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Factor Endowments, Democracy, and Trade Policy Divergence

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Abstract

We develop a stochastic model of electoral competition in order to study the economic and political determinants of trade policy. We model a small open economy with two tradable goods, each of which is produced using a sector-specific factor (e.g., land and capital) and another factor that is mobile between these tradable sectors (labor); one nontradable good, which is also produced using a specific factor (skilled labor), and an elected government with the mandate to tax trade flows. The tax revenue is used to provide local public goods that increase the economic agents' utility. We use this general equilibrium model to explicitly derive the ideal policies of the different socioeconomic

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groups in society (landlords, industrialists, labor, and skilled workers). We then use those ideal policies to model the individual probabilistic voting behavior of the members of each of these socioeconomic groups. We use this model to shed light on how differences in the comparative advantages of countries explain trade policy divergence between countries as well as trade policy instability within countries. We regard trade policy instability to mean that, in equilibrium, political parties diverge in terms of the political platforms they adopt. We show that in natural resource (land)–abundant economies with very little capital, or in economies that specializes in the production of manufactures, parties tend to converge to the same policy platform, and trade policy is likely to be stable and relatively close to free trade. In contrast, in a natural resource–abundant economy with an important domestic industry that competes with the imports, parties tend to diverge, and trade policy is likely to be more protectionist and unstable.

1. Introduction

Many developing countries adopted trade protectionist measures during the second part of the 20th century. Most of these countries, if not all of them, did not have a comparative advantage in the manufacturing sector and they did not industrialize in a sustainable way as a result. Instead, they had a comparative advantage within the primary sector. In contrast, countries with comparative advantage in the manufacturing sector tended to remain much more open to trade. In addition, the countries that adopted import substitution policies tended to show substantial volatility over time in their trade policies. In this paper, we develop a stochastic model of electoral competition to study the economic and political determinants of trade policy. Our goal is to provide an explanation of the variability of trade policy both across countries and within a country over time, rather than across industrial sectors.

Many models of political choice emphasize political convergence to an electoral mean or median. Although extremely useful to study important questions in the field of political economy, such models appear to be of limited use in explaining the oscillations that can occur as a result of divergent political choices by parties. Schofield (2007) suggests, however, that political parties will not converge if there is sufficient difference in the *valences* of political leaders, where the valence of a candidate captures all the characteristics of the candidate and the party that affect voting decisions and are not related with policy platforms. Furthermore, in this version of the stochastic model, there is convergence or divergence depending on pure political factors, such as the difference in the valances of the candidates, as well as on the distribution of voters' policy preferences, which ultimately depends on structural characteristics of the economy.

We model a small open economy with two tradable goods, each of which is produced using a sector-specific factor (land and capital) and a third factor (e.g., labor) which is mobile between these tradable sectors. There is also one nontradable good, which is produced using a specific factor (skilled labor). The political model has an elected government with the mandate to fix an *ad valorem* import tax rate. The tax revenue is used to provide two local public goods. One public good is targeted at the specific factors of production whereas the other is targeted at the mobile factor of production. We use this general equilibrium model to derive the ideal policies of the different socioeconomic groups in society (landlords, industrialists, workers, and service workers). We then use those derived ideal policies to model the individual probabilistic voting behavior of the members of each of these socioeconomic groups. The combined model is thus based on micropolitical economy foundations of citizens' preferences. We believe this paper is the first to employ this methodology in order to study how differences in the factor endowments of countries explain trade policy divergence between countries as well as trade policy instability within countries.

Just as in Grossman and Helpman (1994, 1996), we consider two interconnected sources of political influence: electoral competition and interest groups. In their study of the political economy of protection, Grossman and Helpman proposed a model of protection in which economic interests organize along sectoral lines, so that interest groups form to represent industries. Their model predicts a cross-sectional structure of protection, depending on political and economic characteristics, and provides an excellent model of within country cross-section variability of trade policy. In contrast, we focus on the variability of trade policy both across countries and within a country over time, rather than across sectors.

Our work is related to the analysis of Rogowski (1987, 1989) on the effects of international trade on political alignments (see also Baldwin 1989). Rogowski (1987) elaborates a lucid explanation of political cleavages, as well as changes in those cleavages over time as a consequence of exogenous shocks in the risk and cost of foreign trade. Rogowski (1987) classifies economies according to their factor endowments of capital, land, and labor, and uses his classification to deduce two main types of political cleavages: a class cleavage and an urban–rural cleavage. The model that we present includes nontradable goods and this allows for a richer characterization of political alignments. In particular, in natural resource (land)–abundant economies, without the inclusion of nontradable goods, landlords favor free trade, and industrialists and workers are protectionist, inducing an urban–rural cleavage. However, once nontradable goods are introduced in the model, distributive conflict among urban groups will also be present. Industrialists and unskilled workers may favor protectionist policies while skilled workers favor free trade policies (see Galiani, Heymann, and Magud 2009). Furthermore, we show that the presence of a distributive conflict between urban groups can have interesting political effects in the determination of trade policy.

Employing our international trade model we construct a taxonomy to classify different economies given their economic structures:

(1) *Specialized natural resource–rich economies.* This set comprises countries that are highly abundant in the factor specific to the less labor-intensive tradable industry (land). They specialize in the production of primary goods.

(2) *Diversified natural resource–rich economies.* They comprise countries that are moderately abundant in the factor specific to the less labor-intensive tradable industry (land), but they display an important activity in the production of the two tradable goods.

(3) *Industrial economies.* They comprise countries relatively scarcely endowed with natural resources that are either relatively abundant in the factor specific to the more labor-intensive tradable industry (capital) or are highly endowed with the mobile factor of production (labor).

We show that in a specialized natural resource–abundant economy, or in an industrial economy, political parties tend to converge to the same policy platform and, hence, trade policy is likely to be stable and relatively close to free trade. In contrast, in a natural resource–abundant economy with an important domestic industry which competes with imports, parties tend to diverge and, hence, trade policy is likely to be more protectionist and unstable.[1] The intuition behind this result is that in a diversified natural resource–rich economy the underlying trade policy constituencies are more balanced and therefore it is more likely that the party with the lowest valence will find optimal to leave the electoral center and propose a platform that targets some specific socioeconomic groups rather than stay at the center and obtain a vote share proportional to the difference in electoral valences.

In summary, we first link the trade policy preferences of each group in society with the country's underlying economic structure. We then show that when there exists a strong political constituency in favor of free trade, a stable liberal trade policy regime emerges. On the other hand, when the underlying trade policy constituencies are more balanced, political parties may diverge in their policy platforms, and the resulting political outcome may be unstable in the sense that very different policy regimes can arise depending

[1] This is consistent with the empirical evidence in O'Rourke and Taylor (2006) who show that, in the late 19th century, democratization led to more liberal trade policies in countries where workers stood to gain from free trade. Using more recent evidence, Mayda and Rodrik (2005) show that individuals in sectors with a revealed comparative disadvantage tend to be more protectionist than individuals in sectors with a revealed comparative advantage. They also show that individuals in nontradable sectors tend to be the most protrade of all workers.

on which party wins the election. Finally, we also show that when policy platforms diverge the economic structure influences the pattern of divergence. In particular, in specialized natural resource–rich and industrial economies, parties tend to propose very similar trade policies, but they differ in their budget allocation proposal. Thus, distributional conflict mainly occurs in the budget allocation, which, in our model, does not affect the efficiency of the economy. On the other hand, in diversified natural resource–rich economies parties tend to diverge in both dimensions. Thus, party rotation induces significant changes in the efficiency of the economy since each party implements a different trade policy.

The rest of the paper is organized as follows. Section 2 presents our simple general equilibrium model of a small open economy. We find and characterize the competitive equilibrium of the model, as well as the ideal policies of each group of agents. In Section 3, we introduce the stochastic spatial electoral model with exogenous valence, and we use it to study the political economy of trade policy. Section 3.1 presents the conditions for convergence to a weighted political mean. In Section 3.2, we emphasize that political convergence depends both on political parameters, such as heterogeneity of political perceptions, and on economic structure, namely the electoral covariance matrix of economic preferences. In Section 3.3, we show how the structure of the economy affects policy choices, in particular the equilibrium trade policy. In Section 4, we extend the model to incorporate interest groups. In Section 5, we discuss some historical examples drawn from the United States and Argentina. Finally, Section 6 offers brief concluding remarks.

2. The Economy

In this section, we develop a static model of a small open economy and characterize the ideal policies of the different groups in society. Consider an augmented Ricardo-Viner specific factor model of an open economy with two tradable goods, labeled X and Y, and a nontradable good, labeled N. Good $X(Y)$ is produced employing a factor specific to industry $X(Y)$, denoted $F_X(F_Y)$, and labor, denoted L, which can move between tradable industries without friction. Let $L_X(L_Y)$ be the amount of L employed in industry $X(Y)$.[2] Production functions are assumed to be Cobb–Douglas with different factor intensities:

$$Q_X = A_X\,(F_X)^{\alpha_X}\,(L_X)^{1-\alpha_X}\,,$$
$$Q_Y = A_Y\,(F_Y)^{\alpha_Y}\,(L_Y)^{1-\alpha_Y}\,.$$

[2] It is not difficult to extend the model to any finite number of tradable goods, each produced with a specific factor and factor L. However, the political equilibrium would be more complicated and the fundamental message of our analysis would remain the same.

We assume, without loss of generality, that $\alpha_X > \alpha_Y$. The nontradable good is produced employing labor specific to industry N, denoted F_N, with the linear production function

$$Q_N = A_N F_N.$$

Here, $Q_s\,(s = X, Y, N)$ is the total output of good s. The aggregate vector endowment of factors is $\mathbf{e} = (\bar{F}_X, \bar{F}_Y, \bar{F}_N, \bar{L})$.

We focus on the functional distribution of income. Therefore, we only consider four socioeconomic groups associated with the resources they control: for example, natural resources, capital, labor, and skilled labor. The society we have in mind is one composed of landlords, industrialists (owning sector-specific capital), workers (mobile factor between tradable industries), and service workers. We identify the latter with skilled workers.[3] A household of type k owns $\frac{\bar{k}}{n_k}$ units of factor k, and zero units of all other factors, where n_k represents the fraction of the population belonging to group k. All individuals have the same utility function, which is Cobb–Douglas in private goods and separable in a local public good:

$$u^{i,k}\left(c_X^{i,k}, c_Y^{i,k}, c_N^{i,k}, G_k\right) = \left(c_X^{i,k}\right)^{\beta_X}\left(c_Y^{i,k}\right)^{\beta_Y}\left(c_N^{i,k}\right)^{\beta_N} + H\left(G_k\right).$$

Here, $c_s^{i,k}$ is the consumption of the private good $s = X, Y, N$ by individual i of type $k (0 < \beta_s < 1$, with $\beta_X + \beta_Y + \beta_N = 1)$; G_k is the consumption of a local public good by the households of type k; and H is a strictly increasing and strictly concave subutility function. These local public goods are just a convenient way of handling transfers in kind to different groups in society.[4] In particular, in the rest of the paper we assume that the government provides two local public goods: one that benefits specific factors, denoted G_F, and another that benefits the mobile factor, denoted G_L. These are associated, respectively, with the upper and middle-class groups and the low-income group.

In order to avoid distorting the private good markets merely due to the public sector utilization of private goods as its inputs of production, we assume that the government also has a Cobb–Douglas production function with the same coefficients of the utility function.[5] Even though we do not need this assumption to obtain our results, it simplifies the analysis below.

[3] This is clearly a simplification. The service sector tends to comprise both unskilled workers, such as domestic workers, and highly skilled workers, such as financial sector workers, medical doctors, etc. Thus, for the sake of simplicity, we are abstracting from modeling the unskilled segment of the service sector. Nevertheless, including this subsector in the model would not change the qualitative results of our analysis.

[4] This formulation has one methodological advantage over an alternative setup with lump-sum transfers. As we show in Lemma 1, with a mild condition in H , each socioeconomic group ideal trade policy is interior.

[5] Formally, the government production function is given by $Q_G = A_G (C_X^g)^{\beta_X} (C_Y^g)^{\beta_Y} (C_N^g)^{\beta_N}$, where C_s^g is the amount of good $s = X, Y, N$ used as inputs by the public sector, and $A_G = [(\beta_X)^{\beta_X} (\beta_Y)^{\beta_Y} (\beta_N)^{\beta_N}]^{-1}$. This specification does not imply that the presence of the

Finally, we assume that the economy is small in the sense that it cannot affect the international prices of tradable goods $\mathbf{p}^* = (p_X^*, p_Y^*)$. Since the government can tax exports and impose import tariffs, domestic prices may differ from international prices. Let $\mathbf{p} = (p_X, p_Y, p_N)$ be the vector of domestic good prices, $CPI = (p_X)^{\beta_X}(p_Y)^{\beta_Y}(p_N)^{\beta_N}$ the consumer price index, and $\mathbf{w} = (w_{F_X}, w_{F_Y}, w_{F_N}, w_L)$ the vector of factor prices, where w_k is the rental rate of factor k. Due to Lerner's theorem, export taxes are equivalent to import tariffs. Thus, without loss of generality, we assume that the government only imposes import taxes at the rate $\tau \geq 0$.

In Appendix A, we summarize three results that characterize the competitive equilibrium of this open economy. These results suggest the following taxonomy of *economic structures*. Let $\Psi = \frac{A_Y(\bar{F}_Y)^{\alpha_Y}(\bar{L})^{(\alpha_X-\alpha_Y)}}{A_X(\bar{F}_X)^{\alpha_X}}$ be the degree of comparative advantage in industry Y:

(1) *Specialized natural resource–rich economies*: $\Psi = 0$;

(2) *Diversified natural resource–rich economies*: $(\frac{\alpha_Y}{1-\alpha_Y})^{\alpha_Y}(\frac{1-\alpha_X}{\alpha_X})^{\alpha_X}\Omega\frac{p_X^*}{p_Y^*} < \Psi < \Omega\,\frac{p_X^*}{p_Y^*}$;

(3) *Industrial economies*: $\Omega\frac{p_X^*}{p_Y^*} < \Psi \leq (1+\bar{\tau}_{aut})\Omega\frac{p_X^*}{p_Y^*}$;

where Ω is a constant that depends on α_X, α_Y, β_X, and β_Y and $\bar{\tau}_{aut}$ is the import tax tariff that sends the economy to autarky.[6]

Many economies can be accommodated within this taxonomy. Economies highly endowed with natural resources (relative to capital and labor), such as, for example, Argentina before the 1930 crisis, or most OPEC countries, can be regarded as having a Type 1 economic structure. However, Argentina, after World War II, is better classified as having a Type 2 economic structure (see Galiani and Somaini 2010). Actually, several economies well endowed with natural resources and which adopted import substitution policies moved from a Type 1 to a Type 2 economic structure. Many backward economies, such as those of Africa, can also be seen to have a Type 2 economic structure, even though they might not have an important industrial sector. In this case, the agricultural sector acts as the sector intensive in the use of labor (L), while the exporting sector exploits the endowment of a specific natural resource (e.g., diamonds in Botswana). Finally, Type 3 economies consist of two types. First are those that are highly endowed with capital (relative to natural resources and labor) such as all developed

public sector does not change the competitive equilibrium of the economy, neither that it does not affect welfare. It merely implies that the public sector, as is our desire, only affects the economy through tax collection and the assignment of the local public goods.

[6] Formally, $\Omega = \frac{(\beta_Y)^{\alpha_Y}(1-\alpha_X)^{1-\alpha_X}}{(\beta_X)^{\alpha_X}(1-\alpha_Y)^{1-\alpha_Y}}[\beta_Y(1-\alpha_Y)+\beta_X(1-\alpha_X)]^{\alpha_X-\alpha_Y}$.We also assume that: $\alpha_X \geq \max\{\frac{\beta_X(1-2\alpha_Y)}{\beta_X(1-2\alpha_Y)+\beta_Y(1-\alpha_Y)}, \frac{(\beta_Y+\beta_N)\alpha_Y}{\beta_Y+\beta_N\alpha_Y}\}$. However, this is not a very restrictive assumption, since industry X is relatively intensive in the specific factor F_X.

countries. Second are those highly endowed with labor (L) that export labor-intensive manufactured goods such as it is the case of China today.[7] Note, however, that this taxonomy is a static one. An economy with a given endowment vector **e** could be classified, for example, either under the category 1 or 2 depending on, among other things, the international relative price of the tradable goods (see Galiani and Somaini 2010). In addition, the vector endowment **e** could evolve over time.

The relevance of this taxonomy will become clear as soon as we derive the ideal policies of each socioeconomic group. In order to do so, we now define the policy space and the indirect utility function of each group.

Real government revenue is given by

$$\frac{R(\tau)}{CPI(\tau)} = \frac{\tau p_l^*[C_l(\tau) - Q_l(\tau)]}{CPI(\tau)}, \tag{1}$$

where $Q_l(\tau)$ and $C_l(\tau)$ measure, respectively, the equilibrium production and consumption of the imported good. $\frac{R(\tau)}{CPI(\tau)}$ has the typical inverted U shape with zeros at $\tau = 0$ and $\tau = \tau_{aut}$ and a maximum at $\tau_{\max}$ given by

$$\frac{1 - \tau_{\max}}{\tau_{\max}} = \eta_{(C_l - Q_l),p_l} - \beta_N \eta_{p_N,p_l} - \beta_l, \tag{2}$$

where η indicates elasticity. In equilibrium, government production equals government real revenue. Suppose, however, that a fraction of the public goods vanishes in the process of distributing it, possibly due to corruption or any other form of rent dissipation prevalent in the operation of the public sector. Then,

$$G_L = A(\gamma)\frac{R(\tau)}{CPI(\tau)}, \quad G_F = A(1-\gamma)\frac{R(\tau)}{CPI(\tau)}, \tag{3}$$

where $\gamma \in [0, 1]$ is the fraction of government revenue allocated to the provision of G_L ($1 - \gamma$ is the fraction allocated to G_F), and $A(.)$ is a strictly increasing and strictly concave function such that $A(x) \leq x$, $A(0) = 0$, and $A'(1) = 0$.[8]

From Equations (1) and (3), we see that public decisions are restricted to a two-dimensional space: the government must set the import tax rate and the fraction of revenue assigned to the provision of each local public good. Thus, the "policy space" of an economy with endowment vector **e** and international prices $\mathbf{p}^*$ is given by

$$Z = \{z = (\tau, \gamma) : 0 \leq \tau \leq \tau_{aut}, 0 \leq \gamma \leq 1\} \subset \Re_+^2. \tag{4}$$

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[7] Note that in the case of developed economies highly abundant in capital, all our results will still hold even if it were the case that the workers in the tradable exporting sector are skilled and can move without friction between this industry and the (skilled) service sector.

[8] The methodological advantage of this formulation is, as we show in Lemma 1, that the ideal budget allocation of each socioeconomic group is interior.

Here τ is the tax rate on imports and γ is the fraction of government revenue allocated to the provision of G_L. Clearly, Z is a convex and compact subset of the semipositive quadrant $\Re^2_+$.

Since preferences over private and public goods are separable and preferences over bundles of private goods are represented by a Cobb–Douglas utility function, the indirect utility function of each individual is given by his real income (using the consumer price index as deflator) plus the utility derived from the consumption of the local public good. Formally, the "indirect utility function of an individual belonging to group" $k = (F_X, F_Y, F_N, L)$is given by

$$v^k(\tau, \gamma) = \frac{w_k(\tau)}{CPI(\tau)} \frac{\bar{k}}{n_k} + H\left(A(\gamma_k) \frac{R(\tau)}{CPI(\tau)}\right), \tag{5}$$

where $\gamma_L = \gamma$ and $\gamma_k = 1 - \gamma$ for $k = F_X, F_Y, F_N$.

For each group in society, its ideal policy is the point in the policy space Z that maximizes its indirect utility function (5).

LEMMA 1: ***Ideal policies.*** *Let* $z^k = (\tau^k, \gamma^k)$ *denote the ideal policy for an individual from group* k. *Then* $\gamma^L = 1$ *and* $\gamma^k = 0$ *for* $k = F_X, F_Y, F_N$. *Moreover, assume that* $\lim_{G \to 0} H'(G) = \infty$ *and* $\max\{\frac{w_{F_X}\bar{F}_X}{n_{F_X}}, \frac{w_{F_Y}\bar{F}_Y}{n_{F_Y}}\} \geq \frac{w_{F_N}\bar{F}_N}{n_{F_N}} \geq \frac{w_L\bar{L}}{n_L}$. *Then, for economies characterized by structure 1,* $\tau^{F_X} < \tau^{F_N} < \tau^L < \tau_{\max}$. *For economies characterized by structure 2,* $\tau^{F_X} < \tau^{F_N} < \tau_{\max} < \tau^L < \tau^{F_Y}$. *For economies characterized by structure 3,* $\tau^{F_Y} < \tau^{F_N} < \tau^L < \tau_{\max} < \tau^{F_X}$.

Proof: See Appendix A. ■

The ideal policy for each socioeconomic group is the key economic input of the political game that we develop in the next section. Note, in particular, how these ideal policies vary with different economic structures. In a specialized natural rich economy (structure 1), there is no protectionist demand, and in an industrial economy (structure 3), the only protectionist group is the one that owns the factor specific to the import competing industry. However, in a diversified natural resource–rich economy, there are two protectionist groups, those owning F_Y or L, while the groups owning F_X or F_N lose from protection.

3. The Polity

In this section, we introduce the stochastic spatial model of electoral competition. We begin with a formal definition of the stochastic spatial model as a game in normal form. We define and discuss an equilibrium concept for this game, and study the conditions under which parties converge to a weighted electoral mean. We then use the model to study the political determination of trade policies using the bliss points derived in Lemma 1.

3.1. The Stochastic Spatial Model with Exogenous Valence

The timing of events is as follows (Persson and Tabellini 2000):

(1) Party leaders simultaneously announce their electoral platforms.
(2) Each voter receives a private signal about candidates' valence.
(3) Elections are held.
(4) The elected candidate implements the announced platform.

Let $P = \{1, \ldots, p\}$ be the set of all political parties. Each party $j \in P$ selects a platform $z_j = (\tau_j, \gamma_j)$ from the policy space Z. We let $\mathbf{Z} = \times_{j \in P} Z$. A profile of party platforms is denoted $\mathbf{z} \in \mathbf{Z}$. When necessary we use the notation $\mathbf{z}_{-j}$ to represent the profile of platforms of all parties except party j. The preferences of party $j \in P$ is given by its expected vote share function $S_j : \mathbf{Z} \to [0, 1]$:

$$S_j(\mathbf{z}) = \sum_{k \in V} n_k \rho_j^k(\mathbf{z}). \tag{6}$$

Here, $\rho_j^k(z)$ is the probability that a voter in group k votes for party j, while $V = \{F_X, F_Y, F_N, L\}$ is the set of all groups of voters, and n_k is the proportion of the population in group k.

The utility associated with a given voter in group k when party j implements platform z_j is given by

$$\begin{aligned} v^k(z_j) &= v^k_{pol}(z_j) + \lambda_j + \varepsilon_j^k \\ &= -\phi_\tau^k(\tau_j - \tau^k)^2 - \phi_\gamma^k(\gamma_j - \gamma^k)^2 + \lambda_j + \varepsilon_j^k, \end{aligned} \tag{7}$$

where (i) $z^k = (\tau^k, \gamma^k) \in Z$ is the ideal policy for the voters in group k; (ii) $\phi_\tau^k > 0$ ($\phi_\gamma^k > 0$) measures the importance that voters in group k assign to the import tax rate (the local public good); and (iii) $\lambda_j + \varepsilon_j^k$ is the private signal received by a voter in group k about party j's valence. We shall assume that the expected value of this signal is λ_j, and is common to all groups, and that the error vector $\varepsilon^k = (\varepsilon_1^k, \ldots, \varepsilon_p^k)$ has a cumulative stochastic distribution denoted F^k. We assume that F^k is the Type 1 extreme value distribution, which is the same for all k.

Given a profile of platforms $\mathbf{z} \in \mathbf{Z}$, let $v^k(\mathbf{z}) = (v^k(z_1), \ldots, v^k(z_p))$. Candidates do not know the private signal received by each individual voter, but the probability distribution of these signals in each group of the electorate is common knowledge. Let F^k be the cumulative distribution function of $(\varepsilon_1^k, \ldots, \varepsilon_p^k)$. Then the probability that a voter in group k selects party j is given by

$$\rho_j^k(\mathbf{z}) = \Pr[v^k(z_j) > v^k(z_l) \quad \text{for all } l \neq j]. \tag{8}$$

Finally, we order parties according to their expected valence: $\lambda_p \geq \cdots \geq \lambda_1$.

DEFINITION 1: *The stochastic spatial model with exogenous valence is the game in normal form* $\Gamma_{exo} = \langle P, \mathbf{Z}, \mathbf{S} \rangle$, *where*

(1) ***Players:*** $P = \{1, \ldots, p\}$ *is the set of political parties.*
(2) ***Set of strategies:*** Z *is the policy space defined in section 2 and* $\mathbf{Z} = \times_{j \in P} Z$ *is the space of all strategy profiles.*
(3) ***Utility functions:*** $S_j : \mathbf{Z} \to [0, 1]$ *is the expected vote share function of party* $j \in P$ *deduced from (7) and (8) and* $\mathbf{S} = \times_{j \in P} S_j$.

We solve this game by finding its local Nash equilibrium (LNE).

DEFINITION 2: *A strict (weak) LNE of the stochastic spatial model* $\Gamma_{exo} = \langle P, \mathbf{Z}, \mathbf{S} \rangle$ *is a vector of party positions* $\mathbf{z}^*$ *such that for each party* $j \in P$, *there exists an* ϵ*-neighborhood* $B_\epsilon(z_j^*) \subset Z$ *of* z_j^* *such that*

$$S_j(z_j^*, \mathbf{z}_{-j}^*) > (\geq)\ S_j(z_j', \mathbf{z}_{-j}^*) \quad \textit{for all } z_j' \in B_\epsilon(z_j^*) - \{z_j^*\}.$$

REMARK 1: *An LNE is a pure strategy Nash equilibrium (PNE) if we can substitute* Z *for* $B_\epsilon(z_j^*)$ *in the above definition.*

REMARK 2: *It is usual in general equilibrium theory to use first-order conditions, based on calculus techniques, to determine the nature of the critical equilibrium. Because production sets and consumer preferred sets are usually assumed to be convex, the Brouwer's fixed point theorem can then be used to assert that the critical equilibrium is a Walrasian equilibrium. However, in political models, the critical equilibrium may be characterized by positive eigenvalues for the Hessian of one of the political parties. As a consequence the utility function (expected vote share function) of such a party fails pseudo-concavity. Therefore, none of the usual fixed point arguments can be used to assert existence of a "global" PNE. For this reason, we use the concept of a "critical Nash equilibrium" (CNE), namely a vector of strategies which satisfies the first-order condition for a local maximum of the utility functions of the parties. Standard arguments based on the index, together with transversality arguments can be used to show that a CNE will exist and that, generically, it will be isolated.*[9] *An "LNE" satisfies the first-order condition, together with the second-order condition that the Hessians of all parties are negative (semi-) definite at the CNE. Clearly, the set of LNE will contain the PNE, so once the LNE are determined, then simulation can be used to determine if one of them is a PNE.*

Let $(\phi_\tau, \phi_\gamma) = \sum_{k \in V} n_k(\phi_\tau^k, \phi_\gamma^k)$ be the average importance that voters give to the tax rate and the local public goods, respectively. Then, define the

[9] As we show below, the weighted electoral mean is a CNE. A more general proof of existence of CNE can also be obtained using the Fan (1961) theorem, as in Schofield (1984).

weighted mean of the electoral ideal policies, or *weighted electoral mean* $z_m = (\tau_m, \gamma_m)$ by

$$(\tau_m, \gamma_m) = \sum_{k \in V} n_k \left(\frac{\phi_\tau^k}{\phi_\tau} \tau^k, \frac{\phi_\gamma^k}{\phi_\gamma} \gamma^k \right). \tag{9}$$

Note that z_m is just a weighted average of the ideal policies of each group, where the weights take into account the fraction of voters in each group (n_k) and the importance that each group gives to each policy dimension relative to the average importance in the population $(\phi_\tau^k/\phi_\tau$ and $\phi_\gamma^k/\phi_\gamma)$.[10] We call $\mathbf{z}_m = \times_{j \in P} z_m \in \mathbf{Z}$ the *joint weighted electoral mean* of the stochastic spatial model.

Under the assumption of a *Type 1 extreme value distribution,* the probability that a voter in group k votes for party j at a profile $\mathbf{z} \in \mathbf{Z}$ can be shown to be

$$\rho_j^k(\mathbf{z}) = \left[1 + \sum_{l \neq j} \exp\left(v_{pol.}^k(z_l) - v_{pol.}^k(z_j) + \lambda_l - \lambda_j \right) \right]^{-1}.$$

The objective of party j is to maximize its expected vote share $S_j(\mathbf{z}) = \sum_{k \in V} n_k \rho_j^k(\mathbf{z})$. Since $S_j(\mathbf{z})$ is continuously differentiable we can use calculus to solve this problem. The first-order necessary condition for the maximization of $S_j(\mathbf{z})$ is given by

$$\mathbf{D}S_j(\mathbf{z}) = -2 \sum_{k \in V} n_k \rho_j^k(\mathbf{z}) \left(1 - \rho_j^k(\mathbf{z})\right) \begin{pmatrix} \phi_\tau^k (\tau_j - \tau^k) \\ \phi_\gamma^k (\gamma_j - \gamma^k) \end{pmatrix} = \mathbf{0}. \tag{10}$$

If all candidates adopt the same policy position, so $\mathbf{z}_0 = \times_{j \in P} z_0$, say, then $\rho_j^k(\mathbf{z}_0)$ is independent of k and may be written $\rho_j(\mathbf{z}_0)$. Assuming that $\rho_j(\mathbf{z}_0) \neq 0$, the first-order condition becomes $(\tau_j, \gamma_j) = (\tau_m, \gamma_m)$ for all j. Therefore, if each party proposes $z_m = (\tau_m, \gamma_m)$, the first-order condition of all parties is satisfied. We say that the *joint weighted electoral mean* $\mathbf{z}_m$ satisfies the first-order condition of an LNE.

The second-order sufficient (necessary) condition for an equilibrium at $\mathbf{z}$ is that the matrix $\mathbf{D}^2 S_j(\mathbf{z})$ evaluated at $\mathbf{z}$ be negative definite (semidefinite). Earlier results in Schofield (2007) can be generalized to show that

$$\mathbf{D}^2 S_j(\mathbf{z}) = 2 \sum_{k \in V} n_k \rho_j^k(\mathbf{z}) \left(1 - \rho_j^k(\mathbf{z})\right) \left[2\left(1 - 2\rho_j^k(\mathbf{z})\right) \mathbf{W}^k \mathbf{B}_{z_j}^k \mathbf{W}^k - \mathbf{W}^k \right], \tag{11}$$

where

$$\mathbf{W}^k = \begin{bmatrix} \phi_\tau^k & 0 \\ 0 & \phi_\gamma^k \end{bmatrix}, \; \mathbf{B}_{z_j}^k = \begin{bmatrix} (\tau_j - \tau^k)^2 & (\tau_j - \tau^k)(\gamma_j - \gamma^k) \\ (\tau_j - \tau^k)(\gamma_j - \gamma^k) & (\gamma_j - \gamma^k)^2 \end{bmatrix}.$$

[10] If for all groups $\phi_\tau^k = \phi_\tau$ and $\phi_\gamma^k = \phi_\gamma$, then $z_m = (\tau_m, \gamma_m) = \sum_k n_k (\tau^k, \gamma^k)$ is a weighted average of the ideal points of each group of voters, where the weights are the sizes of the groups.

DEFINITION 3: *Considering the model $\Gamma_{exo} = \langle P, \mathbf{Z}, \mathbf{S} \rangle$ when F^k is the Type 1 extreme value distribution for all k, we define:*

(1) The probability $\rho_j(\mathbf{z}_m)$ that a voter in group k votes for party j at the profile $\mathbf{z}_m$ is $\rho_j(\mathbf{z}_m) = [1 + \sum_{l \neq j} \exp(\lambda_l - \lambda_j)]^{-1}$ (note that $\rho_j(\mathbf{z}_m)$ only depends on the valence terms, and not on the party platforms).

(2) The coefficient A_j of party j is $A_j = 2(1 - 2\rho_j(\mathbf{z}_m))$.

(3) The matrix $\sum_{k \in V} n_k(\mathbf{W}^k \mathbf{B}^k_{z_m} \mathbf{W}^k)$ is termed the weighted electoral variance–covariance matrix about the joint electoral mean, $\mathbf{z}_m$.

(4) The characteristic matrix of party j at $\mathbf{z}_m$ is $\mathbf{H}_j(\mathbf{z}_m) = \sum_{k \in V} n_k(A_j \mathbf{W}^k \mathbf{B}^k_{z_m} \mathbf{W}^k - \mathbf{W}^k)$.

(5) The matrix Φ is 2 by 2 diagonal with elements ϕ_τ and ϕ_γ in the main diagonal.

(6) The convergence coefficients of the model are

$$c\left(\Gamma_{exo.}\right) = A_1 \sum_{k \in V} n_k \mathrm{Tr}\left(\Phi^{-1} \mathbf{W}^k \mathbf{B}^k_{z_m} \mathbf{W}^k\right),$$

$$d\left(\Gamma_{exo.}\right) = \frac{A_1 \sum_{k \in V} n_k \mathrm{Tr}\left(\mathbf{W}^k \mathbf{B}^k_{z_m} \mathbf{W}^k\right)}{\mathrm{Tr}\left(\Phi\right)}.$$

Here, Tr*(M)* means the trace of the matrix *M*.

A result in Schofield (2007) can be generalized to the case here, of multiple groups in the economy, to show that the Hessian, $\mathbf{D}^2 S_j(\mathbf{z}_m)$ of party j at $\mathbf{z}_m$ can be expressed in terms of the characteristic matrix. Thus,

$$\mathbf{D}^2 S_j\left(\mathbf{z}_m\right) = 2\rho_j\left(\mathbf{z}_m\right)\left(1 - \rho_j(\mathbf{z}_m)\right)\mathbf{H}_j(\mathbf{z}_m).$$

The following proposition establishes necessary and sufficient conditions for the joint weighted electoral mean to be an equilibrium of the electoral game.

PROPOSITION 1: *Assume that F^k is the Type 1 extreme value distribution for all k. The condition $c(\Gamma_{exo}) < 1$ is sufficient for the joint weighted electoral mean, $\mathbf{z}_m$, to be a strict LNE of the stochastic spatial model $\Gamma_{exo} = \langle P, \mathbf{Z}, \mathbf{S} \rangle$. The condition $d(\Gamma_{exo}) \leq 1$ is necessary for $\mathbf{z}_m$ to be an LNE.*

Proof: See Appendix B. ■

If the sufficient convergence condition holds, then the equilibrium prediction of the outcome of the electoral game is the weighted electoral mean of the ideal points $z_m = (\tau_m, \gamma_m)$. There can be two or more parties and the expected vote share of each party may differ, but the policy outcome will not be affected, since all parties implement z_m. Thus, different policies can only be the consequence of differences in the economic and political parameters that determine z_m. On the other hand, if the necessary convergence condition fails, then different policies have a positive probability of being implemented either because there is a nonconvergent PNE in which parties propose different policies or because there is a mixed strategy Nash equilibrium (according to Glicksberg 1952, a mixed-strategy Nash equilibrium will always exist). Furthermore, simulations of a number of these models not only confirm but also strengthen these results. For instance, although it does not follow directly from Proposition 1, when $c(\Gamma_{exo}) < 1$, simulations show that $\mathbf{z}_m$ is not only an LNE but also the *unique* PNE; and when $d(\Gamma_{exo}) > 1$, simulations confirm that $\mathbf{z}_m$ is not an LNE and in many cases it is also possible to compute a nonconvergent LNE.[11]

The intuition behind Proposition 1 can be better understood in a situation with only two parties. Suppose that the expected valence of party 2 is higher than the expected valence of party 1, i.e., $\lambda_2 > \lambda_1$. Then, if both parties propose the same platform z_m, only voters with a valence shock that compensates the expected valence difference prefer to vote party 1. Moreover, given that both parties propose the same platform, the expected vote share of party 1 decreases as the expected valence difference increases. This effect can be interpreted as the cost for party 1 of adopting the platform proposed by party 2 (the term A_1 in the convergence coefficients captures this effect). Party 1 can avoid this cost by proposing a different platform. However, this is also a costly move, particularly if the variance of the voters ideal policies is very low, which implies that departing from the weighted electoral mean causes a significant drop in the expected vote share (the term $\sum_{k\in V} n_k \mathrm{Tr}(\Phi^{-1}\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k)$ in the convergence coefficients captures this effect). Proposition 1 establishes that if the first effect dominates the second one, then in equilibrium, parties converge to the weighted electoral mean.

Note also how the parameters of the electoral game affect the convergence coefficients. Again, assume a two-party system. Since $A_1 = 2(1 - 2\rho_1(\mathbf{z}_m))$, if $\lambda_2 \approx \lambda_1$, then $\rho_1(\mathbf{z}_m) \approx \frac{1}{2}$ and $A_1 \approx 0$, so the convergence coefficients ≈ 0.Thus, in a two-party system, if $\lambda_2 \approx \lambda_1$, then the model predicts policy convergence. On the other hand, in a fragmented polity, with many parties, then some parties will have low valence, thus $\rho_1(\mathbf{z}_m)$ can be very small, implying that $A_1 \approx 2$. In particular, if the electoral covariance matrix has sufficiently large terms (i.e., $\sum_{k\in V} n_k \mathrm{Tr}(\Phi^{-1}\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k)$ is relatively high) then one expects policy divergence. Moreover, empirical analyses of electoral games in a number of countries support these results.[12]

[11] In such cases, the lowest valence party tends to be located, in equilibrium, on the eigenvector of its characteristic matrix. In one case, it was shown that there did exist a mixed-strategy Nash equilibrium generated by a limit cycle of the underlying gradient field.

[12] For example, electoral models for recent elections in the United States and the United Kingdom found that $c(\Gamma_{exo}) \leq 1$ (see Schofield *et al.* 2011a, Schofield, Gallego, and Jeon

3.2. Trade Policy under Convergence

We now study how the economic structure affects z_m and the convergence coefficients. We first consider the situation in which the sufficient condition for convergence holds. Then, Proposition 1 implies that the outcome of the electoral game is the weighted electoral mean $z_m = (\tau_m, \gamma_m)$. We now characterize z_m for the three economic structures identified in Section 2. From Lemma 1, it is always the case that $\gamma^k = 0$ for $k = F_X, F_Y, F_N$ and $\gamma^L = 1$ regardless of the economic structure. Furthermore, $\gamma_m = n_L \phi_\gamma^L / \phi_\gamma$.[13] Thus, *ceteris paribus*, the higher the fraction of workers in the tradable industries in the population (n_L), and the more sensitive they are to changes in the provision of the local public good, measured by $(\phi_\gamma^L / \phi_\gamma)$, the higher the fraction of the government revenue expended in G_L in equilibrium.

Conversely, the ideal import tax rate for each group varies across the different economic structures. From Lemma 1, we know that for a structure 1 economy, $\tau^{F_N} < \tau_{\max}$ and $\tau^L < \tau_{\max}$, while for a structure 2 economy we have $\tau^{F_N} < \tau_{\max} < \tau^L$. Therefore, the electoral equilibrium τ_m would be lower in an economy with structure 1 than in one with structure 2. Moreover, it is likely that the magnitude of this difference would be large. To see this note that, in a specialized natural resource–abundant economy, all socioeconomic groups have an ideal import tax rate below $\tau_{\max}$. However, in a diversified natural resource–rich economy, workers in the tradable industries have an ideal import tax rate above $\tau_{\max}$, so it can even be the case that in equilibrium $\tau_m > \tau_{\max}$. For example, the workers in the tradable industries may be an important fraction of the population as well as being highly responsive to trade policies.

An economy with structure 3 is analogous to an economy with structure 1, since all socioeconomic groups have an ideal import tax rate below $\tau_{\max}$, except for the owners of factor F_X. Hence, unless the owners of factor F_X are much more responsive to trade policy changes than the rest of the voters, τ_m is strictly less than $\tau_{\max}$. In fact it can be very low. For example, the negative impact of the import tax on real wages in the tradable industries can be large. Therefore, τ_m is also lower for an economy with structure 3 than for an economy with structure 2.

Finally, note that irrespective of the economic structure, *ceteris paribus*, the higher the fraction of service workers in the population (n_{F_N}), or the more sensitive they are to changes in the import tax rate, measured by $(\phi_\tau^{F_N} / \phi_\gamma)$, the lower the equilibrium τ_m is. This is particularly relevant for economies with structure 2. Thus, it is not the case that natural resource–abundant economies will necessary have protectionist political equilibria as postulated in Rogowski (1987, 1989).

2011b). Electoral models for countries with many small and low valence parties found that $d(\Gamma_{exo}) > 1$ (see Schofield *et al.* 2011a for Israel and Schofield *et al.* 2011c for Turkey.)

[13] If $\phi_\gamma^k = \phi_\gamma$ for all k, then $\gamma_m = \frac{n_L}{1-n_L}$.

In summary, if the economy is either specialized in the production of the less labor-intensive tradable industry (structure 1), or either abundant in the factor specific to the more labor-intensive tradable industry or in labor (structure 3), the electoral equilibrium is likely to be relatively closer to free trade. In this case, the great majority of the population loses with the adoption of protectionist policies. However, if the economy resembles the characteristics of the economic structure 2, society is split into two groups: owners of factor F_X and service workers who favor a relatively free trade policy, while owners of factor F_Y and workers L in the tradable industries prefer a more protectionist policy. The equilibrium tax rate is higher in this third case than in the first two cases, and so is the level of distortion in the economy. The development of the nontradable sector plays a key role in political cleavages, however. The reason is that service workers push the political equilibrium toward the ideal position of the relative abundant factor in the economy. Therefore, they act as a moderating force against the protectionist tendency.

3.3. Economic Structure and Divergence

As we showed in the previous section, given that the convergence condition holds, we can then explain how trade policy at a given time depends on the prevalent economic structure. Now, we investigate the convergence conditions under the three different economic structures derived in Section 2 and study how different economic structures affect the *stability* of trade policy.

First of all, however, we need to define what we mean by stability of a policy in our model. We interpret *convergence* of political parties to the same political platform as *stability* of policies. Indeed, if in equilibrium all political parties converge to the same platform, although there can be uncertainty about which party wins the election there is complete certainty about the policy outcome. If, instead, in equilibrium the political parties do not converge to the same platform, then there are different policies with positive probability of being implemented. This means that we could observe different policies in a given economy over time. In this sense, an economic structure that induces political convergence is one that gives rise to stable policy outcomes. These will change smoothly in response to shocks to the distribution of political power, the international terms of trade or technology. An economic structure that induces political divergence is one that generates a more volatile environment, where we can observe (possibly large) changes in policies even without any change in the economic or political fundamentals.

Proposition 1 shows that a sufficient condition for convergence to z_m is $c(\Gamma_{exo}) < 1$, while a necessary condition is $d(\Gamma_{exo}) \leq 1$. These convergence coefficients, $c(\Gamma_{exo})$ and $d(\Gamma_{exo})$, depend on the stochastic distribution of the valence signals as well as the distribution of the ideal policies in the population. We now compare the convergent coefficients for different economic structures. Since the key difference among economic structures is the ideal trade policy for the workers of the tradable industries, we consider $d(\Gamma_{exo})$ as a function of τ^L, keeping constant all the other variables that determine it. Note that $d(\Gamma_{exo})$ is a quadratic and symmetric function and has a minimum at the value of τ^L that satisfies the following equation:

$$\frac{\partial d\,(\Gamma_{exo})}{\partial \tau^L} = 2A_1\, n_L \phi_\tau^L \left[-\phi_\tau^L(\tau_m - \tau^L) + \left(\frac{1}{\phi_\tau}\right) \sum_{k\in V} n_k \left(\phi_\tau^k\right)^2 \left(\tau_m - \tau^k\right) \right] = 0.$$

The second term in the squared brackets is very small in absolute value (in fact, it equals zero if ϕ_τ^k is the same for all groups). Hence, $\frac{\partial d(\Gamma_{exo})}{\partial \tau^L}$ depends primarily on $\tau_m - \tau^L$. If the economy has structure 3, then $\tau^{F_X} < \tau^{F_N} < \tau^L < \tau_{\max} < \tau^{F_Y}$, which implies that unless $n_{F_X} \gg n_{F_Y}$, $(\tau_m - \tau^L)$ is positive but very small. Therefore, for an economy with structure 3, $\frac{\partial d(\Gamma_{exo})}{\partial \tau^L} \approx 0$ and hence $d(\Gamma_{exo})$ is very close to its minimum. This is also the case for economies with structure 1. On the other hand, for an economy with structure 2, $\tau^{F_X} < \tau^{F_N} < \tau_{\max} < \tau^L < \tau^{F_Y}$, which implies that unless $n_{F_X} \ll n_{F_Y}$, $(\tau_m - \tau^L)$ is negative and large in absolute value, we have that $d(\Gamma_{exo})$ is far from its minimum. Since $\frac{\partial c(\Gamma_{exo})}{\partial \tau^L} = \frac{\partial d(\Gamma_{exo})}{\partial \tau^L}/\phi_\tau$, the same argument also apply to the coefficient $c(\Gamma_{exo})$.

Thus, convergence coefficients tend to be larger than their minimum values for diversified natural resource–rich economies (structure 2) but very close to their minimum values for specialized natural resource–rich economies (structure 1) and industrial economies (structure 2). If the convergence coefficients for a particular polity are large, then we can say, informally, that the likelihood of convergence is lower. This allows us to infer that policy stability is more likely in economies with structures 1 or 3 than in economies with structure 2.

The above argument has focused on the dependence of the convergence coefficients on the weighted electoral variance–covariance matrix. As we noted earlier, the convergence coefficients also depend on the parameters of the electoral game. In particular, in a two-party system, if $\lambda_2 \approx \lambda_1$ then the model predicts policy convergence. On the other hand, in a fragmented polity, with many parties, then some must have low valence, and with a large enough covariance matrix, one can expect policy divergence.

Thus, political divergence is a consequence of both political and economic forces. Policy divergence is a pure political issue related to electoral competition. Voters have different perceptions of the average quality of the political parties, and these are independent of the platform they propose. These perceptions affect voting probabilities in such a way that candidates or party leaders need not locate at the center of the policy space. However, differences in valences alone are not enough to induce political divergence. As proposition 1 clearly shows, the convergence coefficients depend on the electoral variance–covariance matrix. If the trace of this matrix is large, then convergence is less likely. Politics makes policy divergence possible, but economic forces are needed to induce it, since it is heterogeneity in policy preferences that fundamentally determines the convergence coefficients.

3.4. Extension: Parties and Organizations

In this section, we extend the stochastic spatial model of electoral competition presented in Section 3 by including organizations that try to influence political outcomes through campaign contributions. We formally define this extension as a two-stage dynamic game and define an equilibrium concept for this dynamic game. We then study the convergence conditions and characterize the equilibrium outcome of the political game when there is no convergence. There are three motivations for introducing organizations into the basic political model developed in Section 3. First, without their inclusion, when the convergence conditions do not hold, we can say little about the electoral outcome beyond the fact that there is divergence. Second, even in the best democracies, the political power of groups differs from the power conveyed merely by share of the group in the total population. Third, with the introduction of organizations parties can behave as if they had policy preferences. Furthermore, organizations can be seen as a formal way to endogenously generate parties with policy preferences.

3.5. The Stochastic Spatial Model with Exogenous and Endogenous Valence

We now assume that there exist political organizations other than political parties. These organizations are independent, with their own agenda, but may be linked to parties in various ways. An example is that of unions, which try to influence political outcomes through campaign contributions. Contributions are valuable for politicians because they can be used to increase the electorate's perceived quality of a candidate or to discredit political rivals. Thus, valence becomes an endogenous variable that depends on campaign contributions. Grossman and Helpman (1996) consider two distinct motives for interest groups: "Contributors with an *electoral motive* intend to promote the electoral prospects of preferred candidates. Those with an *influence motive* aim to influence the politicians' policy pronouncements."[14] In the proposition presented below we consider a case that captures only the electoral motive, but not the influence motive. Except for the introduction of these organizations, the stochastic spatial model remains fundamentally the same as the model with exogenous valence presented in the previous section.

The timing of the events is as follows:

(1) Organizations simultaneously announce their campaign contribution functions, specifying the contributions they will make in response to the party electoral platforms.
(2) Political parties simultaneously announce their electoral platforms.

[14] See Schofield (2006) and Schofield and Miller (2007) for a model that captures both motives.

(3) Organizations observe these platforms and simultaneously implement their campaign contributions.

(4) Each voter receives a private signal about candidates' quality.

(5) Elections are held.

(6) The elected party implements the announced platform.

Suppose that each group of voters has an organization that can make contributions to political campaigns, and assume that due to institutional constraints, political parties cannot transfer money or resources to organizations, so contributions must be nonnegative. Let $c_k : \mathbf{Z} \to \times_{j \in P} \Re_+ = \mathbf{C}$ denote a contribution function made by organization k, and let C^*denote the space of all feasible contribution functions. Let $\mathbf{C}^* = \times_{k \in V} C^*$. A profile of contribution functions is denoted by $\mathbf{c}^* = \times_{k \in V} c_k$. When necessary we use the notation $\mathbf{c}^*_{-k}$ to denote the profile of contribution functions of all organizations except organization k.

The utility of a voter belonging to group k when party j implements platform z_j is now

$$\begin{aligned} v^k(z_j, \mathbf{c}) &= v^k_{pol}(z_j) + \lambda_j + \varepsilon^k_j + \mu_j(\mathbf{c}), \\ &= -\phi^k_\tau(\tau_j - \tau^k)^2 - \phi^k_\gamma(\gamma_j - \gamma^k)^2 + \lambda_j + \varepsilon^k_j + \mu_j(\mathbf{c}). \end{aligned} \tag{12}$$

The last term is the *endogenous valence function* $\mu_j : \mathbf{C} \to \Re_+$, which captures the impact of contributions on valence values.[15]

As before, the probability that a voter from group k votes for party j is given by

$$\rho^k_j(\mathbf{z}, \mathbf{c}) = \Pr[v^k(z_j, \mathbf{c}) > v^k(z_l, \mathbf{c}) \quad \text{for all } l \neq j]. \tag{13}$$

We assume that each organization has a leader, who collects contributions from its members and uses them to support political parties in their electoral campaigns. Each leader receives a "payment" that depends linearly on the policy preferences of the members of the organization, and must pay the cost of collecting the contributions among its members. Following Persson and Tabellini (2000), we assume that these costs are a quadratic function in the per member contribution since the free rider problem in collective action is more severe in large groups. The leader maximizes his expected payment net of the costs of collecting contributions. Thus, the preference of leader k is given by the function $L_k : \mathbf{Z} \times \mathbf{C} \to \Re$

$$L_k(\mathbf{z}, \mathbf{c}) = \sum_{j \in P} S_j(\mathbf{z}, \mathbf{c}) \left(a_{k,j} v^k_{pol.}(z_j) + b_{k,j} \right) - \sum_{j \in P} \frac{1}{2} \left(\frac{c_{k,j}}{n_k} \right)^2. \tag{14}$$

[15] We usually assume that μ_j depends only on the contributions made to party j, but in principle, μ_j could also be lowered by contributions made to other parties.

Here, $c_{k,j}$ denotes the contribution made by organization k to party j. We assume that $a_{k,j} \geq 0$ and $b_{k,j} \geq 0$. This specification is flexible enough to capture very different situations. If group k does not have an organization then we set $a_{k,j} = b_{k,j} = 0$ for all $j \in P$. If the leader of organization k has party preferences for party j then $a_{k,j} > a_{k,l}$ and/or $b_{k,j} > b_{k,l}$.[16] If leader k is twice more effective collecting contributions than leader h, then $a_{k,j} = 2a_{h,j}$ and $b_{k,j} = 2b_{h,j}$. For the purposes of this paper, the crucial distinction is between partisan organizations and nonpartisan organizations. Since each organization "represents" the interest of a socioeconomic group, if each organization is attached to a party (i.e., the leader has a strong predilection for a particular party), then the party must indirectly adopt the policy preferences of this organization as the party preferences, at least to some extent.[17]

DEFINITION 4: *The stochastic spatial model with exogenous and endogenous valence is the two-stage dynamic game* $\Gamma_{end} = \langle P, V, \mathbf{Z}, \mathbf{C}, \mathbf{S}, \mathbf{L} \rangle$, *where*

(1) ***Players****:* $P = \{1, \ldots, p\}$ *is the set of all political parties, and* $V = \{F_X, F_Y, F_N, L\}$ *is the set of all groups of voters, which is also the set of all organization leaders.*

(2) ***Utility functions****:*

   (a) $S_j : \mathbf{Z} \times \mathbf{C} \to [0, 1]$ *is the expected vote share function of party* $j \in P$*, obtained from (12) and (13). Let*

$$\mathbf{S} = \times_{j \in P} S_j : \mathbf{Z} \times \mathbf{C} \to \times_{j \in P} [0, 1] .$$

   (b) $L_k : \mathbf{Z} \times \mathbf{C} \to \Re$ *is the utility function of leader* $k \in V$ *given by (14). Let*

$$\mathbf{L} = \times_{k \in V} L_k : \mathbf{Z} \times \mathbf{C} \to \times_{j \in V} \Re.$$

(3) ***Sequence of play****: First, all organization leaders announce their campaign contribution functions. The parties then respond and simultaneously select platforms from the policy space* Z*. Then, organization leaders observe the profile of platforms and simultaneously implement their campaign contributions. Voters receive their signals and the election is held.*

As Grossman and Helpman (1996) note, there are two equilibrium notions appropriate to this game. One involves a commitment mechanism on the activists, having the effect that their offers, intended to influence the party leaders, are credible. Reputation, for example in a repeated play game,

[16] Schofield (2007) considers a reduced-form version of the organization contribution game, in which μ_j is assumed a C^2, concave function with a maximum at the ideal point of the organizations that support party j. For the two candidates case (14) provides microfoundations for μ_j. The key is to assume organizations with partisan preferences.

[17] Roemer (2001) argues that "there is not, in general, free entry of representatives of classes into parties."

may suffice. Under the other, once the party leaders have made their policy pronouncements, then without a commitment device, only the electoral effect will be relevant (because of the preferences of the activists for one party over another).[18] In both cases, the solution concept is local subgame perfect Nash equilibrium.

DEFINITION 5: *A strict (weak) local subgame perfect Nash equilibrium of the stochastic spatial model* $\Gamma_{end.} = \langle P, V, \mathbf{Z}, \mathbf{C}, \mathbf{S}, \mathbf{L}, \rangle$ *is a profile of party positions* $\mathbf{z}^* \in \mathbf{Z}$ *and a profile of contribution functions* $\mathbf{c}^* \in \mathbf{C}^*$ *such that:*

(1) *For each political party* $j \in P$*, there exists an* ϵ *-neighborhood* $B_\epsilon(z_j^*) \subset Z$ *around* z_j^* *such that*

$$S_j(\mathbf{z}^*, \mathbf{c}^*(\mathbf{z}^*)) > (\geq)\ S_j((\tilde{z}_j, \mathbf{z}^*_{-j}), \mathbf{c}^*(\tilde{z}_j, \mathbf{z}^*_{-j}))$$
$$\text{for all } \tilde{z}_j \in B_\epsilon(z_j^*) - \{z_j^*\}.$$

(2a) *Under commitment. For each leader* $k \in V$*, there is no feasible contribution function* $c'_k \in C^*$ *such that*

$$L_k(\mathbf{z}', c'_k(\mathbf{z}'), \mathbf{c}^*_{-k}(\mathbf{z}')) > L_k(\mathbf{z}^*, \mathbf{c}^*(\mathbf{z}^*)),$$

where $\mathbf{z}'$ *is such that for all* $j \in P$ *there exists an* ϵ*-neighborhood* $B_\epsilon(z'_j) \subset Z$ *around* z'_j *such that*

$$S_j(\mathbf{z}', c'_k(\mathbf{z}'), \mathbf{c}^*_{-k}(\mathbf{z}')) > (\geq)\ S_j((\hat{z}_j, \mathbf{z}'_{-j}), c'_k(\hat{z}_j, \mathbf{z}'_{-j}), \mathbf{c}^*_{-k}(\hat{z}_j, \mathbf{z}'_{-j}))$$
$$\text{for all } \hat{z}_j \in B_\epsilon(\hat{z}_j) - \{\hat{z}_j\}.$$

(2b) *Under no commitment. For each leader* $k \in V$ *and each profile of party positions* $\mathbf{z}$ *there is no feasible contribution function* $c'_k \in C$ *such that*

$$L_k(\mathbf{z}, c'_k(\mathbf{z}), \mathbf{c}^*_{-k}(\mathbf{z})) > L_k(\mathbf{z}, \mathbf{c}^*(\mathbf{z})).$$

REMARK 3: *If* $B_\epsilon(\mathbf{z}_j^*) = B_\epsilon(z'_j) = Z$ *and we consider only the weak inequality, then the definition above is just the usual one for a subgame perfect Nash equilibrium.*

REMARK 4: *A general proof of existence of Nash equilibrium, and hence subgame perfect Nash equilibrium, can be obtained using Brouwer's fixed point theorem applied to the function space* $\mathbf{C}^*$ *if we assume that the vote share functions are pseudo-concave and* $\mathbf{C}^*$ *consists of equicontinuous functions (Pugh 2002).*

Let ω^k be a measure of the power of organization k. Let $(\bar{\phi}^k_\tau, \bar{\phi}^k_\gamma) = (1 + \omega^k)(\phi^k_\tau, \phi^k_\gamma)$ be a power-adjusted measure of the importance that group

[18] Schofield (2006) avoids some of these difficulties by using a reduced form of the activist functions. The solution to this reduced-form game is identical to one where the party leaders themselves have induced policy preferences, but still maximize vote shares (see the policy preference models by Duggan and Fey 2005 and Peress 2010).

k gives to each policy dimension, and $(\bar{\phi}_\tau, \bar{\phi}_\gamma) = \sum_{h\in V} n_k(\bar{\phi}_\tau^k, \bar{\phi}_\gamma^k)$ the corresponding population averages. Define the *adjusted weighted mean of the ideal policies* $\bar{z}_m = (\bar{\tau}_m, \bar{\gamma}_m)$ by

$$(\bar{\tau}_m, \bar{\gamma}_m) = \sum_{k\in V} n_k \left(\frac{\bar{\phi}_\tau^k}{\bar{\phi}_\tau}\tau^k, \frac{\bar{\phi}_\gamma^k}{\bar{\phi}_\gamma}\gamma^k \right). \tag{15}$$

Note that $\bar{z}_m$ is an adjusted version of the weighted mean z_m defined in Section 3.1 (in fact if $\omega^k = \omega$ for all k, then $\bar{z}_m = z_m$). The difference is that now better organized groups have a larger weight. Denote $\bar{\mathbf{z}}_m = \times_{j\in P}\bar{z}_m$ the *joint adjusted weighted electoral mean* of the stochastic spatial model.

As we noted earlier, there are two motives for organizations to provide contributions: an *influence motive* and an *electoral motive*. Once the parties have made their policy choices, then the electoral motive persists, but the influence motive does not. Unless there is a commitment mechanism, activists need only consider the electoral motive in determining the contribution vector. So, let us assume that there is no commitment mechanism. For purposes of exposition, suppose that there are only two parties and that the endogenous valence functions are linear in the contributions and the same for both parties, so that $\mu_j = \mu \sum_{k\in V} c_{k,j}$.

In Appendix B, we show that, under these assumptions, the first-order necessary condition for the maximization of $S_j(\mathbf{z})$ is given by

$$\mathbf{D}S_j(\mathbf{z}) = -2\sum_{k\in V} n_k \rho_j^k(\mathbf{z})\left(1-\rho_j^k(\mathbf{z})\right)\begin{pmatrix} \phi_\tau^k(\tau_j - \tau^k) - \frac{\mu}{2}\frac{\partial C_{j-l}^*(\mathbf{z})}{\partial \tau_j} \\ \phi_\gamma^k(\gamma_j - \gamma^k) - \frac{\mu}{2}\frac{\partial C_{j-l}^*(\mathbf{z})}{\partial \gamma_j} \end{pmatrix} = \mathbf{0}. \tag{16}$$

Here, $\rho_j^k(\mathbf{z}) = [1 + \exp(v_{pol.}^k(z_l) - v_{pol.}^k(z_j) - \mu C_{j-l}^*(\mathbf{z}) + \lambda_l - \lambda_j)]^{-1}$ and $C_{j-l}^*(\mathbf{z}) = \sum_{k\in V}(c_{k,j}^*(\mathbf{z}) - c_{k,l}^*(\mathbf{z}))$ is the difference in contributions received by part j when the platforms are $\mathbf{z}$. In Appendix B, we also prove that the second-order sufficient (necessary) condition is that the matrix $\mathbf{D}^2 S_j(\mathbf{z})$ evaluated at a profile that satisfies the first-order condition be negative definite (semidefinite)

$$\mathbf{D}^2 S_j(\mathbf{z}) = 2\sum_{k\in V} n_k \rho_j^k(\mathbf{z})\left(1-\rho_j^k(\mathbf{z})\right)\left[2\left(1-2\rho_j^k(\mathbf{z})\right)\mathbf{W}^k\mathbf{B}_{\tilde{z}_j}^k\mathbf{W}^k - \tilde{\mathbf{W}}^k\right], \tag{17}$$

$$\text{where } \tilde{z}_j = z_j - \frac{\mu}{2}(\mathbf{W}^k)^{-1}\mathbf{D}C_{j-l}^*(\mathbf{z}), \tilde{\mathbf{W}}^k = \mathbf{W}^k - \frac{\mu}{2}\mathbf{D}^2 C_{j-l}^*(\mathbf{z})$$

$$\text{and } \mathbf{W}^k = \begin{bmatrix} \phi_\tau^k & 0 \\ 0 & \phi_\gamma^k \end{bmatrix};\ \mathbf{B}_{\tilde{z}_j}^k = \begin{bmatrix} \left(\tilde{\tau}_j - \tau^k\right)^2 & \left(\tilde{\gamma}_j - \gamma^k\right)\left(\tilde{\tau}_j - \tau^k\right) \\ \left(\tilde{\gamma}_j - \gamma^k\right)\left(\tilde{\tau}_j - \tau^k\right) & \left(\tilde{\gamma}_j - \gamma^k\right)^2 \end{bmatrix}.$$

The following proposition characterizes the equilibrium platforms in this no-commitment and two-parties case.

PROPOSITION 2: *Consider the no-commitment stochastic spatial model* $\Gamma_{end.} = \langle P, V, \mathbf{Z}, \mathbf{C}, \mathbf{S}, \mathbf{L} \rangle$, *with exogenous and endogenous valence. Suppose that there are only two parties,* F^k *is the extreme value distribution for all k, and the utility functions* L_k *are all concave functions of* c_k. *Suppose further that* $\mu_j = \mu \sum_{k \in V} c_{k,j}$. *There are two cases to consider:*

(1) *Suppose that the leaders of the organizations do not have partisan preferences, but they may vary in their influence ability, that is,* $a_{k,j} = a_k$ *and* $b_{k,j} = b_k$ *for all* $j = 1, 2$. *Then,* $\omega^k = \bar{\mu}^2 n_k a_k$ *for all k, where* $\bar{\mu} = \mu \rho_1(\bar{\mathbf{z}}_m)(1 - \rho_1(\bar{\mathbf{z}}_m))$. *The joint adjusted weighted electoral mean* $\bar{\mathbf{z}}_m$ *is the unique profile that simultaneously satisfies the first-order condition (16) with both parties proposing the same platform. A sufficient (necessary) condition for* $\bar{\mathbf{z}}_m$ *to induce a strict (weak) local subgame perfect Nash equilibrium is that the Hessian matrices,* $\mathbf{D}^2 S_j(\bar{\mathbf{z}}_m)$, *of both parties evaluated at* $\bar{\mathbf{z}}_m$, *be negative definite (semidefinite).*

(2) *On the other hand, assume that the leaders of the organizations have strong partisan preferences, in the following sense. There is a partition* $\{V_1, V_2\}$ *of* V *such that for all* $k \in V_1$, $a_{k,1} > a_{k,2}$ *and* $b_{k,1} > b_{k,2}$, *while for all* $k \in V_2$, $a_{k,2} > a_{k,1}$ *and* $b_{k,2} > b_{k,1}$. *Then, a profile* $\mathbf{z}^*$ *that satisfies the first-order condition requires that each party be located between the electoral joint mean and the ideal policies of the organizations that support the party. A sufficient (necessary) condition for this profile to induce a strict (weak) local subgame perfect Nash equilibrium is that the Hessian matrices,* $\mathbf{D}^2 S_j(\mathbf{z}^*)$, *of both parties evaluated at* $\mathbf{z}^*$, *be negative definite (semidefinite).*

Proof: See Appendix B. ■

Note, from the second part of this proposition, that the equilibrium position of each party must involve a balance between the centripetal attraction of the electoral center and the centrifugal force of contributions.

3.6. Trade Policy under Convergence

In Section 3.2 we studied the determination of trade policy under the assumptions that political competition is purely electoral and parties' platforms converge. The idea behind this model is a situation in which the electoral franchise is extended to the whole population and groups do not have any extra power to influence policy besides elections. In general, this would not be an accurate representation for at least some countries and some periods of history. Introducing organizations other than political parties allows us to capture an additional source of political power created by how willing each group of voters is to provide contributions to support their preferred policies.

Consider a situation with only two parties, in which all activist leaders do not have partisan preferences, and the Hessian matrices of both parties evaluated at $\bar{\mathbf{z}}_m$ are negative definite. Then, Proposition 2 (part 1) implies that the political equilibrium outcome is given by the adjusted weighted electoral mean $\bar{z}_m = (\bar{\tau}_m, \bar{\gamma}_m)$. This means that the more organized a group is, as measured by ω^k, the higher impact the group has on the equilibrium outcome. Therefore, organizations can either moderate or reinforce the conclusions from the model without organizations. For instance, a land-rich economy (with structure 1) can be even closer to free trade if the landowner elite has relatively more lobby power than workers and the nascent industrial capitalists. Alternatively, the landed elite in a moderately land-abundant economy, but with a relatively important manufacturing industry (as in an economy with structure 2), can oppose the protectionist propensity of capitalists and workers, using its lobby power. It will be able to do this until the capitalists and workers build their own organizations and lobby power.

Thus the model suggests a very rich structure of institutional and economic path dependence. For example, a powerful landowner elite can maintain the economy very close to free trade, discouraging the growth of the secondary sector, and hence avoiding the emergence of a major protectionist force formed by capitalists and workers. It is also possible that an exogenous decrease in the international terms of trade leads to a sufficient growth in the secondary sector, which turns workers in the tradable sector into a protectionist force. The lobby power of landowners and service workers can offset this protectionist impulse for some time. Eventually capitalists and "tradable" workers counterbalance this force by building their own lobby power and creating a more protectionist equilibrium.

Once the economy is in a protectionist equilibrium, landlords and service workers may try to respond by disenfranchising workers in the tradable sector and suppressing their organizations. Eventually workers in tradable industries will switch to become supporters of free trade. Hence, it is very natural to imagine exogenous and endogenous switches between structures 1 and 2. It is much more complicated to picture this kind of switch in a capital-abundant economy, since all groups, except landlords, prefer either free trade or a very moderate protectionism.

In summary, if the introduction of organizations increases the power of the owners of the factor specific to the exporting industry and/or service workers, then the equilibrium trade policy comes closer to free trade. If instead it increases the power of the owners of the factor specific to the industry that competes with the imports or of its workers, then the equilibrium trade policy becomes more protectionist.

3.7. Economic Structure, Political Power, and Convergence

The way activists influence the convergence coefficients is subtle. Again, assume that there are only two parties and activist leaders do not have partisan preferences (part 1 in Proposition 2), then it is possible that convergence is more or less likely with activists than without them. The reason is that the endogenous components of valence have an ambiguous effect on the Hessian matrices of both parties evaluated at $\bar{\mathbf{z}}_m$. On the other hand, if activist leaders have partisan preferences (part 2 in Proposition 2), campaign contributions constitute an unambiguous centrifugal force, inducing each party to trade off the electoral mean and the ideal position of the organizations that support the party.

3.8. Trade Policy under Divergence

Consider a situation with two political parties. Party 1 receives contributions from organizations $k = F_X, F_Y, F_N$ while party 2 receives contributions from organization L. Let $z_j^* = (\tau_j^*, \gamma_j^*)$ be the equilibrium platform of party $j = 1, 2$. Regardless of the structure of the economy, in equilibrium party 1 offers a lower fraction of government revenue allocated to G_F than the electoral mean, and party 2 offers a higher fraction of government revenue allocated to G_L than the electoral mean; that is, $\gamma_2^* > \gamma_m > \gamma_1^*$ (Proposition 2, part 2). The reason is fairly intuitive. When party 1 is choosing a platform, then in order to maximize campaign contributions it must balance a centrifugal force that pushes it to the electoral center γ_m, and a centripetal force that pushes it to $\gamma^k = 0$, the ideal policy of the organizations that support the party.

The same logic applies to party 2 with $\gamma^L = 1$. The importance of each of these forces varies with the political parameters. All else equal, the more effective activists leaders are and the more effective contributions are, the more intense is the centripetal force, and thus the further apart γ_2^* and γ_1^* will be. Furthermore, *ceteris paribus*, the higher is the exogenous valence of a party, the closer it is to the electoral mean.

The structure of the economy has, however, an important effect on τ_j^*. If the economy has either structure 1 or 3, the ideal import tax rate for workers in the tradable industries τ^L tends to be very close to the electoral mean τ_m. If the influence ability of the organizations $k = F_X, F_Y, F_N$ does not vary too much, it is also the case that the weighted ideal import tax rate of these groups is also very close to τ_m. Therefore, $\tau_1^* \approx \tau_2^* \approx \tau_m$, and parties' platforms do not have a significant variation in terms of the proposed trade policy. On the other hand, if the economy has structure 2, and the fraction of the owners of factor F_Y in the population is not very high, then $\tau^L > \tau_m$, which implies that $\tau_2^* > \tau_m$. Moreover, if the influence ability of organizations $k = F_X, F_Y, F_N$ does not vary too much, it is also the case that the weighted ideal import tax rate of these groups must be lower than τ_m, which implies that $\tau_1^* < \tau_m$. Therefore, $\tau_2^* > \tau_m > \tau_1^*$, and parties' platform differ significantly in terms of the proposed trade policy. Recall also that τ_m is higher for an economy with structure 2 than for an economy with structures 1 or 3. Hence, party 2 offers a highly protectionist policy, whereas party 1 proposes a relatively moderate one.

In summary, for an economy with structures 1 or 3, both parties tend to propose very similar and moderate trade policies, while sharply differing in their budget proposals. Party 1 offers a higher level of G_F and party 2 offers instead a higher level of G_L. Political conflict is mainly about the budget allocation dimension. On the other hand, for an economy with structure 2, parties tend to differ in both dimensions. Party 1 offers a moderate trade policy and a higher level of G_F, while party 2 offers a highly protectionist trade policy and a higher level of G_L. There is political conflict in both dimensions of policy. Finally, note that for an economy with structures 1 and 3, the efficiency of the economy does not significantly vary when there is a change in the party that wins the election, since both parties propose similar trade policies. Distributional conflict mainly occurs in the budget allocation, which, in our model, does not affect the efficiency of the economy. However, for an economy with structure 2, party rotation induces significant changes in the efficiency of the economy since each party implements a very different trade policy.

4. Historical Cases

The results on convergence and divergence can be used to explain historical patterns in trade policy. We now exemplify our model with the cases of the United States and Argentina, because they offer two interesting, albeit very different illustrations of our model. While the United States is a case in which the economic structure changed from a diversified natural resource–rich economy to an industrial economy, Argentina is a case in which the economic structure changed from a specialized natural resource–rich economy to a diversified natural resource–rich economy. As a consequence, trade policies in these two countries followed the basic patterns predicted by our model. Thus, these case studies indicate how the economic structure affects the stability and degree of trade protectionism.

4.1. The United States

In the 1790s, import tariffs in the United States were not very high and the main purpose of them was to finance the government rather than to protect domestic industries. In the period from 1790 to 1820 tariffs were increased, but mainly to obtain more revenue and to finance the War of 1812 (see Irwin 2003). Early industrialization in the United States and the demand of raw materials from the industrialization of the United Kingdom radically changed this situation in the 1820s. The North produced manufactures that competed with British imports and favored protectionist measures. The South exported cotton and preferred free trade. From 1820 to 1830, tariffs were significantly raised with the crucial purpose of protecting domestic industries from foreign competition. The North obtained the necessary votes in Congress to increase tariffs, by offering the West financial resources for internal improvements. However, from 1830 to the Civil War, tariffs were decreased. This time the West voted with the South. Two circumstances contributed to this switch. First, President Andrew Jackson vetoed the internal improvements bills, which undermined the North–West coalition. Second, the West began exporting grain, making them more supportive of free trade. As a result, the Compromise Tariff of 1833 established a progressive reduction of tariffs that undid almost all the increase that took place during the 1820s (see Irwin 2006a).

During the Civil War, the Tariff Acts of 1862 and 1864 were proposed as means to raise capital for the effort against the South. It is likely this was not the only reason. Indeed, Lincoln's economic advisor, Henry Carey, argued in his book of 1896 that the "American system" involving tariffs was the only way to maintain equality, in contrast to the free trade British system of imperialism. After the Civil War, the Republicans became even more closely associated with pro-capital protectionism, while the Democrats, associated with the agrarian interest in the South and the West, called for a reduction of import duties. In 1887, President Cleveland, a Democrat, made tariffs the key focus of his State of the Union Address, arguing that duties should be reduced, or even abolished, for raw materials. In the 1888 presidential election, Harrison, a Republican, was elected, and the Republicans obtained majorities in both the Senate and the House. They immediately began to work on a new bill to raise tariffs. In fact, in 1890, the Congress, dominated by Republicans, passed the McKinley Tariff Act, which significantly increased the average duty. However, in 1890 midterm election the Republican party suffered a defeat and McKinley, the author and main defender of the 1890 Tariff Act, lost his seat. In the 1892, presidential election, the Democrats took control of the Presidency, the Senate and the House and in 1894 they passed the Wilson–Gorman Tariff, which lowered tariffs again undoing some of the changes introduced by the McKinley Act. The conflict between protectionist interests of the northeast and the agrarian interests of the West and South came to a head in the presidential contest of 1896 between the Republican William McKinley and the Democrat William Jennings Bryan, which was won by McKinley with 51% of the popular vote but 60% of the electoral college. McKinley, who was known as the Napoleon of Protection, while he was president stated in an speech to the Republican Party: "Under free trade the trader is the master and the producer the slave. Protection is but the law of nature, the law of self-preservation, of self-development, of securing the highest and best destiny of the race of man."[19]

In terms of our model, during the 19th century the United States was a diversified natural resource–rich economy with a comparative advantage

[19] William McKinley speech, October 4, 1892 in Boston, MA: *William McKinley Papers*, Library of Congress.

in the primary sector, but with an important and growing manufacturing sector that competed with imports. We believe that this period illustrates a divergent political equilibrium, in which trade policy is unstable. Either a party with a protectionist platform (the Republicans) or a party with a free trade platform (the Democrats) could win the elections.

In the 20th century, the economic structure of the United States suffered an extraordinary change. As Irwin (2006b) has put it:

> At the end of the 19th century, though, the pattern of U.S. trade changed dramatically. For most of the century, the United States had a strong comparative advantage in agricultural goods and exported mainly raw cotton, grains, and meat products in exchange for imports of manufactured goods. But in the mid 1890s, America's exports of manufactures began to surge. Manufactured goods jumped from 20% of U.S. exports in 1890 to 35% by 1900 and nearly 50% by 1913. In about two decades, the United States reversed a century-old trade pattern and became a large net exporter of manufactured goods.

This reversal in the comparative advantage in the United States had a crucial effect on its political equilibrium. Once the United States became an industrial economy, industrial capitalists and workers gradually converted to free trade and the country moved to a convergent equilibrium with low tariffs. Moreover, except in very extraordinary circumstances, like the Great Depression, the tariff ceased to be an important source of political conflict and was no longer a key issue for political polarization and party differentiation.

4.2. Argentina

We now consider the case of Argentina. This country is relatively well endowed with highly productive land, and its comparative advantage has always been in the production of primary goods.[20] Up to the 1930s, Argentina was well integrated to the world economy, while some protectionism naturally developed during the world recession of the 1930s. After World War II, in 1946, workers voted *en masse* in a presidential election,[21] and the country closed itself off in large degree from world markets until the mid-1970s. Since then, though the country has tended to reintegrate with the world economy, trade policies have been highly volatile.[22]

At the beginning of the 20th century, Argentina's factor endowment resembled what we denoted here as a specialized natural resource–rich

[20] See Brambilla, Galiani, and Porto (2010).
[21] See Cantón (1968).
[22] Hopenhayn and Neumeyer (2005) argue that this uncertainty about trade policy significantly hampered capital accumulation during this period.

economy. However, during the interwar period; trade opportunities and the terms of trade worsened and these triggered an industrialization process. This accelerated with the world depression during the 1930s and the Second World War. As a result, Argentina started the second half of the 20th century with a very different economic configuration. Industrialization had developed apace, bringing about what we have called a diversified natural resource–rich economy (see Galiani and Somaini 2010). These new economic conditions also changed the political equilibrium; urban workers employed in the manufacturing sector and industrialists were the major social actors and they demanded a deepening of the industrialization process. This took the economy close to autarky.

Indeed, pre-1930 Argentine society remained, on the whole, flexible, and social mobility was about as high as in other countries of recent settlement. The majority of the elite, although wealthy and powerful, were attached to a liberal ideology until at least the 1920s, as witnessed by the educational system (see Galiani *et al.* 2008). It is likely that a few more decades of an expanding world economy would have induced an acceleration in the growth of urban leadership. This could have reconciled the aspirations of urban workers, entrepreneurs, and rural masses with a gradual decline in rural exportable commodities. Yet such a balancing act, even under prosperous conditions, was difficult in Argentina. The main problem that arose was that policies which were best from the viewpoint of economic efficiency (e.g., free, or nearly free trade) generated an income distribution favorable to the owners of the relatively most abundant factor of production (land). This strengthened the position of the traditional elite. In Argentina, contrary to what occurred in the United States or Britain, by the end of the Second World War what was efficient was not popular (Diaz Alejandro 1970). Once workers voted on a large scale for the first time in 1946, an urban–rural cleavage developed under the leadership of Perón. This coalition not only shifted trade policy but it also significantly modified the distribution of public expenditures toward the low-income class. In the 21st century, although Argentina still has a diversified natural resource–rich economic structure, the rise of the service economy has debilitated the supremacy of the "populist" coalition and its policy can no longer be viewed in terms of an urban–rural cleavage.

5. Concluding Remarks

In this paper, we have explored the political and economic consequences of the theoretical model of political economy that we developed. We have focused our attention on three main issues. First, we have assumed that the sufficient conditions for policy convergence are satisfied and we have characterized the equilibrium outcome. We have stressed the role of the economic structure in the determination of political equilibrium.

Second, we have studied how likely it is that an economic structure induces policy convergence. Here, the emphasis has been on policy stability, rather than on comparing the equilibrium levels of protection induced by different economic and political structures. This is a question that has not been emphasized in the traditional literature of the political economy of international trade. However, we think it is a relevant issue because high volatility and sudden changes in trade policies have been considered important impediments to growth in many developing countries.

Third, we have considered and interpreted the political equilibrium under divergence. In particular, we have shown that there can exist a political equilibrium in which there is a positive probability of a “populist” outcome with a high level of protection and more public goods for unskilled workers. In addition, there can exist a “middle class” outcome with a relatively lower level of protection and more public goods for specific factors. We interpret this result to mean that, in equilibrium, society can switch from one of these outcomes to the other.

Finally, globalization has recently been a powerful force in bringing about economic convergence across many countries (see O’Rourke and Williamson 2000). When there was a backlash against globalization after the 1930 crisis, the result was economic divergence. For many developing countries, this backlash lasted for almost 50 years. Today, there is a persistent fear of a repeat of the past, that the current economic crisis will again induce a backlash against world market integration. Though this is possible, our analysis suggest that the risk of it is less likely than it was 80 years ago. The main reason is the growth of the service economy through the world. As we have shown, the development of the nontradable sector in the economy plays a key role in political alignments, since the skilled service workers push the political equilibrium toward the ideal position of the relative abundant factor in the economy. Therefore, they act as a moderating force against the protectionist tendency.

Appendix A

The Economy

In this appendix, we characterize the competitive equilibrium of the economic model. The final goal is to prove Lemma 1 in Section 2.

Let $\bar{Q}_X$ ($\bar{Q}_Y$) be the maximum output of industry X (Y) given the aggregate endowment $\mathbf{e}$, so $\bar{Q}_X = A_X(\bar{F}_X)^{\alpha_X}(\bar{L})^{1-\alpha_X}$, $\bar{Q}_Y = A_Y(\bar{F}_Y)^{\alpha_Y}(\bar{L})^{1-\alpha_Y}$. Let l_s be the fraction of factor L employed in industry $s = X, Y$. From profit maximization in industries X and Y, we obtain the equilibrium allocation of labor between the tradable industries

$$(1-\alpha_X)\, p_X \bar{Q}_X\, (l_Y)^{\alpha_Y} = (1-\alpha_Y)\, p_Y \bar{Q}_Y\, (1-l_Y)^{\alpha_X}. \tag{A1}$$

Under the Cobb–Douglas utility assumption, expenditure shares are constant, so $\frac{p_X C_X}{\beta_X} = \frac{p_Y C_Y}{\beta_Y} = \frac{p_N C_N}{\beta_N}$, where C_s is the aggregate consumption of good $s = X, Y, N$. Since we do not allow international factor mobility the trade balance must be balanced, that is $p_X^*(Q_X - C_X) + p_Y^*(Q_Y - C_Y) = 0$. From these two expressions, we obtain the equilibrium price of the nontradable good

$$p_N = \left(\frac{\beta_N}{\beta_X \frac{p_X^*}{p_X} + \beta_Y \frac{p_Y^*}{p_Y}} \right) \left[\frac{p_X^* \bar{Q}_X (1 - l_Y)^{1-\alpha_X} + p_Y^* \bar{Q}_Y (l_Y)^{1-\alpha_Y}}{\bar{Q}_N} \right]. \qquad \text{(A2)}$$

It is not difficult to see that there exists a unique l_Y that solves Equation (A1).[23] Once l_Y is determined, Equation (A2) determines a unique p_N. Hence, given a vector of international prices $\mathbf{p}^*$, a vector of factor endowments $\mathbf{e}$, and an import tax rate τ, Equations (A1) and (A2) determine a unique equilibrium. Denote by $l_Y(\tau)$ and $p_N(\tau)$ the functions that give the equilibrium values of l_Y and p_N for each τ, given $\mathbf{p}^*$ and $\mathbf{e}$. A direct application of the implicit function theorem implies that these functions are continuously differentiable. Analogously, let $w_k(\tau)$ denote the equilibrium nominal rental price of factor k, and define the equilibrium consumer price index as the following geometric average of the prices of consumption goods $CPI(\tau) = (p_X)^{\beta_X}(p_Y)^{\beta_Y}(p_N)^{\beta_N}$. Then, the real rental price of factor k is w_k/CPI. We are interested in characterizing how rental factor prices change when the import tax rate changes, which may depend on the comparative advantage of the economy.

RESULT 1: *Define the economy degree of comparative advantage in industry* Y *by* $\Psi = \frac{A_Y(\bar{F}_Y)^{\alpha_Y}(\bar{L})^{(\alpha_X - \alpha_Y)}}{A_X(\bar{F}_X)^{\alpha_X}}$. *Then, the economy has a comparative advantage in industry* X *(respectively,* Y*) if and only if* $\Psi < \Omega \frac{p_X^*}{p_Y^*}$ *(respectively,* $\Psi > \Omega \frac{p_X^*}{p_Y^*}$*), where* $\Omega = \frac{(\beta_Y)^{\alpha_Y}(1-\alpha_X)^{1-\alpha_X}}{(\beta_X)^{\alpha_X}(1-\alpha_Y)^{1-\alpha_Y}}[\beta_Y(1-\alpha_Y) + \beta_X(1-\alpha_X)]^{\alpha_X - \alpha_Y}$.

Proof: See extended Appendix in Galiani, Schofield, and Torrens (2011). ■

Next, we focus on the rental factor prices. We begin with specific factors.

RESULT 2: *(Specific factor rental prices): Let* τ_{aut} *be the tax rate on imports that pushes the economy into autarky. The real rental factor prices of the factor specific to the exporting industry and the nontradable industry are decreasing in the import tax*

[23] Rearranging terms in Equation (A1), we have

$$\frac{(l_Y)^{\alpha_Y}}{(1 - l_Y)^{\alpha_X}} = \frac{(1 - \alpha_Y)\, p_Y \bar{Q}_Y}{(1 - \alpha_X)\, p_X \bar{Q}_X}.$$

The right-hand side of this expression is a positive constant while the left-hand side is an strictly increasing function of l_Y, with $\lim_{l_Y \to 0} = 0$ and $\lim_{l_Y \to 1} = \infty$.

rate for all $\tau \in [0, \tau_{aut}]$*; while the real rental factor price of the factor specific to the import competing industry is increasing in the import tax rate for all* $\tau \in [0, \tau_{aut}]$.

Proof: See extended Appendix in Galiani *et al.* (2011). ■

Next, we consider the mobile factor.

RESULT 3: *(Mobile factor rental price): Suppose that the economy has a comparative advantage in the less labor-intensive industry X, that is* $\Psi < \Omega \, \frac{p_X^*}{p_Y^*}$. *Then, if* $\Psi = 0$, *the real wage is decreasing in the import tax rate for all* $\tau \geq 0$, *while if* $\Psi > (\frac{\alpha_Y}{1-\alpha_Y})^{\alpha_Y}(\frac{1-\alpha_X}{\alpha_X})^{\alpha_X}\Omega(\frac{p_X^*}{p_Y^*})$, *the real wage is increasing in the import tax rate for all* $\tau \in [0, \tau_{aut}]$. *On the other hand, suppose that the economy has a comparative advantage in the more labor-intensive industry Y, that is* $\Psi > \Omega \, \frac{p_X^*}{p_Y^*}$. *Then, if the following two conditions hold, the real wage is decreasing in the import tax rate for all* $\tau \in [0, \tau_{aut}]$*:*

(1) $\alpha_X \geq \max\{\frac{\beta_X(1-2\alpha_Y)}{\beta_X(1-2\alpha_Y)+\beta_Y(1-\alpha_Y)}, \frac{(\beta_Y+\beta_N)\alpha_Y}{\beta_Y+\beta_N\alpha_Y}\}$.

(2) $\Omega\frac{p_X^*}{p_Y^*} < \Psi \leq (1+\bar{\tau}_{aut.})\Omega\frac{p_X^*}{p_Y^*}$, *where* $\bar{\tau}_{aut} = \frac{1}{2}[\sqrt{(1+\frac{\beta_Y}{\beta_X})^2 + 4\frac{\beta_Y}{\beta_X}} - (1+\frac{\beta_Y}{\beta_X})]$.

Proof: See extended Appendix in Galiani *et al.* (2011). ■

Results 2 and 3 are very useful to prove Lemma 1, which is our final goal in this Appendix.

Proof of Lemma 1: Since $v^k(\tau, \gamma)$ is a continuous function and the policy space Z is a compact set, a global maximum (τ^k, γ^k) exists. Since $v^k(\tau, \gamma)$ is strictly increasing in γ for $k = L$ and strictly decreasing in γ for $k = F_X, F_Y, F_N$ we have $\gamma^k = 0$ for $k = F_X, F_Y, F_N$, and $\gamma^L = 1$. The ideal import tax rate τ^k must be interior because for $\tau = 0$ and $\tau = \tau_{aut}$ government revenue is zero and $H'(0) \to \infty$. Therefore, the derivative of $v^k(\tau, \gamma)$ with respect to τ evaluated at (τ^k, γ^k) must be equal to zero, or which is equivalent, τ^k must satisfies

$$\eta_{w_k/CPI,\tau}\frac{w_k\bar{k}}{n_k} + RH'\left(\frac{R}{CPI}\right)\eta_{R/CPI,\tau} = 0.$$

Consider an economy with structure 1. It is not difficult to verify from the proves of results 2 and 3 that $\eta_{w_{F_X}/CPI,p_Y} < \eta_{w_{F_N}/CPI,p_Y} < \eta_{w_L/CPI,p_Y} < 0$. Since $H'(0) \to \infty$ and $\frac{w_{F_X}\bar{F}_X}{n_{F_X}} \geq \frac{w_{F_N}\bar{F}_N}{n_{F_N}} \geq \frac{w_L\bar{L}}{n_L}$, the previous expression implies that $\tau^{F_X} < \tau^{F_N} < \tau^L < \tau_{\max}$. For an economy with structure 2, again it is not difficult to verify that $\eta_{w_{F_Y}/CPI,p_Y} > \eta_{w_L/CPI,p_Y} > 0$, and $\eta_{w_{F_X}/CPI,p_Y} < \eta_{w_{F_N}/CPI,p_Y} < 0$. Since $H'(0) \to \infty$ and $\max\{\frac{w_{F_X}\bar{F}_X}{n_{F_X}}, \frac{w_{F_Y}\bar{F}_Y}{n_{F_Y}}\} \geq \frac{w_{F_N}\bar{F}_N}{n_{F_N}} \geq \frac{w_L\bar{L}}{n_L}$, the previous expression implies that $\tau^{F_X} < \tau^{F_N} < \tau_{\max} < \tau^L < \tau^{F_Y}$. Finally, for an economy with structure 3, we have $\eta_{w_{F_Y}/CPI,p_X} < \eta_{w_{F_N}/CPI,p_X} < \eta_{w_L/CPI,p_X} < 0$

and $\eta_{w_{F_X}/CPI,p_X} > 0$. Since $H'(0) \to \infty$ and $\max\{\frac{w_{F_X}\bar{F}_X}{n_{F_X}}, \frac{w_{F_Y}\bar{F}_Y}{n_{F_Y}}\} \geq \frac{w_{F_N}\bar{F}_N}{n_{F_N}} \geq \frac{w_L\bar{L}}{n_L}$, the previous expression implies that $\tau^{F_Y} < \tau^{F_N} < \tau^L < \tau_{\max} < \tau^{F_X}$. ■

Appendix B

The Polity

In this Appendix, we prove Propositions 1 and 3.

Proof of Proposition 1: As we have already shown, the joint weighted electoral mean $\mathbf{z}_m$ satisfies the first-order condition for a local equilibrium for all parties (10). Hence, in order to verify that $\mathbf{z}_m$ is a strict local Nash equilibrium (LNE), we only need to check whether the Hessian matrix of each party evaluated at $\mathbf{z}_m$ is negative definite. To prove that $c(\Gamma_{exo.}) < 1$, it is sufficient for $\mathbf{D}^2 S_j(\mathbf{z}_m)$ to be negative definite for all $j \in P$. We proceed as follows: We have defined the characteristic matrix as $\mathbf{H}_j(\mathbf{z}_m) = \sum_{k\in V} n_k(A_j\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k - \mathbf{W}^k)$. Then, the Hessian matrix of party j evaluated at $\mathbf{z}_m$ is given by

$$\mathbf{D}^2 S_j\,(\mathbf{z}_m) = 2\rho_j\,(\mathbf{z}_m)\,(1-\rho_j(\mathbf{z}_m))\mathbf{H}_j\,(\mathbf{z}_m)\,.$$

Since $2\rho_j(\mathbf{z}_m)(1-\rho_j(\mathbf{z}_m))$ is a positive constant, $\mathbf{D}^2 S_j(\mathbf{z}_m)$ is negative definite (semidefinite) if and only if $\mathbf{H}_j(\mathbf{z}_m)$ is negative definite (semidefinite). The trace of $\mathbf{H}_j(\mathbf{z}_m)$ is given by

$$\begin{aligned} Tr\big(\mathbf{H}_j\,(\mathbf{z}_m)\big) &= \sum_{k\in V} n_k Tr\big(A_j\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k - \mathbf{W}^k\big) \\ &= A_j \sum_{k\in V} n_k Tr\big(\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k\big) - \sum_{k\in V} n_k Tr(\mathbf{W}^k) \\ &= \left[\frac{A_j}{A_1} d\,(\Gamma_{exo}) - 1\right] \sum_{k\in V} n_k\left(\phi^k_\tau + \phi^k_\gamma\right). \end{aligned}$$

Since parties are ordered according to their valences $A_1 \geq \cdots \geq A_j \geq \cdots \geq A_p$, this implies

$$Tr(\mathbf{H}_1\,(\mathbf{z}_m)) \geq\ \cdots\ \geq Tr\big(\mathbf{H}_j\,(\mathbf{z}_m)\big) \geq\ \cdots\ \geq\ Tr(\mathbf{H}_p\,(\mathbf{z}_m)).$$

Therefore, if $d(\Gamma_{exo}) < 1$, then $\mathrm{Tr}(\mathbf{H}_j(\mathbf{z}_m)) < 0$ for all $j \in P$.

The determinant of $\mathbf{H}_j(\mathbf{z}_m)$ is given by

$$\begin{aligned} \det\,(\mathbf{H}_j\,(\mathbf{z}_m)) = (A_j)^2 &\sum_{k\in V} n_k\left(\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k\right)_{11} \sum_{k\in V} n_k\left(\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k\right)_{22} \\ &-(A_j)^2\left[\sum_{k\in V}\left(\mathbf{W}^k\mathbf{B}^k_{z_m}\mathbf{W}^k\right)_{21}\right]^2 \\ &+\left(\sum_{k\in V} n_k\phi^k_\tau\right)\left(\sum_{k\in V} n_k\phi^k_\gamma\right)\left[1-\frac{A_j}{A_1}c\,(\Gamma_{exo})\right]. \end{aligned}$$

By the triangle inequality, the sum of the first two terms in this expression for $\det(\mathbf{H}_j(\mathbf{z}_m))$ must be nonnegative. Moreover, $A_1 \geq \cdots \geq A_j \geq \cdots \geq A_p$ implies

$$\left[1 - \frac{A_p}{A_1} c(\Gamma_{exo})\right] \geq \cdots \geq \left[1 - \frac{A_j}{A_1} c(\Gamma_{exo})\right] \geq \cdots \geq [1 - c(\Gamma_{exo})].$$

Therefore, if $c(\Gamma_{exo}) < 1$, then $\det(H_j(\mathbf{z}_m)) > 0$ for all $j \in P$.

Since $d(\Gamma_{exo}) < c(\Gamma_{exo})$, then $c(\Gamma_{exo}) < 1$ implies that $\mathrm{Tr}(\mathbf{H}_j(\mathbf{z}_m)) < 0$, and $\det(\mathbf{H}_j(\mathbf{z}_m)) > 0$ for all $j \in P$. Thus, $c(\Gamma_{exo}) < 1$ is a sufficient condition for $\mathbf{D}^2 S_j(\mathbf{z}_m)$ to be negative definite for all $j \in P$. This completes the proof of sufficiency.

For the necessary part, assume that $\mathbf{z}_m$ is a weak LNE. Then, the Hessian matrix of each party evaluated at $\mathbf{z}_m$ must be negative semidefinite. This implies $\det(\mathbf{D}^2 S_j(\mathbf{z}_m)) \geq 0$ and $\mathrm{Tr}(\mathbf{D}^2 S_j(\mathbf{z}_m)) \leq 0$ for all $j \in P$. This is true if and only if $\det(\mathbf{H}_j^2(\mathbf{z}_m)) \geq 0$ and $\mathrm{Tr}(\mathbf{H}_j^2(\mathbf{z}_m)) \leq 0$ for all $j \in P$. $\mathrm{Tr}(\mathbf{H}_1(\mathbf{z}_m)) \leq 0$ if and only if $d(\Gamma_{exo}) \leq 1$. If $d(\Gamma_{exo}) > 1$, then $\mathrm{Tr}(\mathbf{H}_1(\mathbf{z}_m))$ must be strictly positive, and so one of the eigenvalues of $H_1(\mathbf{z}_m)$ must be strictly positive, violating the weak Nash equilibrium condition. This completes the proof. ■

Proof of Proposition 2: Let us suppose that there are only two parties and that the endogenous valence functions are linear in the contributions and the same for both parties, so that $\mu_j = \mu \sum_{k \in V} c_{k,j}$. Then, the probability that a voter in group k votes for party j rather than for party $l \neq j$, for $j = 1, 2$, is

$$\rho_j^k(\mathbf{z}, \mathbf{c}) = \left[1 + \exp\left(v_{pol}^k(z_l) - v_{pol}^k(z_j) + \lambda_l - \lambda_j + \mu \sum_{k \in V} \left(c_{k,j} - c_{k,l}\right)\right)\right]^{-1}.$$

Since we are assuming that there is no-commitment mechanism, in order to determine optimal contributions after the platform profile $\mathbf{z} = (z_1, z_2)$ is announced, each organization leader maximizes (14) taking $\mathbf{z} = (z_1, z_2)$ as given. The first-order solution of this problem is[24]

$$c_{k,j} = \bar{\mu}(\mathbf{z}, \mathbf{c}) \max\left\{0, (n_k)^2 \left[a_{k,j} v_{pol}^k(z_j) + b_{k,j} - a_{k,l} v_{pol}^k(z_l) - b_{k,l}\right]\right\}. \quad \text{(B1)}$$

In this case, $\bar{\mu}(\mathbf{z}, \mathbf{c}) = \mu \sum_{h \in V} n_h \rho_1^h(\mathbf{z}, \mathbf{c})(1 - \rho_1^h(\mathbf{z}, \mathbf{c}))$. Thus, (B1) implies that if $a_{k,j} v_{pol}^k(z_j) + b_{k,j} \neq a_{k,l} v_{pol.}^k(z_l) + b_{k,l}$ then each leader contributes at most to one party. If $a_{k,j} v_{pol}^k(z_j) + b_{k,j} = a_{k,l} v_{pol.}^k(z_l) + b_{k,l}$, then the leader does not contribute to any party. Adding up the first-order conditions of all

[24] The first-order condition gives a unique maximum since, given $\mathbf{z}$, we can make L_k an strictly concave function of c_k. The reason is that we can always find values of $a_{k,j}$ and $b_{k,j}$ small enough such that the quadratic cost of collecting the contributions prevails and L_k becomes an strictly concave function of c_k.

leaders we obtain the following expression:

$$\frac{\sum_{k \in V} \left(c_{k,j} - c_{k,l}\right)}{\bar{\mu}\left(\mathbf{z}, \mathbf{c}\right)} = \sum_{k \in V} (n_k)^2 \left[a_{k,j} v^k_{pol}(z_j) + b_{k,j} - a_{k,l} v^k_{pol}\left(z_l\right) - b_{k,l}\right]. \quad \text{(B2)}$$

Since, given $\mathbf{z}$, $\bar{\mu}(\mathbf{z}, \mathbf{c})$ only depends on $\sum_{k \in V}(c_{k,j} - c_{k,l})$, this expression implicitly gives the equilibrium value of $\sum_{k \in V}(c_{k,j} - c_{k,l})$ as a function of $\mathbf{z}$ and other parameters. Then, (B1) determines the equilibrium contribution functions. Let $c^*_k : \mathbf{Z} \to \Re^p_+$ be the no-commitment equilibrium contribution function of organization k, and let $\mathbf{c}^* = \times_{k \in V} c^*_k$. Define

$$C^*_{j-l}\left(\mathbf{z}\right) = \sum_{k \in V} \left(c^*_{k,j}\left(\mathbf{z}\right) - c^*_{k,l}\left(\mathbf{z}\right)\right).$$

Parties determine their optimal policy positions with respect to such a profile of no-commitment contribution functions. The problem for party j is to maximize $S_j(\mathbf{z}) = S_j(\mathbf{z}, \mathbf{c}^*(\mathbf{z}))$. Since $S_j(\mathbf{z})$ only involves $C^*_{j-l}(\mathbf{z})$ and C^*_{j-l} is a differentiable function of $\mathbf{z}$, S_j is also a differentiable function of $\mathbf{z}$. Hence, we can again use calculus to solve each party problem.

The first-order necessary condition for party j is given by

$$\mathbf{D} S_j\left(\mathbf{z}\right) = -2 \sum_{k \in V} n_k \rho^k_j\left(\mathbf{z}\right)\left(1 - \rho^k_j\left(\mathbf{z}\right)\right) \begin{pmatrix} \phi^k_\tau(\tau_j - \tau^k) - \frac{\mu}{2} \frac{\partial C^*_{j-l}(\mathbf{z})}{\partial \tau_j} \\ \phi^k_\gamma(\gamma_j - \gamma^k) - \frac{\mu}{2} \frac{\partial C^*_{j-l}(\mathbf{z})}{\partial \gamma_j} \end{pmatrix} = \mathbf{0}.$$

Here $\rho^k_j(\mathbf{z}) = [1 + \exp(v^k_{pol}(z_l) - v^k_{pol}(z_j) - \mu(C^*_{j-l}(\mathbf{z})) + \lambda_l - \lambda_j)]^{-1}$. This is expression (16) in the section 4.

The second order sufficient (necessary) condition is that the matrix $\mathbf{D}^2 S_j(\mathbf{z})$ evaluated at a profile that satisfies the first-order condition be negative definite (semidefinite), where

$$\mathbf{D}^2 S_j\left(\mathbf{z}\right) = 2 \sum_{k \in V} n_k \rho^k_j\left(\mathbf{z}\right)\left(1 - \rho^k_j\left(\mathbf{z}\right)\right)\left[2\left(1 - 2\rho^k_j\left(\mathbf{z}\right)\right) \mathbf{W}^k \mathbf{B}^k_{\tilde{z}_j} \mathbf{W}^k - \tilde{\mathbf{W}}^k\right],$$

$$\text{where} \quad \tilde{z}_j = z_j - \frac{\mu}{2}(\mathbf{W}^k)^{-1} \mathbf{D} C^*_{j-l}\left(\mathbf{z}\right), \tilde{\mathbf{W}}^k = \mathbf{W}^k - \frac{\mu}{2} \mathbf{D}^2 C^*_{j-l}\left(\mathbf{z}\right)$$

$$\text{and} \quad \mathbf{W}^k = \begin{bmatrix} \phi^k_\tau & 0 \\ 0 & \phi^k_\gamma \end{bmatrix}; \ \mathbf{B}^k_{\tilde{z}_j} = \begin{bmatrix} (\tilde{\tau}_j - \tau^k)^2 & (\tilde{\gamma}_j - \gamma^k)(\tilde{\tau}_j - \tau^k) \\ (\tilde{\gamma}_j - \gamma^k)(\tilde{\tau}_j - \tau^k) & (\tilde{\gamma}_j - \gamma^k)^2 \end{bmatrix}.$$

This is Expression (17) in Section 4.

Part 1 (Nonpartisan organizations): Suppose the organizations are nonpartisan and that the influence ability of each organization is the same for both parties. Then, from (B2) is not difficult to verify that if we consider a profile $\mathbf{z}$ such that $z_1 = z_2 = (\tau, \gamma)$ then: (i) $C^*_j(\mathbf{z}) = C^*_l(\mathbf{z}) = 0$,

(ii) $\rho_1(\mathbf{z}) = [1+\exp(\lambda_2 - \lambda_1)]^{-1}$, and (iii) $\frac{\mu}{2}\mathbf{D}C^*_{j-l}(\mathbf{z}) = \rho_1(\mathbf{z})(1-\rho_1(\mathbf{z}))$ $\sum_{k\in V}(n_k)^2 a_k \left(\begin{smallmatrix}\phi^k_\tau(\tau-\tau^k)\\ \phi^k_\gamma(\gamma-\gamma^k)\end{smallmatrix}\right)$. Introducing (i)–(iii) into the first-order condition (16), and rearranging terms we obtain a system of equations, whose unique solution is the profile $\bar{\mathbf{z}}_m$. Therefore, $\bar{\mathbf{z}}_m$ is the unique profile that simultaneously satisfies the first-order condition and predicts parties convergence. A sufficient (necessary) condition for $\bar{\mathbf{z}}_m$ to induce a strict (weak) local maximum for each party is that the Hessian matrices of both parties evaluated at $\bar{\mathbf{z}}_m$, denoted $\mathbf{D}^2 S_j(\bar{\mathbf{z}}_m)$, be negative definite (semidefinite). Finally, if $\bar{\mathbf{z}}_m$ induces a strict (weak) local maximum for both parties, then $\bar{\mathbf{z}}_m$ is a strict (weak) LNE of the game Γ_{end}. Hence, the parties platforms $\bar{\mathbf{z}}_m$ and the contribution functions $c^*_{k,j}(\mathbf{z})$ form a strict (weak) local subgame perfect Nash Equilibrium, which completes the proof of the first part of the proposition.

Part 2 (Partisan organizations): Now, suppose that each organization is attached to only one specific party. Rearranging terms in the first-order condition (16), we obtain a system of equations:

$$\tau_j = \sum_{k\in V}\left[\frac{\rho^k_j(\mathbf{z})\left(1-\rho^k_j(\mathbf{z})\right)n_k\phi^k_\tau}{\sum\limits_{h\in V}\rho^h_j(\mathbf{z})\left(1-\rho^h_j(\mathbf{z})\right)n_h\phi^h_\tau}\right]\tau^k + \frac{\mu}{2}\frac{\partial C^*_{j-l}(\mathbf{z})}{\partial \tau_j}, \tag{B3}$$

$$\gamma_j = \sum_{k\in V}\left[\frac{\rho^k_j(\mathbf{z})\left(1-\rho^k_j(\mathbf{z})\right)n_k\phi^k_\gamma}{\sum\limits_{h\in V}\rho^h_j(\mathbf{z})\left(1-\rho^h_j(\mathbf{z})\right)n_h\phi^h_\gamma}\right]\gamma^k + \frac{\mu}{2}\frac{\partial C^*_{j-l}(\mathbf{z})}{\partial \gamma_j}. \tag{B4}$$

We now show that $z_1 = z_2$ cannot be a solution of this system. Assume for a moment that $z_1 = z_2 = (\tau, \gamma)$ is a solution of the system of balance equations, then from (B2) $\frac{\mu}{2}\mathbf{D}C^*_{j-l}(\mathbf{z}) = \rho_1(\mathbf{z})(1 - \rho_1(\mathbf{z}))\sum_{k\in V}(n_k)^2 a_{k,j}\left(\begin{smallmatrix}\phi^k_\tau(\tau-\tau^k)\\ \phi^k_\gamma(\gamma-\gamma^k)\end{smallmatrix}\right)$. Hence, $\mathbf{D}C^*_{j-l}(\mathbf{z}) \neq \mathbf{D}C^*_{l-j}(\mathbf{z})$, which due to (B3) and (B4) implies that $\tau_1 \neq \tau_2$ and $\gamma_1 \neq \gamma_2$, which is a contradiction. Therefore, there is no profile that at the same time satisfies $z_1 = z_2$ and the first-order condition (16). From the balance conditions (B3) and (B4), we observe that the equilibrium position of each party, denoted z^*_j, must be a trade-off between the centrifugal force of electoral center, captured by the first terms of the right-hand side of (B3) and (B4), and the centripetal force of contributions, captured by the second terms of the right-hand side of (B3) and (B4). Following the same arguments of the first part of the proof a sufficient (necessary) condition for this profile to induce a strict (weak) local subgame perfect Nash equilibrium is that the Hessian matrices of both parties evaluated at this profile $\mathbf{D}^2 S_j(\mathbf{z}^*)$ be negative definite (semidefinite). ■

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