as a share of total GDP is 2.4 percent higher than in a non-election year.

⁹ An election in January gives a value of 1 for the election dummy. However, to be effective fiscal policy arguably had to be adjusted earlier so that the election dummy may not properly identify the election effect.

To proxy partisan cycles we use an ideology index proposed by Potrafke (2011). This index places the cabinet on a left-right scale with values between 1 and 5. It takes the value 1 (5) if the share of governing right wing (left wing) parties in terms of seats in the cabinet and in parliament is larger than 2/3, and 2 (4) if it is between 1/3 and 2/3. The index is 3 if the share of centre parties is 50 percent, or if the left and right wing parties form a coalition government that is not dominated by one side or the other. We base our partisan measure on the data provided by the *Database of Political Institutions* (Beck et al., 2001).¹⁰ Our government ideology measure differs in two important ways from the indicator suggested by Olper (2007). First, we look at the ideological preferences of the whole cabinet and not only at the preferences of the chief executive. Secondly, we use five categories instead of three to enhance precision of the estimates.

3.2 Model

Following Shi and Svensson (2006), we estimate the relationship between political cycles and public agricultural support using the following dynamic panel model based on an unbalanced dataset between 1975 and 2005.

$$spending_{it} = \alpha_i + \gamma spending_{it-k} + \sum_{j=1}^m \beta_j x_{jit-k} + \mu cycle_{it} + \varepsilon_{it} \quad (1)$$

where $spending_{it}$ is public agriculture spending (Gross Subsidy Equivalent or total public agricultural spending) as a share of agricultural income in country i in year t , x_{jit} is a

¹⁰ Years in which a new government took over are labeled based on the ideological position of the government that was in office for most of the year concerned. For instance, when a right wing government replaces a left wing government in August, this year is labeled as left wing.

vector of m control variables, $cycle_{it}$ is the political cycle indicator outlined above (election or ideology variable), and ε_{it} is an error term. The parameter α_i is a country specific intercept. Finally, k indicates the number of lags. We determine the optimal number of lags for each variable using the Schwarz Bayesian Information Criterion (SBC). Equation (1) poses a dynamic error-components model. The lagged dependent variable is correlated with the error term, even if the disturbances are not autocorrelated. Arellano and Bond (1991) develop a generalized method of moments (GMM) estimator that solves this problem using the first difference of the equation.

$$\Delta spending_{it} = \gamma \Delta spending_{it-k} + \sum_{j=1}^m \beta_j \Delta x_{jit-k} + \mu cycle_{it} + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (2)$$

Estimation of (2) requires an instrumental variable procedure to correct for endogeneity and the correlation between the lagged difference of the dependent variable and ε_{it-1} . We can use the second and higher-order lags of the endogenous and dependent variable and the first difference of the exogenous variables as instruments in the estimation of (2) if ε_{it} is serially uncorrelated.

This approach, however, has drawbacks. First, differencing the equation removes the long-run cross-country information present in the levels of the variables. Second, if the independent variables display persistence over time, like our indicators on electoral rules, their lagged levels will be poor instruments for their differences. Under additional assumptions, it is possible to construct an alternative GMM estimator that overcomes these problems. Specifically, more moment conditions are available if we assume that the explanatory variables are uncorrelated with the individual effects (see

Arellano and Bover, 1995). In this case, lagged differences of these variables and of the dependent variable may also be valid instruments for the equation specified in levels. The estimation then combines the set of moment conditions available for the first-differenced equations with the additional moment conditions implied for the equation in levels. Blundell and Bond (1998) show that this system GMM estimator is preferable to that of Arellano and Bond (1991) when the dependent variable and/or the independent variables are persistent. Finally, as long as the model is over-identified, the validity of the assumptions underlying both the difference and the system estimators can be tested through Sargan tests of orthogonality between the instruments and the residuals and through tests of second- or higher order residual autocorrelation.¹¹

The vector of control variables is based on previous studies. Table A2 in the Appendix offers a description and provides the sources, while Table A3 reports the descriptive statistics of the control variables included.¹² First, we include GDP per capita that controls for the level of development of a country as this may influence voters' preferences for public goods as well as the size of the tax base.¹³ Moreover, we include total population as an additional measure of the tax base. The growth rate of real GDP is taken up to capture the influence of the business cycle on public spending (Brender and Drazen, 2005). Inflation may affect government expenditures via price-indexation of expenditures (Brender and Drazen, 2009). In addition, we include trade openness measured as import plus export as a share of GDP. One of the most powerful arguments for agricultural income support is the welfare loss due to trade liberalization.

¹¹ We used the *xtabond2* command in Stata 12.

¹² To check for multicollinearity problems, we calculated the correlation between all explanatory variables. We do not find strong evidence for multicollinearity.

¹³ According to Anderson and Hayami (1986), the level of development is one of the most important determinants of the level of agricultural support.

Furthermore, we include the rural population share. On the one hand it is probably more difficult for the government to cut agricultural subsidies in a country with a larger rural population than in a country with a large urban population (Henning, Krampe and Aszmann, 2011). On the other hand, in developing countries, most agricultural households are net buyers of food and thus stand to lose if these policies put upward pressure on consumption prices (Aksoy and Hoekman, 2010). Meanwhile, small groups, such as farmers in industrial countries, are more efficient in lobbying and collective action (Olson, 1965).

In addition, we include a number of measures to control for characteristics of the agricultural sector: land per capita (measured by arable land divided by the total labor force working in the agricultural sector) and agricultural capital per capita (agricultural capital divided by the number of workers in the agricultural sector).¹⁴ We also include the share of the agricultural sector in GDP as a measure of the economic importance of this sector.¹⁵ As the agricultural sector is rather vulnerable to large-scale natural disasters after which the government often intervenes by providing support, we include the number of natural disasters in a particular country-year reported by EM-DAT (2010).

We also include several political control variables. First, we include dummies for majoritarian vs. proportional and for parliamentary vs. presidential political systems in line with the discussion in the previous section. We base our political system variables on information reported in the World Bank's *Database of Political Institutions*. Countries are classified as follows: If the president has no legislative powers in the realm of fiscal policy and the government is accountable to parliament through a confidence re-

¹⁴ Agricultural capital is defined as the sum of machinery, equipment and fixed livestock.

¹⁵ We also used the share of the work force active in the agricultural sector. However, this gave similar results.

quirement, the country is classified as a parliamentary regime; otherwise it is classified as a presidential system.¹⁶

Furthermore, coalition governments may follow different policies than single party governments. Government expenditure is expected to be increasing with the number of parties forming the government due to the common pool problem (Perotti and Kontopoulos, 2002).¹⁷ There is some evidence that the number of parties in government affects agricultural spending. For instance, Beghin and Kherallah (1994) conclude that coalition governments have more agricultural protection. We therefore control for the number of coalition parties. We also include a dummy that is one in case of a minority government. Following Swinnen (2010) and Olper (2007), we also include a variable to control for institutional quality by using the Polity IV scores.

In addition, we include two dummies. The first one takes the value one when a country is a member of the European Union at time t to control for the CAP. The second one takes the value one after the post-Uruguay Round. One of the main objectives of this round was to reduce support to the agricultural sector. We therefore expect to find a negative effect of trade negotiations on agriculture support. Finally, we include an interaction effect between six regional dummies (Europe, Asia, Latin America, Africa, North America and Australia and Oceania) and the time fixed effect to control for differences in time variant regional agricultural support dynamics.¹⁸

¹⁶ Thus, France and Finland are classified as parliamentary countries even though they have a directly elected president, since the government controls fiscal policy and the government can be brought down by a legislative vote of no confidence.

¹⁷ Proportional elections induce a greater incidence of coalition governments than do majoritarian elections. Yet, the correlation between proportional systems and the number of coalition parties is only 0.42.

¹⁸ Including these regional effects also allows to control for a clustering effect of political system. For instance, right wing proportional systems can mostly be found in Latin America.

4. Main results

This section shows the results for electoral and partisan cycles in public agricultural spending. In view of the unequal distribution of the availability of the data across the countries, we clustered the Huber-White standard errors. Missing data occurs more frequently for developing countries that also tend to provide less support to the agricultural sector. To obtain consistent and robust standard errors we use bootstrap estimation with 1,000 replications.

The Schwarz Bayesian Information Criterion (SBC) suggests that specifications without a lagged dependent variable are rejected at conventional levels of statistical significance, indicating that dynamics is important and that the static fixed effects method is inadequate for the task at hand.

The consistency of the GMM estimator depends on the validity of the instruments. To address this issue we consider two specification tests. The first is Sargan's test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. The second test examines the hypothesis that the error term ε_{it} is not serially correlated. The Sargan test provides no evidence of misspecification, while the serial correlation tests point to first- but no second-order autocorrelation of the residuals, which is in accordance with the assumptions underlying the selection of instruments.

As said, we employ two indicators of support to the agricultural sector. First we use the Gross Subsidy Equivalent as a share of agricultural income. Table 1 reports the results. Column (1) only includes our control variables. We find a significant positive

effect of the lagged dependent variable, GDP per capita, natural disasters, level of democracy and the share of the rural population. Furthermore, we confirm the results of Olper, Raimondi and Swinnen (2010) that countries with a proportional election system spend more on agriculture than those with a majoritarian system. One explanation is that a large share of the countries included in our sample are developing countries where agricultural policy may be considered as a national public good. In addition, the results show that EU members receive more support than non-EU members. Finally, like Thies and Porche (2007) we find that in the post-Uruguay Round period support to the agricultural sector is lower.

In column (2) we add our election cycle measure. The results indicate that in an election year government agricultural support as a share of agricultural income is about 6 percentage points higher than in non-election years. This suggests that the incumbent government uses support to the agricultural sector as an instrument to win votes for its re-election.

Next, in column (3) we add our partisan cycle indicator. The coefficient of the government ideology variable has a negative sign and turns out to be statistically significant. That is, right wing governments provide more support to the agricultural sector than left wing governments. This result is in line with the view that right wing governments take the interests of their agricultural constituency into account. In general, right wing governments spend about 3 percentage points more on public agricultural support than left wing governments. Our results are consistent with some previous studies discussed in section 2.

In column (4) we add both political cycles. The results are similar to those in columns (2) and (3).

As a first robustness check, we apply the general-to-specific method. This method does not rely on economic theory, but is a widely used method in applied econometrics to decide on model specification (see Hendry, 1993). We first estimate a model including all control variables as outlined in the previous section and the election and partisan variables. Next, we drop the least significant variable and estimate the model again. We repeat this procedure until only variables that are significant at a 10 percent level remain. The results, as shown in column (5) of Table 1, yield a significant effect of election and partisan cycles on the Gross Subsidy Equivalent indicator of support to the agricultural sector.

Agricultural subsidies are not distributed uniformly across commodities. Moreover, it is possible that most support is clustered around a limited number of commodities. Our database on the Gross Subsidy Equivalent also contains detailed information on support to agricultural commodities and we therefore re-estimate the model taking this information into account. We categorized the commodities in 18 categories.¹⁹ The results indicate that the variance of support on commodity level contribute about fifty percent of the total variance in agricultural support. This indicates that support differs between the various commodities and that a multilevel model is appropriate. The results based on the multilevel model in columns (6)-(9) of Table 1 confirm our previous findings. Columns (6)-(8) correspond to columns (1)-(4), while the results in column (9) are

¹⁹ Included commodities are: wheat, fruit and vegetables, nuts and seeds, meat, sugar, coffee and tea, cocoa and coconut, milk products, eggs, cotton and wool, hides and skin, maize, other crops, other grains, palmoil, patato and rice, rubber and tabacco. In the estimation, we included commodity fixed effects. This expands our dataset less than 5 times only because not all countries produce all commodities and there are several missing observations.

based on the general-to-specific approach. Again, we find a significant election cycle and a partisan cycle in public agricultural support. Figure 1 reports the p-values of the individual commodity coefficients. The results show that for most commodities political cycles are present. However, judged by the standard deviation of the p-value, the impact of partisan cycles is more homogenous than the impact of election cycles.

[Insert Figure 1 about here]

Table 2 reports the results using total public agriculture spending as dependent variable. The results for the control variables are similar to those of Table 1. Moreover, the results indicate that there is a significant election effect on public agricultural spending. In an election year, spending on agriculture as a share of agricultural income is about 3 percentage points higher than in non-election years. As before, we find a significant effect of our partisan cycle measure: spending under right wing governments is about 4 percentage points higher than under left wing governments.

[Insert Tables 1 and 2 about here]

To sum up: so far our results provide support for election and partisan cycles in government support to the agricultural sector. However, as argued in section 2, the impact of election and ideology cycles may differ across political and electoral systems. Before we analyze this in more detail, we first examine whether there is an interaction

effect of the two political cycles, i.e. does political ideology play a role in determining the size of the election effect? We estimate the following model:

$$spending_{it} = \alpha_i + \gamma spending_{it-k} + \mu_1 election_{it-1} + \mu_2 ideology_{it-1} + \mu_3 (election_{it-1} \times ideology_{it-1}) + \beta_j x_{jit-k} + \varepsilon_{it} \quad (3)$$

Where $election_{it}$ refers to the election indicator, while $ideology_{it}$ represents the government ideology measure. The conditional effect of government ideology on the effect of elections can be calculated by the derivation of equation (3) with respect to government ideology.

$$\frac{\partial spending}{\partial election} = \mu_1 + \mu_3 ideology$$

We include in Table 3 an interaction term of the election indicator with the government ideology measure. The statistical significance of the interaction effects cannot be tested with a simple t-test on the coefficient of the interaction terms but must be based on the estimated cross-partial derivative. The standard error of interest is

$$\hat{\sigma}_{\frac{\partial spending}{\partial election}} = \sqrt{\text{var}(\mu_1) + ideology^2 \times \text{var}(\mu_3) + 2 \times ideology \times \text{cov}(\mu_1, \mu_3)} \quad (4)$$

The standard errors are used to calculate the confidence bands around the marginal effect. We use the methodology suggested by Ai and Norton (2003) and Brambor, Clark and Golder (2006), i.e., we plot the marginal effect of our election measure on support

to the agricultural sector conditional on the government ideology. The 95 percent confidence intervals around the line allow us to determine the conditions under which elections has a statistically significant effect on public agricultural support. Elections have a statistically significant effect when the upper and lower bounds of the confidence interval are both above (or below) zero.

[Insert Table 3 about here]

Figure 2 shows the marginal impact of elections on both measures of public support to the agricultural sector (vertical axis), conditional on government ideology (horizontal axis) based on the regressions shown in columns (1) and (2) of Table 3. It follows that elections have a stronger effect on agricultural spending under right wing cabinets as the marginal effect line is downward sloping (the more to the right on the horizontal axis—i.e. the more left wing the government is—the lower the support). The effect is also significant, as for both measures of public support to the agricultural sector the upper and lower bound of the confidence interval are above zero.²⁰ So, while right wing cabinets in normal times spend more on public agricultural support than left wing governments, they spend even more in the pre-election period. Apparently, around election time right wing parties want to signal to farmers that they represent the interests of their agricultural constituency.

[Insert Figure 2 about here]

²⁰ As pointed out by one of the referees, this finding is arguably not in line with the median voter approach.

Next, in Table 4 we estimate the models shown in column (5) of Tables 1 and 2 including interaction effects between the political cycle and the indicators of the political system (majoritarian vs. proportional systems, and parliamentary vs. presidential systems).²¹ In this case we can test the interactions by just examining the *t*-values, because we make the political cycle effect conditional on a dummy (Green, 2002).

The results for the total sample as shown in the first part of Table 4 suggest that proportional elections are associated with higher pre-election support to the agricultural sector. In contrast, the marginal effect of elections on support to the agricultural sector does not differ systematically across presidential and parliamentary regimes.

However, as discussed in section 2, the impact of the political system may depend on the level of development. The second part of Table 4 shows the results if we split our sample into industrial and other countries.²² In line with the arguments presented in section 2, it turns out that the conditioning impact of the electoral system differs across both samples. In non-industrial countries a proportional electoral system is related to higher pre-election spending on agricultural support, while in industrial countries a majoritarian electoral system is associated with more pre-election support to the agricultural sector. The results for the interaction effect with the dummy representing a presidential vs. a parliamentary system show that in non-industrial countries parliamentary systems are associated with higher pre-election public spending on the agricultural sec-

²¹ The elections are not divided equally across the political systems. Of the elections included, about 32 percent can be considered as proportional-presidential, 28 percent as proportional-parliamentary, 27 percent as majority-presidential and only 13 percent can be classified as majority-parliamentary.

²² Table A1 shows the classification of the countries in our sample.

tor. In industrial countries the interaction between elections and the type of government is not significant.

Finally, we test for a possible interaction between the political system and the partisan cycle. The results in Table 5 indicate that in non-industrial countries right wing parties in proportional systems provide more support to the agricultural support than right wing parties in majoritarian systems. In contrast, in industrial countries right wing parties in majoritarian systems spend more on agriculture than right wing parties in proportional systems.

[Insert Tables 4 and 5 about here]

Table 6 summarizes our findings and relates them to the theoretical predictions put forward in section 2. Our results suggest that in industrial countries with a majoritarian system the election effect is stronger than in countries with a proportional system. This is in line with the arguments put forward in section 2. Specifically, under a majoritarian system it is easier to target specific small and well-organized interest groups, such as agriculture. In developing countries a large share of the population is involved in the agricultural sector. In line with arguments put forward in section 2, support to the agricultural sector in these countries can be seen as some kind of a public good and is therefore more likely under proportional systems.

Furthermore, we find that election cycles are stronger under a parliamentary system in developing countries. In view of the size of the sector and the nature of the

agricultural support as a public good in developing countries, this finding is in line with previous studies finding that parliamentary systems have more broad-based government spending than presidential systems. However, for industrial countries we do not find that the type of government affects the strength of the election cycle.

In addition, our findings indicate that partisan cycles are also affected by the electoral system. In industrial countries right wing governments spend more in majoritarian systems. This result is in line with the view that agricultural support in industrial countries is not a public good and that under a majoritarian system it is easier to target specific constituencies. In developing countries right wing parties in proportional systems provide more support to the agricultural support than right wing parties in majoritarian systems. This is in line with the view that agricultural support in developing countries is a public good and that under majoritarian systems government spending is more broadly based.

We do not find any evidence that the partisan cycle is different across presidential and parliamentary systems.

[Insert Table 6 about here]

5. Sensitivity analysis

By comparing the mean square forecast error of column (5) of Table 1 or 3 with an average mean square forecast error we are able to undertake an out-of-sample analysis (Henning, Krampe and Aszmann, 2011). The results indicate that the models perform

less well in some really poor African countries and the rich Nordic countries.²³ It is therefore possible that outliers or sample heterogeneity affect the estimation results. We therefore first re-estimate the regressions in column (5) of Tables 1 and 2 excluding country-years where the dependent or the PBC variable are labelled as outlier to test for the sensitivity of our findings for the selection of countries in our sample.²⁴ The results as shown in column (1) and (6) of Table 7 are fairly similar to those reported in column (5) of Tables 1 and 2.²⁵

In the regressions reported in Tables 1 and 2 we included all democratic countries for which we have sufficient data. To examine whether sample heterogeneity affects our results, we performed several robustness checks. First, we divide the sample into various more homogenous country groups. We divide our sample into EU countries, non-EU industrial countries, developing and emerging market economies.²⁶ According to Olper and Raimondi, (2004; 2010), Olper (2007) and Henning (2008) the effect of political institutions on agricultural policy may depend on the level of economic development of a country. In addition, the impact of political cycles in industrial countries may differ between EU-countries and non-EU countries. Within the EU, national governments have fewer opportunities to use agricultural support as a political instrument. The results show that in all country samples there is a significant election effect. Yet, the magnitude is higher in developing and emerging market countries independent of the political system present. In addition, in industrial countries we find that

²³ Detailed results are available upon request.

²⁴ Outliers are defined as: $x < Q(25) - 3IQR$ or $x > Q(75) + 3IQR$, where Q is the quantile and IQR the interquartile range given by 75th percentile - 25th percentile.

²⁵ Also the results on the conditional effect of ideology and electoral system on the election effect remains in line with our previous findings.

²⁶ Following the classification in the IMF World Economic Outlook of April 2008; see Table A1 for the classification details.

the coefficients of the election variable are higher in non-EU countries compared to EU-countries. The results also suggest that partisan cycles are significantly more pronounced in industrial countries than in emerging markets and developing countries.

[Insert Table 7 about here]

Furthermore, the effect of political cycles on public agricultural spending may be different across countries depending on the economic and political power of the rural population or the agricultural sector (Henning, Krampe and Aszmann, 2011; Bates and Block, 2011a,b). To examine this in more detail, we split the sample in two different ways. First, we divide the sample into two equal-sized subsamples on the basis of the share of the population living in rural areas. When a large share of the population is living in rural areas, support of rural voters is needed to win an election. The results in columns (1)-(2) and (5)-(6) of Table 8 indicate that election and partisan cycles in agricultural spending are significantly higher in countries with a large share of the population living in rural areas. This latter subsample is dominated by developing countries. This result supports the idea that agricultural policy is a national public good and is therefore more likely to be supported by the government.

Second, we divide the total sample into a subsample of countries where more than 20 percent of total GDP is contributed by the agricultural sector, while the other subsample includes countries where less than 20 percent of GDP is contributed by the

agricultural sector.²⁷ The results in columns (3)-(4) and (7)-(8) of Table 8 indicate that there are no significant differences between the two samples.

[Insert Table 8 about here]

Next, we test the hypothesis put forward by Brender and Drazen (2005) that there is a 'learning effect', i.e., a PBC only shows up in countries with limited experience with democratic elections. We test for this learning effect by dividing the sample into young democracies and old democracies. We consider countries that have been democratic more than 20 years on a row since 1945 as old democracies. We find that in both samples the election effect is significantly positive, but the effect is significantly larger in young democracies. These results are only partly in line with the findings of Brender and Drazen (2005), who found no significant PBC effect in mature democracies.

In addition, we test if countries with a bicameral political system have larger election cycles due to disproportionate representation of rural areas or the agricultural sector. Based on information provided by the World Bank's *Database of Political Institutions* we divide our sample into bicameral and non-bicameral systems. The results in the bottom part of Table 9 show that there are no large differences between the two systems.

[Insert Table 9 about here]

²⁷ We also used thresholds of 30 percent, 40 percent and the median, but this gave similar results.

Furthermore, we have used two alternative measures for election and partisan cycles. First, several studies use dummy variables for pre-election and post-election years (Shi and Svensson, 2006; Brender and Drazen, 2005). As a robustness check we re-estimated the main model including these two dummies. The results (shown in columns (1) and (2) of Table 10) indicate that the coefficient of the pre-election year dummy is significant, in contrast to the post-election year dummy.

Second, we test an alternative measure for our political ideology measure suggested by Klomp and De Haan (2012, 2013) by measuring political ideology as follows

$$\mathbf{ideology} = \sum \delta_i P_i$$

Where δ_i is the share of seats taken in parliament by government party i , P_i is the ideology of government party i and is measured on a scale running from -1 (full left wing), 0 (centre) to +1 (full right wing). The variable is based on the data provided by the *Database on Political Institutions*. The results as shown in column (3) of Table 9 are in line with our previous findings. Again, we find that political ideology is a significant determinant of support to the agricultural sector.

Finally, we re-estimated the model in column (5) of Tables 1 and 2 using two alternative indicators of support to the agricultural sector: agricultural support per capita and total agricultural support as a share of total government spending. The results in columns (4) and (5) of Table 10 show a similar pattern compared to the main results in

Tables 1 and 2 so that our results do not depend on the methodology for calculating our indicators of support to the agricultural sector.

[Insert Table 10 about here]

6. Conclusions

Many countries provide support to their agricultural sector through a complex array of policy measures, such as tariffs and subsidies. Politicians may also use agricultural policies for political purposes. In this paper we examine whether election and partisan cycles have a significant effect on support to the agricultural sector, using a panel model including some 70 democratic industrial and developing countries over the period 1975 to 2005.

In line with previous findings, our results suggest that public agricultural spending increases under the influence of upcoming elections. Also the ideological position of the government has a significant impact: right wing governments redistribute more income to the agricultural sector than left wing governments. In addition, we find that political cycles are conditional on several factors. First, elections have a stronger effect on support to the agricultural sector under right wing governments. So, while right wing governments in normal times provide more support than left wing governments, they spend even more in the pre-election period. Second, we find that the effect of election and partisan cycles is conditional on the political system. In industrial countries the election effect is stronger under majoritarian than under proportional electoral systems, while in developing countries the election effect is stronger under proportional electoral

systems. In developing and emerging market countries right wing parties in proportional systems provide more support to the agricultural support than right wing parties in majoritarian systems, while in industrial countries right wing parties in majoritarian systems spend more on agriculture than right wing parties in proportional systems.

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Table 1. Estimation results for Gross Subsidy Equivalent

Dependent variable: Gross Subsidy Equivalent as a share of agricultural income									
	National level					Commodity level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged dependent variable	0.351 [2.04]**	0.347 [1.91] *	0.401 [1.78] *	0.310 [2.25] **	0.377 [2.16] **	0.307 [1.81] *	0.423 [1.85] *	0.280 [2.01] **	0.410 [2.59] **
GDP per capita	0.127 [2.01] **	0.112 [2.18] **	0.114 [1.90] *	0.112 [2.07] **	0.130 [2.49] **	0.110 [2.17] **	0.122 [1.96] *	0.106 [2.35] **	0.144 [1.92] *
Growth rate of GDP	0.157 [0.98]	0.153 [0.96]	0.157 [0.83]	0.165 [0.95]		0.159 [1.14]	0.144 [0.89]	0.150 [0.99]	
Inflation	0.087 [1.45]	0.079 [1.24]	0.094 [1.38]	0.080 [1.64]		0.085 [1.27]	0.086 [1.62]	0.069 [1.58]	
Trade openness	-0.088 [-1.34]	-0.084 [-1.30]	-0.100 [-1.35]	-0.087 [-1.14]		-0.077 [-1.58]	-0.110 [-1.34]	-0.077 [-1.08]	
Natural disasters	0.181 [1.96]*	0.190 [1.72] *	0.200 [1.79] *	0.159 [1.92] *	0.173 [1.88]	0.179 [1.92] *	0.166 [1.88] **	0.133 [2.02] **	0.150 [1.74] *
Size agricultural sector	0.545 [1.54]	0.594 [1.43]	0.502 [1.63]	0.583 [1.47]		0.710 [1.49]	0.457 [1.48]	0.661 [1.60]	
Size agricultural sector squared	-0.023 [-0.98]	-0.022 [-1.03]	-0.024 [-0.91]	-0.023 [-0.90]		-0.019 [-1.11]	-0.020 [-1.00]	-0.020 [-0.79]	
Total population	0.198 [0.74]	0.195 [0.72]	0.224 [0.68]	0.209 [0.71]		0.199 [0.66]	0.184 [0.83]	0.213 [0.82]	
Rural population	0.345 [1.98]*	0.306 [1.70] *	0.302 [1.75] *	0.361 [1.88] *	0.408 [2.04] **	0.342 [2.10] **	0.305 [1.69] *	0.340 [1.87] *	0.447 [2.08] **
Land endowment	-0.237 [-1.44]	-0.234 [-1.64]	-0.257 [-1.50]	-0.263 [-1.39]		-0.239 [-1.49]	-0.215 [-1.29]	-0.282 [-1.61]	
Capital endowment	-0.145 [-1.32]	-0.163 [-1.14]	-0.133 [-1.17]	-0.153 [-1.19]		-0.186 [-1.40]	-0.135 [-1.26]	-0.175 [-1.15]	
Proportional system	5.187 [1.94]**	4.468 [2.00] **	4.414 [2.19] **	5.958 [2.05] **	5.620 [2.12] **	3.868 [2.07] **	3.836 [2.71] **	5.046 [2.46] **	4.604 [2.08] **
Parliamentary system	3.179 [1.94]*	2.765 [1.91] *	3.520 [1.97] *	3.015 [1.99] **	3.431 [2.01] **	3.303 [1.95] *	3.384 [1.94] *	3.445 [2.07] **	3.651 [2.03] *
Number of coalition parties	0.991 [1.39]	1.076 [1.49]	0.982 [1.45]	1.044 [1.49]		1.221 [1.38]	0.868 [1.30]	1.108 [1.35]	
Minority government	-2.011 [-0.99]	-2.010 [-0.93]	-2.226 [-0.89]	-2.017 [-1.04]		-2.098 [-0.83]	-2.167 [-0.94]	-2.023 [-1.01]	
EU-Member	8.123 [2.34] **	7.435 [2.03] **	8.745 [2.18] **	8.707 [2.31] **	9.416 [2.55] **	7.950 [2.03] **	9.402 [2.22] **	10.117 [2.08] **	7.840 [2.14]
Uruguay Round	-7.786 [-2.12] **	-6.777 [-1.91] *	-7.790 [-2.04] **	-7.308 [-2.27] **	-7.827 [-2.32] **	-6.909 [-2.26] **	-8.982 [-1.96] **	-7.818 [-2.27] **	-6.851 [-2.38] **
Level of democracy	1.541 [2.01] **	1.683 [2.09] **	1.586 [2.23] **	1.702 [2.06] **	1.631 [2.41] **	1.592 [2.58] **	1.561 [2.74] **	1.687 [1.97] *	1.536 [2.41] **
Election cycle		6.322 [2.06] **		6.311 [2.10] **	6.398 [2.74] **	6.299 [1.99] **		6.102 [2.01] **	6.389 [2.07] **
Partisan cycle			-0.738 [-2.02] **	-0.708 [-2.08] **	-0.711 [-2.44] **		-0.729 [-2.05] **	-0.777 [-2.01] **	-0.731 [-2.04] **
Observations	1274	1274	1274	1274	1274	5912	5912	5912	5912
Number of countries	63	63	63	63	63	63	63	63	63
Variance on commodity level						0.521	0.501	0.476	0.491
Arellano–Bond test AR(1)	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.002
Arellano–Bond test AR(2)	0.712	0.734	0.733	0.738	0.742	0.684	0.689	0.662	0.642
Sargan test (p-value)	0.514	0.513	0.490	0.507	0.547	0.612	0.585	0.613	0.600

Note: This table shows estimates of equation (2) using the Gross Subsidy Equivalent as dependent variable. In columns (1)–(5) agricultural support is measured on the country level, while in columns (6)–(9) agricultural support is aggregated on commodity level. Column (1) shows the baseline model; columns (2) and (6) show the baseline model including the election variable; columns (3) and (7) show the baseline model including the partisan variable; columns (4) and (8) show the baseline model including both political cycle variables; columns (5) and (9) shows the outcomes of the general-to-specific method. The model is estimated including fixed time and regional effects. *t*-values are shown in parentheses. ***/** indicates significance at 10 and 5 percent, respectively.

Table 2. Estimation results for public spending on agriculture

Dependent variable: Public agricultural spending as share of GDP					
National level					
	(1)	(2)	(3)	(4)	(5)
Lagged dependent variable	0.395 [1.82] *	0.367 [1.90] *	0.408 [2.15] **	0.447 [2.17] **	0.363 [1.97] **
GDP per capita	0.128 [2.23] *	0.151 [2.37] **	0.129 [2.09] **	0.109 [1.98] **	0.103 [2.55] **
Growth rate of GDP	0.164 [1.07]	0.180 [1.33]	0.185 [0.98]	0.178 [1.14]	
Inflation	0.054 [1.16]	0.053 [1.08]	0.064 [1.19]	0.064 [1.26]	
Trade openness	-0.079 [-1.39]	-0.085 [-1.56]	-0.063 [-1.28]	-0.075 [-1.47]	
Natural disasters	0.129 [1.69] *	0.127 [1.91] *	0.150 [1.94] *	0.127 [1.95] *	0.110 [1.98] **
Size agricultural sector	0.310 [1.26]	0.285 [1.22]	0.264 [1.07]	0.355 [1.09]	
Size agricultural sector squared	-0.026 [-0.81]	-0.023 [-0.82]	-0.025 [-0.70]	-0.030 [-0.88]	
Total population	0.228 [0.60]	0.215 [0.67]	0.254 [0.64]	0.257 [0.67]	
Rural population	0.301 [1.88] *	0.343 [1.75] *	0.320 [1.79] *	0.323 [2.08] **	0.309 [1.99] **
Land endowment	-0.176 [-1.57]	-0.205 [-1.86]	-0.166 [-1.48]	-0.194 [-1.83]	
Capital endowment	-0.075 [-1.35]	-0.077 [-1.24]	-0.089 [-1.31]	-0.075 [-1.16]	
Proportional system	4.955 [1.92] *	5.113 [1.93] *	4.179 [1.95] *	5.520 [1.91] *	5.746 [2.10] **
Parliamentary system	3.668 [1.92] *	3.060 [2.10] **	4.224 [1.95] **	3.634 [2.09]	3.781 [1.98] **
Number of coalition parties	1.008 [1.60]	1.031 [1.53]	1.062 [1.63]	1.052 [1.52]	
Minority government	-1.267 [-1.14]	-1.033 [-1.37]	-1.343 [-0.99]	-1.131 [-1.03]	
EU-Member	8.778 [2.11] **	7.093 [2.15] **	9.221 [2.25] **	8.066 [2.19] **	9.428 [2.35] **
Uruguay Round	-3.817 [-1.82] *	-3.780 [-1.90] *	-4.498 [-1.92] *	-3.610 [-1.84] *	-4.283 [-1.98] **
Level of democracy	1.635 [1.94] *	1.361 [2.25] **	1.847 [2.01] **	1.595 [1.92] *	1.703 [2.04] **
Election cycle		2.541 [1.93] *		3.115 [1.90] *	2.963 [2.03] **
Partisan cycle			-0.510 [-1.87] *	-0.488 [-1.83] *	-0.470 [-2.13] **
Observations	1005	1005	1005	1005	1005
Number of countries	67	67	67	67	67
Arellano–Bond test AR(1)	0.002	0.002	0.002	0.002	0.002
Arellano–Bond test AR(2)	0.578	0.549	0.555	0.571	0.56
Sargan test (p-value)	0.423	0.419	0.436	0.426	0.498

Note: This table shows estimates of equation (2) using public agricultural spending as dependent variable. Column (1) shows the baseline model; column (2) shows the baseline model including the election variable; column (3) shows the baseline model including the partisan variable; column (4) shows the baseline model including both political cycle variables; column (5) shows the outcomes of the general-to-specific method. The model is estimated including fixed time and regional effects. *t*-values are shown in parentheses. */** indicates significance at 10 and 5 percent, respectively.

Table 3. Interaction of election and ideology variables

	Gross Subsidy Equivalent	Public agricultural spending
Election cycle	7.108** [2.78]	4.962** [2.95]
Partisan cycle	-0.655** [-2.02]	-0.399** [-2.19]
Election cycle x partisan cycle	-0.098** [-1.98]	-0.091** [-2.09]

*Note: This table shows the estimation results of equation (3). The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Tables 1 and 2. Only the coefficients of the political cycle variables and their interaction are shown. t-values are shown in parentheses. */** indicates significance at 10 and 5 percent, respectively.*

Table 4. Interaction effects of political system and election cycle

	Gross Subsidy Equiva- lent	Public agricultural spending
	(1)	(2)
Total sample		
Election cycle	5.581 [2.84]**	2.601 [2.57]**
Proportional x Election	1.325 [2.01]**	0.612 [1.94] *
Election cycle	5.799** [2.88]	2.812** [2.79]
Parliamentary x Election	0.712 [1.12]	0.452 [1.04]
Industrialized countries		
Election cycle	5.084 [2.44]**	2.332 [2.35]**
Proportional x Election	-0.266 [-1.94]*	-0.220 [-1.85]*
Election cycle	5.225** [2.51]	2.167** [2.39]
Parliamentary x Election	-0.411 [-1.10]	-0.334 [-1.03]
Developing and emerging market coun- tries		
Election cycle	6.044 [2.98]**	3.075 [2.94]**
Proportional x Election	1.607 [2.57]**	0.819 [2.98]**
Election cycle	6.012 [3.20] **	3.327 [3.02] **
Parliamentary x Election	0.913 [1.97] **	0.787 [1.98] **

*Note: This table shows the estimation results of equation (2), adding interaction effects between our election cycle variable and political system indicators. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Tables 1 and 2. Only the coefficients of the election cycle variable and its interaction with political system variables are shown. The three blocs show the results for the total sample, industrial countries, and the other countries in the sample, respectively. t-values are shown in parentheses. **/*** indicates significance at 10 and 5 percent, respectively.*

Table 5. Interaction effects of political system and partisan cycle

	Gross Subsidy Equiva- lent	Public agricultural spending
	(1)	(2)
Total sample		
Partisan cycle	-0.701 [-2.48]**	-0.433 [-2.06]**
Proportional x partisan	0.061 [1.86]*	0.027 [1.79]*
Partisan cycle	-0.760** [-2.56]	-0.457** [-2.00]
Parliamentary x partisan	-0.032 [-1.34]	-0.021 [-1.29]
Industrialized countries		
Partisan cycle	-0.936 [-2.12]**	-0.646 [-2.01]**
Proportional x partisan	-0.052 [-1.70]*	-0.006 [-1.68]*
Partisan cycle	-0.925** [-1.77]	-0.585** [-1.43]
Parliamentary x partisan	-0.035 [-1.14]	-0.029 [-1.27]
Developing and emerging market coun- tries		
Partisan cycle	-0.580 [-2.67]**	-0.397 [-2.11]**
Proportional x partisan	0.199 [2.58]**	0.034 [2.51]**
Partisan cycle	-0.531** [-2.51]	-0.428** [-2.17]
Parliamentary x partisan	-0.017 [-1.44]	-0.019 [-1.54]

*Note: This table shows the estimation results of equation (2), adding interaction effects of our partisan cycle variable and political system indicators. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Tables 1 and 2. Only the coefficients of the partisan cycle variable and its interaction with political system variables are shown. The three blocs show the results for the total sample, industrial countries, and the other countries in the sample, respectively. t-values are shown in parentheses. **/*** indicates significance at 10 and 5 percent, respectively.*

Table 6. Summary of main results

		Industrial countries		Non-industrial countries	
		Prop. vs. Maj.	Parl. vs. Pres.	Prop. vs. Maj.	Parl. vs. Pres.
Election cycle	Predicted	Maj>Prop	Pres>Parl	Prop>Maj	Parl>Pres
	Estimated	Maj>Prop	Non significant	Prop>Maj	Parl>Pres
Partisan cycle	Predicted	Maj>Prop	Pres>Parl	Prop>Maj	Parl>Pres
	Estimated	Maj>Prop	Non significant	Prop>Maj	Non significant

Table 7. Sensitivity analysis: Subsamples

	Outlier correction	EU- countries	Non-EU indus. Count	Emerging markets	Developing countries	Outlier correction	EU- countries	Non-EU indus. Count	Emerging markets	Developing countries
	Election cycle					Partisan cycle				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gross Subsidy Equivalent										
Proportional	6.619 [2.96]**	2.408 [1.78]*	3.795 [2.50]**	6.937 [3.14]**	4.460 [2.56]**	-0.807 [-2.03]**	-0.856 [-2.16]**	-1.027 [-2.62]**	-0.809 [-2.14]**	-0.325 [-1.79]*
Majority	5.270 [2.69]**	2.004 [1.81]*	2.660 [2.30]**	5.428 [2.72]**	3.354 [2.22]**	-0.631 [-2.13]**	-0.679 [-2.29]**	-0.805 [-2.75]**	-0.631 [-2.16]**	-0.295 [-1.74]*
Presidential	5.183 [3.17]**	1.565 [2.08]**	2.967 [2.54]**	5.398 [3.40]**	3.464 [2.71]**	-0.657 [-2.06]**	-0.693 [-2.23]**	-0.826 [-2.58]**	-0.702 [-2.14]**	-0.280 [-1.70]*
Parliamentary	5.144 [3.08]**	1.986 [1.88]*	2.790 [2.66]**	5.171 [3.29]**	3.277 [2.64]**	-0.718 [-2.24]**	-0.749 [-2.36]**	-0.897 [-2.87]**	-0.737 [-2.29]**	-0.289 [-1.83]*
Public agricultural spending										
Proportional	3.187 [2.90]**	1.013 [1.93]*	1.748 [2.34]**	3.477 [3.15]**	2.001 [2.44]**	-0.420 [-2.08]**	-0.426 [-2.20]**	-0.539 [-2.51]**	-0.451 [-2.27]**	-0.187 [-1.73]*
Majority	2.712 [2.61]**	0.988 [1.74]*	1.505 [2.34]**	2.983 [2.78]**	1.662 [2.29]**	-0.409 [-2.08]**	-0.422 [-2.08]**	-0.525 [-2.62]**	-0.438 [-2.16]**	-0.171 [-1.79]*
Presidential	2.502 [2.48]**	0.995 [1.78]*	1.338 [2.11]**	2.620 [2.53]**	1.524 [2.00]**	-0.364 [-2.09]**	-0.365 [-2.28]**	-0.467 [-2.72]**	-0.392 [-2.10]**	-0.170 [-1.74]*
Parliamentary	2.233 [2.81]**	0.714 [1.83]*	1.174 [2.49]**	2.419 [2.93]**	1.403 [2.40]**	-0.408 [-2.19]**	-0.416 [-2.23]**	-0.501 [-2.77]**	-0.433 [-2.25]**	-0.181 [-1.94]*

Note: *t*-values are shown in parentheses. In columns (1) and (6) we delete outliers defined by the inter quantile range; columns (2)-(5) and (7)-(10) show the estimation results of various subsamples ** indicates significance at 10 and 5 percent, respectively. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Table 1 and 2.

Table 8. Sensitivity analysis: Political and economic power

	High rural population	Low rural population	High agri. cult. Share	Low agri. Cult. share	High rural population	Low rural population	High agri. cult. share	Low agri. Cult. share
	Election cycle				Partisan cycle			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gross Subsidy Equivalent								
Proportional	7.539 [3.22]**	4.871 [2.19]**	7.127 [2.28]**	7.281 [2.05]**	-0.861 [-2.40]**	-0.637 [-2.23]*	-0.768 [-2.24]**	-0.910 [-2.21]**
Majority	5.461 [2.15]**	4.356 [1.85]*	5.751 [2.07]**	6.058 [1.98]**	-0.666 [-2.61]**	-0.535 [-1.99]**	-0.771 [-2.47]**	-0.649 [-2.28]**
Presidential	4.632 [2.96]**	3.929 [1.95]*	4.803 [2.07]**	4.971 [2.04]*	-0.767 [-2.70]**	-0.521 [-2.07]*	-0.672 [-2.33]**	-0.671 [-2.78]**
Parliamentary	5.036 [2.03]**	4.262 [1.99]**	5.075 [2.04]**	4.892 [1.98]**	-0.731 [-2.97]**	-0.551 [-2.08]*	-0.755 [-2.02]*	-0.749 [-1.91]*
Public agricultural spending								
Proportional	3.186 [2.79]**	2.278 [2.08]**	3.359 [2.64]**	3.304 [2.59]**	-0.497 [-2.13]**	-0.376 [-1.72]*	-0.515 [-2.14]**	-0.423 [-2.19]**
Majority	2.497 [2.69]**	1.940 [1.74]*	2.736 [2.43]**	2.586 [2.25]**	-0.402 [-2.05]**	-0.334 [-1.74]**	-0.441 [-1.87]*	-0.426 [-1.81]*
Presidential	2.554 [3.22]**	1.763 [2.30]**	2.387 [2.95]**	2.539 [3.26]**	-0.478 [-2.11]**	-0.350 [-1.92]*	-0.482 [-2.02]**	-0.428 [-2.16]**
Parliamentary	2.718 [2.17]**	1.962 [1.87]*	2.152 [2.11]**	2.533 [2.01]**	-0.496 [-1.71]**	-0.373 [-2.12]**	-0.506 [-1.89]*	-0.486 [-1.74]*

*Note: this table shows the estimation results of various subsamples. t-values are shown in parentheses. **/* indicates significance at 10 and 5 percent, respectively. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Table 1 and 2.*

Table 9. History of democracy and bicameral systems

	Gross Subsidy Equivalent	Public agricultural spending
Old democracies	5.074 [2.01]**	2.115 [1.99]**
New democracies	7.125 [2.55]**	2.998 [2.34]**
Bicameral	5.891** [2.21]	2.417** [2.17]
Non-bicameral	5.014** [2.00]	2.204** [2.04]

*Note: t-values are shown in parentheses. In columns (1) and (6) we delete outliers defined by the inter quantile range; columns (2)-(5) and (7)-(10) show the estimation results of various subsamples */** indicates significance at 10 and 5 percent, respectively. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Table 1 and 2.*

Table 10. Sensitivity analysis: Alternative cycle and support indicators

	Pre-election	Post-election	Alternative partisan variable	Agricultural spending per capita	Agricultural spending as a share of total government spending
	(1)	(2)	(3)	(4)	(5)
Gross Subsidy Equivalent					
Election cycle	5.312 [2.37]**	-1.283 [-1.11]		11.442 [2.60]**	9.627 [2.12]**
Partisan cycle			-3.044 [-2.05]**	-1.586 [-1.92]**	-1.348 [-1.86]*
Public agricultural spending					
Election cycle	2.279 [1.98]**	-0.511 [-0.71]		4.910 [1.96]**	4.042 [1.91]*
Partisan cycle			-2.103 [-1.89]*	-1.138 [-1.93]*	-1.007 [-1.83]*

*Note: this table shows the estimation results of alternative political cycles and agricultural support measures. t-values are shown in parentheses. */** indicates significance at 10 and 5 percent, respectively. The model is estimated including fixed time and regional effects. The model is estimated including the control variables found significant in column (5) of Table 1 and 2.*

Figure 1. Political cycles in commodity support

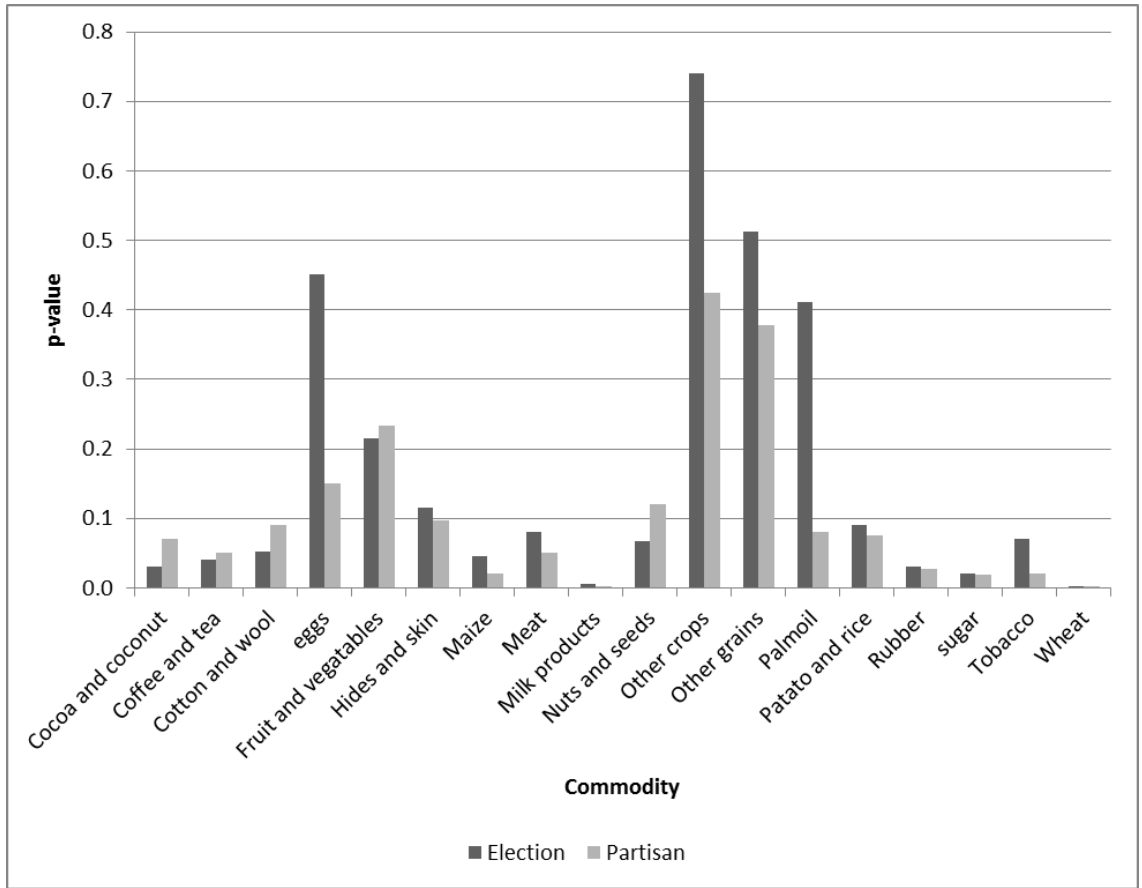
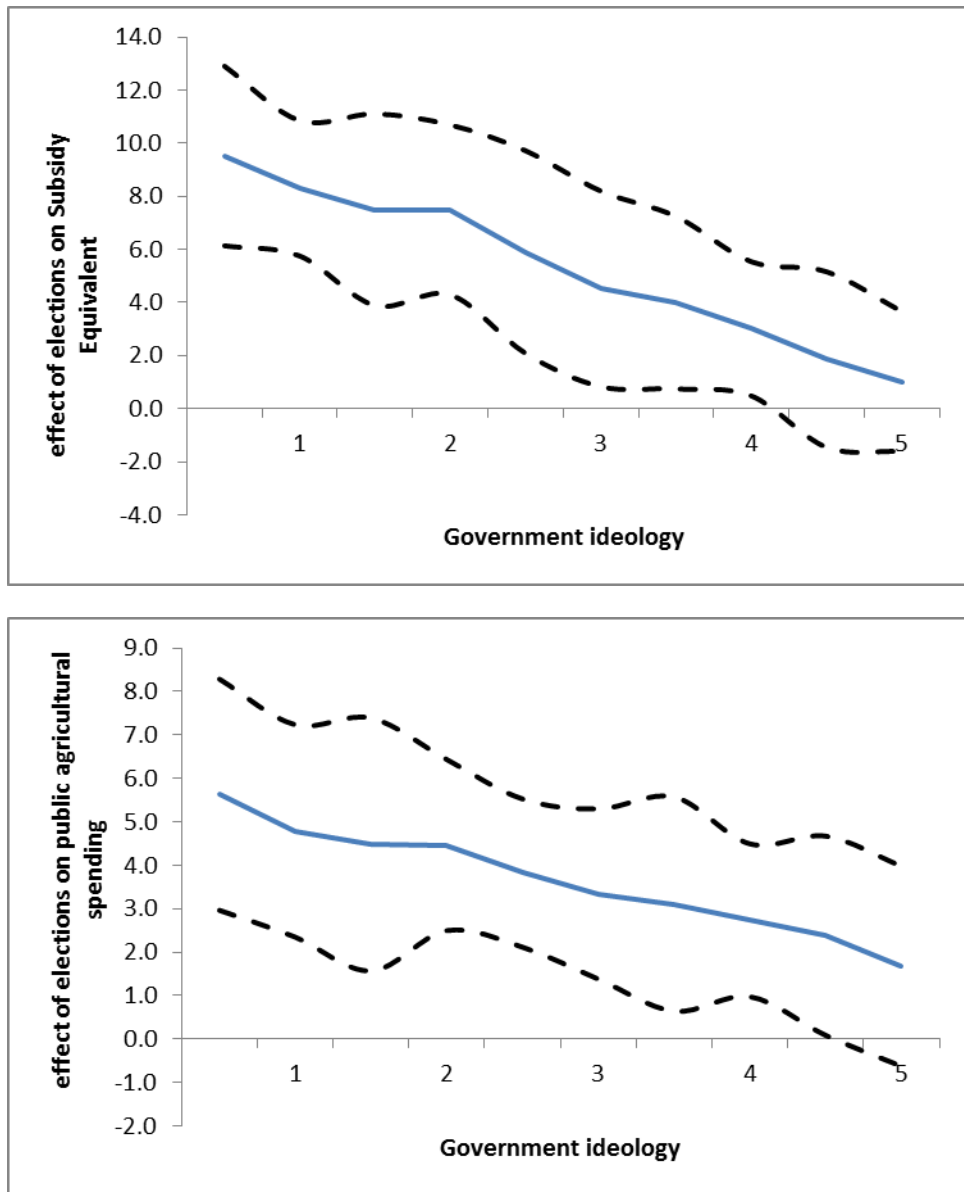


Figure 2. Interaction between election and ideology cycles



The straight line reports the marginal effect of the government ideology on the occurrence of a PBC in agricultural support. The dotted lines are the 95 percent confidence intervals.

Table A1. Countries included

	Gross Subsidy Equivalent	Public expenditure		Gross Subsidy Equivalent	Public expenditure
Albania*		•	Lithuania**	•	•
Argentina*	•	•	Luxembourg*		•
Australia**	•	•	Madagascar**	•	•
Austria*	•	•	Malaysia**	•	•
Bangladesh*	•	•	Mali**	•	
Belgium		•	Mauritius**		•
Bolivia*		•	Mexico**	•	•
Brazil*	•	•	Mozambique**	•	
Bulgaria*	•	•	Nepal**		•
Canada**	•	•	Netherlands*	•	•
Chile*	•	•	New Zealand*	•	•
Colombia*	•	•	Nicaragua**	•	•
Costa Rica*		•	Nigeria**	•	•
Cyprus*		•	Norway*	•	•
Czech Republic*	•	•	Panama**		•
Denmark*	•	•	Paraguay**		•
Dominican Rep**	•	•	Peru**		•
Ecuador**	•	•	Philippines**	•	•
El Salvador**		•	Poland**	•	•
Estonia**	•	•	Portugal*	•	•
Fiji**		•	Romania**	•	•
Finland*	•	•	Russia**	•	•
France*	•	•	Slovakia**	•	•
Germany*	•	•	Slovenia**	•	•
Greece*		•	South Africa**	•	•
Ghana**	•	•	Spain*	•	•
Guatemala**		•	Sri Lanka**	•	•
Honduras**		•	Sweden*	•	•
Hungary**	•	•	Switzerland*	•	•
Iceland*	•	•	Tanzania**	•	
India**	•	•	Thailand**	•	•
Indonesia**	•	•	Trinidad**		•
Ireland*	•	•	Turkey**	•	•
Israel*		•	United Kingdom*	•	•
Italy*	•	•	United States*	•	•
Japan*	•	•	Ukraine**	•	•
Kenya**	•	•	Uruguay**		•
Korea (South)*	•	•	Zambia**	•	•

* Industrial country ** Emerging economy

Table A2. Data sources

Variable	Description	Source
GDP per capita	Real GDP per capita in constant US dollars of 2000	Heston et al. (2009)
Growth rate of GDP	Growth rate of GDP per capita	Heston et al. 2009
Inflation	Calculated by $p/(1+p)$ where p is the change in Consumer Price Index.	IMF (2010)
Trade openness	Sum of import and export as a share of total GDP.	IMF (2010), World Bank (2010)
Majoritarian system	Dummy variable that is one if the election is in a majority electoral system	Update of Beck et al. (2001), electionresources (2007)
Parliamentary system	Dummy variable that is one if the election is in a parliamentary system	Update of Beck et al. (2001), electionresources (2007)
Minority governments	Dummy variable taking the value one when a particular country-year is ruled by a government with a minority of seats in parliament.	Update of Beck et al. (2001)
Number of coalition parties	Number of coalition parties	Update of Beck et al. (2001), electionresources (2007)
Natural disasters	Number of natural disasters in a particular country-year	EM-DAT (2010)
EU member	Dummy variable that is one if a country is a member of the EU in a particular year	www.eu.com
Uruguay Round	Dummy variable taking the value one in the post Uruguay Round period, otherwise zero	Wikipedia
Size agricultural sector	Share of GDP contributed by the agricultural sector	IMF (2010), World Bank (2010), OECD (2010), FAO (2010)
Total population	Total number of inhabitants within a country	World Bank (2010)
Level of democracy	Polity IV score	Polity IV (2006)
Rural population	Share of total population living in the rural areas	IMF (2010), World Bank (2010), OECD (2010), FAO (2010)
Land endowment	Total hectare of arable land by the labor force working in the agricultural sector.	IMF (2010), World Bank (2010), OECD (2010), FAO (2010)
Capital endowment	Total of agricultural capital (machinery, equipment and fixed livestock) in a particular country divided by the number of workers in the agricultural sector.	IMF (2010), World Bank (2010), OECD (2010), FAO (2010)

Table A3. Descriptive statistics

Variable	Mean	standard deviation
GDP per capita (logarithm)	7.68	1.71
Growth rate of GDP	1.97	5.68
Inflation	6.56	5.08
Trade openness	59.21	31.01
Majoritarian system	0.44	0.41
Parliamentary system	0.32	0.46
Minority governments	0.02	0.12
Number of coalition parties	2.31	1.01
Natural disasters	0.45	1.19
EU member	0.13	0.34
Uruguay Round	0.57	0.5
Size agricultural sector	0.17	14.27
Total population (logarithm)	16.75	1.44
Level of democracy	3.09	7.17
Rural population	48.62	22.98
Land endowment	0.37	0.41
Capital endowment	4.46	2.43
Partisan cycle	2.73	1.73
Election cycle	0.26	0.11