

# Political (dis)integration, rent seeking and growth\*

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## Abstract

We study the role of political (dis)integration in the determination of economic performance. We present a model in which firms interact in both the economic market - where they compete for market share - and in the political market - where they compete for transfers from the government. Competition has positive effects in both markets: it induces cost-reducing technological innovation and makes rent seeking less convenient. Market structure plays an important role in this economy and is determined endogenously by a zero profit condition. Political disintegration, on impact, lowers competition in the political market. This has a direct negative effect on growth and an indirect effect, through a change in market structure, that depends on the quality of institutions. An important implication of this framework is that rent seeking adds a cost to the *homogenization* effect of economic integration by concentrating political power in the hands of surviving domestic firms. Political integration mitigates this cost.

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# 1 Introduction

Political borders are fluid. Since the end of World War II, we have observed an impressive phenomenon of political disintegration. Indeed, the number of independent countries is now almost three times greater than it was in 1945. On the other hand, there are also examples of the opposite process. International political (along with economic) integration has occurred in Europe, where nation states have imposed limits on their sovereign use of certain policies (e.g. fiscal policy), have delegated control over some relevant competencies, such as trade policy and antitrust, to the European Union and are debating further political integration.

While economists have generally devoted their attention to the effects of economic integration on growth, the consequences of political (dis)integration on the economic performance have received surprisingly little attention.<sup>1</sup> Does political (dis)integration affect economic growth? And if so, through what channels? Perhaps more importantly, is political integration beneficial for growth (and separatism harmful) as economic markets globalize?

We address these questions in a framework where growth is endogenous and depends on how much a society invests in research and development (R&D). Firms choose to devote resources to both productive activities (production of final goods and R&D) and to unproductive ones such as rent seeking, here defined as any activity that has a positive internal effect to the firm and a negative external effect.<sup>2</sup> Examples of these activities range from lobbying the government -for favorable policy or in the attempt to divert public revenue for private interest or to create an artificial monopoly by means of regulation, etc.- to direct corruption and the bribing of politicians and bureaucrats to obtain favors. These activities share the common feature of being profitable, but wasteful: they use real resources to produce profits but no output.

We argue that, other things equal, political integration changes the level of competition within the political market and has consequences for rent seeking and growth. Consider political disintegration. When a country breaks up, some regions become newly independent political entities, as happened in the former Soviet Union in the 1990s. Regional governments assume new prerogatives and decide aspects of economic policy that were formerly the domain of a central government. Firms in a newly independent region, formerly seeking rents from the central authority, must now lobby the local government. This shift has two relevant implications for rent seeking. First, there can be a change in the quality or structure of institutions - through increased transparency and accountability, or through a change in the rules of the game. Different institutions will provide

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<sup>1</sup>An important exception is the work by Alesina, Spolaore and Warcziarg (1999 and 2005) and Spolaore and Warcziarg (2005). We postpone a discussion of related literature to the next section.

<sup>2</sup>Bhagwati (1982) similarly defines directly unproductive profit-seeking (DUP) activities as “*ways of making profits (i.e. income) by undertaking activities that are directly unproductive, in the sense that they produce pecuniary returns but do not produce goods or services that enter a conventional utility function or input into such good and services.*”

firms with new incentives and different returns to rent seeking. For example, pioneering work by Persson and Tabellini (2003) describes the incentives brought about by different constitutional rules. Whether political separation results in improved political institutions is an open question. A second, and more general, relationship between political integration and rent-seeking is that the market for political competition is altered. The number of firms vying for rents in the political market of the newly independent political entity can be affected. Importantly, this effect carries through to the economic market since it has an effect on firms' gross profits and the number of firms that can be supported in equilibrium. In this paper we focus on this second aspect and study how the change in size of the political market affects rent seeking and economic growth.

The economic model builds on the work of Peretto (1996 and 2003) and Brou and Ruta (2007). We assume an oligopolistic goods market with an endogenous number of firms engaging in production of a differentiated final good and undertaking two main activities other than final good production: in-house R&D and rent seeking. Both activities can be profitable for firms, but have very different consequences for the welfare of society. Rent seeking is purely wasteful, while industrial R&D generates knowledge that reduces firm-specific costs and can be used in subsequent R&D activity by all firms, thus increasing the growth rate of the economy. With free entry, the number of firms is determined by the zero profit condition that firms' cash flows just cover their fixed, R&D and rent seeking costs. A larger number of competitors in the economic and political markets plays a role in determining firms' incentives to engage in R&D and, ultimately, increases the rate of growth of the economy.

Rent seeking influences economic growth in two important ways: it diverts resources away from innovation and it affects the number of firms that the market supports in equilibrium. The former effect reduces growth, while the latter's effect on growth is ambiguous and depends on the quality of institutional checks and balances on government activity and the accountability of bureaucrats and politicians. If the quality of institutions is low, the government is highly responsive to rent seeking activities and the equilibrium is characterized by high rent seeking. In this case, a lower number of firms is supported in the zero-profit equilibrium and firms' incentives to engage in R&D are low resulting in slower economic growth.

Political (dis)integration has an effect on growth through these two channels. On impact political disintegration reduces competition in the political market and increases the profits from rent seeking for existing firms, leading to an increase in rent seeking activity. Higher rent seeking has a direct negative effect on growth and an indirect effect through a change in equilibrium market structure. This second effect is also negative -i.e. the number of active firms is reduced- if the quality of institutions is low. This change in market structure further decreases firms' engagement in R&D and reduces the growth rate of the economy. On the other hand, when the checks and balances

on government activity are high, the fall in competition in the political market due to political disintegration leads to firm entry. This market structure effect counteracts the negative direct effect of increased rent seeking on growth. In other words, the model suggests that political disintegration in general has ambiguous consequences for economic growth. The effect is unambiguously negative for countries with sufficiently poor institutions.

We use this framework to address the interaction between political and economic integration. Economic integration reduces the number of domestic firms as foreign competition drives some firms that could survive under a protectionist trade regime to exit the market. Facing less competition in the political market, domestic firms will dedicate more resources to rent seeking and less to R&D. In other words, firms will react to their diminished economic power and greater political power by focusing on rent seeking activity. Although it is possible that foreign firms will compensate for the exit of domestic firms, in the absence of political integration growth might be negatively affected. When economic and political integration go hand in hand, this is not the case and growth is guaranteed to improve.

The paper is organized as follows. The following section discusses some classic work on rent seeking and political integration and recent related economic literature. Section 3 presents the formal model. We solve the model in section 4 under the assumption of an economic and political union and establish results on the effects of rent seeking on market structure and growth. Section 5 studies the interaction between economic and political integration. We discuss caveats and policy implications in section 6. Concluding remarks follow.

## 2 Related literature

The issue of political (dis)integration has attracted the attention of political scientists, philosophers and historians for a long time. The idea that political integration creates competition between different rent seekers has a rich intellectual history. In *Idea of a Perfect Commonwealth*, David Hume writes,<sup>3</sup>

“[w]e shall conclude this subject, with observing the falsehood of the common opinion, that no larger state, such as France or Great Britain, could ever be modeled into a commonwealth, but that such a form of government can only take place in a city or small territory. The contrary seems probable. Though it is more difficult to form a republican government in an extensive country than in a city; there is more facility, when once it is formed, of preserving it steady and uniform, without tumult and faction. . . In a larger government, which is modeled with masterly skill, there is compass and room enough to refine the democracy. . . it is very difficult, either by intrigue, prejudice, or passion, to hurry them [e.g. different parts] into any measures against the public interest.”

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<sup>3</sup>We thank Frances Rosenbluth for bringing this passage to our attention.

In the *Federalist Paper 10*, James Madison suggests that an advantage of political integration over political separation exists in the larger variety of special interests confronting each other.<sup>4</sup> Madison writes: “*It clearly appears, that the same advantage. . . in controlling the effects of faction, is enjoyed by a large over a small republic,—is enjoyed by the Union over the States composing it.*” Madison returns to the same idea in the *Federalist Paper 51* discussing the possibility of Rhode Island as an independent state rather than a member of the Union. He writes: “*In the extended republic of the United States, and among the great variety of interests, parties, and sects which it embraces, a coalition of a majority of the whole society could seldom take place on any other principles than those of justice and the general good.*” Taken together, the passages from Hume and Madison suggest that the multiplicity of rent seeking groups under political integration makes each one of them less able to distort policy to their advantage (and to the disadvantage of the general interest).

To our knowledge, few economists have focused on this aspect of political integration. Relevant exceptions include Mancur Olson and James Buchanan. In *The Rise and Decline of Nations*, Olson observes that jurisdictional integration - “*the shift to a new institution of the right to take at least some important decisions in economic policy*” - reduces the power of organized interest groups. Buchanan (1990) goes even further. Analyzing the process of political integration in Europe he writes, “[t]he ‘European difference’ here lies, of course, in the juxtaposition of the historically familiar exercise of rent seeking pressures within nation-states and the prospect for a constitution of federal union that will insure competition among producers and consumers of goods and resources across the territory that encompasses the several nation-states.”<sup>5</sup>

The present work is related to three areas of recent economic research: the work on rent seeking/corruption and economic growth; the recent literature on the break up of countries; and the study of the effects of economic integration on economic performance. We briefly point out main similarities with this literature.

Unproductive activities have been investigated in many different areas of economic theory. Several authors have studied the effect of lobbying and rent seeking on economic performance. Krueger (1974) finds that rent seeking is socially costly because it leads an economy to operate

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<sup>4</sup>Madison refers to these groups as factions and defines them as, “[a] number of citizens, who are united and actuated by some common impulse of passion, or of interest, adverse to the rights of other citizens, or to the permanent and aggregate interests of the community.”

<sup>5</sup>Political thinkers proposing integration in Europe after the end of World War II were also well aware of the effects of political integration on rent seeking. Altiero Spinelli, whose writing inspired the creation of the European Union, wrote in 1957 that “*the power of national states to decide economic policy only benefits national special interests*” and argued that, for precisely this reason, these groups were opposing the European integration process. The historical account of Ginsborg (1990) finds in fact that in Italy a lobby of steel producers pressured the government to stay out of the European Coal and Steel Community in the early 1950s. Moreover, the leading business association (Confindustria) opposed the project of the European Economic Community in 1957. See also Ruta (2005) for a formal model of this idea.

inside its transformation curve. Baumol (1990) argues that growth depends on the allocation of resources between productive activities, such as innovation, and unproductive ones, such as rent seeking and organized crime, and provides several historical examples of this mechanism dating from the Roman Empire to Mandarin China to recent times. A similar argument is developed within an endogenous growth model by Murphy, Shleifer and Vishny (1991) - who also find some empirical support in a cross country analysis - and more recently by Angeletos and Kollintzas (2000). Borelli and Pessoa (2004) study the effects of rent seeking on capital accumulation, while Krusell and Rios-Rull (1996), Prescott and Parente (2000) and Bellettini and Ottaviano (2005) focus on the role of vested interests in preventing the adoption of efficient technologies.<sup>6</sup> Aghion, Acemoglu and Zilibotti (2004) suggest that lobbying can be the reason why countries do not switch to an innovation based strategy and fall into a low growth trap. Finally, there is a large recent empirical literature that, using subjective indices of perceived corruption, shows that economic growth is negatively affected by corruption (see, for instance, Mauro, 1995). In a companion paper (Brou and Ruta, 2007), we look at the effects of rent seeking on the structure of markets and growth. Differently from the previous literature, in the present work we study how political and economic (dis)integration influence firms' incentives to engage in R&D relative to rent seeking.

A recent, but growing, literature studies the economic determinants and the effects on welfare of the break up and unification of countries.<sup>7</sup> Alesina, Spolaore and Wacziarg (2000 and 2005) focus on the relationship between political (dis)integration, the size of the economic market and economic growth. More specifically they argue that, in a world with important trade restrictions, political integration has a positive effect on economic growth, because it increases the size of the economic market. On the other hand, in a regime of free trade, political (dis)integration should not matter for economic growth, the size of the economic market being independent of political borders. Their empirical analysis confirms that the effects of country size on growth are less important as economies become more open.<sup>8</sup> Few empirical studies deal directly with the economic effects of political (dis)integration. An exception is Braun, Hausmann and Pritchett (2004), who find that, after disintegration, newly independent countries' growth rates were lower compared to OECD countries and no better on average when compared to older independent countries. Spolaore and Wacziarg (2005) study the endogenous determination of trade policy and political integration. They argue that political integration has a positive market size effect, but a negative effect on

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<sup>6</sup>On the political economy of technological change from an historical perspective, see Mokyr (1998).

<sup>7</sup>Contributions to this literature include Milanovic (1996), Alesina and Spolaore (1997), Bolton and Roland (1997), Casella and Feinstein (2002) and Alesina, Angeloni and Etro (2005). For recent surveys see Alesina and Spolaore (2003) and Ruta (2005).

<sup>8</sup>Alesina, Spolaore and Wacziarg (2005) critically review the literature on country size and economic growth. This literature typically suggests that the size of countries has little to do with economic growth, but fails to take into account the fact that openness can substitute for a large domestic market.

trade openness, thus the total effect on economic growth is in general ambiguous. In contrast to our work, these papers do not consider the possibility that political separation or integration affect political competition and rent seeking and, through this channel, economic growth. On the other hand, we fully abstract from the costs of preferences heterogeneity that are possibly embedded in a larger political jurisdiction. Overall, we perceive our work as complementary to previous research in this area.

The literature on the effects of *economic* integration on growth is extensive and we do not attempt to summarize the main findings.<sup>9</sup> Here we follow the approach of Peretto (2003) who builds on Grossman and Helpman (1991) and studies the effects of economic integration -the move from autarky to free trade and a multilateral decrease of trade tariffs- on market structure and economic growth. Similarly to other works in this area (e.g. Aghion and Howitt, 1998), economic integration has a positive effect on growth by increasing competition in economic markets.<sup>10</sup> Quite clearly, the difference with this line of research is that we study the effects of economic *and* political integration on the rate of growth.

### 3 The model

Consider an economy composed of  $m$  identical regions. Each region has a population of identical individuals of size  $L$ . Consumers have symmetric preferences over differentiated goods supplied by oligopolistic producers and are endowed with one unit of labor each. We abstract from the labor-leisure decision, so that total labor supply in each region is  $L$ . Firms engage in production, R&D and rent seeking activities. Regions can be integrated into a single political entity (a political union) and a single market or disintegrated into different independent states and separate economies. We begin by describing the case of full (i.e. economic *and* political) integration and establishing the main properties of the model. Economic integration implies that all firms sell their product to all consumers and that, through their interaction in the goods market, technological knowledge spills over across borders. Political integration means that a supranational government taxes all citizens in order to finance its expenditures. Firms seeking redistribution must deal with this level of government.

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<sup>9</sup>Path-breaking work on economic integration and endogenous growth is Rivera-Batiz and Romer (1991). For recent surveys of the literature see Licandro (2003) and Ventura (2005).

<sup>10</sup>Consistent with this idea, recent empirical work (e.g. Nickell, 1996, Blundell et al., 1995, Aghion et al., 2005) suggest a positive correlation between product market competition (measured by the number of competitors in the same industry) and productivity growth within a firm or industry.

### 3.1 Preferences

An individual living in region  $k$  maximizes lifetime utility

$$u_k(t) = \int_t^\infty e^{-\rho(\tau-t)} \log C_k(\tau) d\tau \quad (1)$$

subject to the intertemporal budget constraint

$$\int_t^\infty e^{-\int_t^\tau r(s)ds} [E_k(\tau) + T_k(\tau)] d\tau \leq \int_t^\infty e^{-\int_t^\tau r(s)ds} [W(\tau) + D(\tau)] d\tau + A_k(t),$$

where  $\rho > 0$  is the individual's discount rate,  $E_k$  is per capita expenditure and  $T_k$  is per capita taxes in region  $k$ ,  $W$  is the wage rate that we take as the numeraire and assume equal to unity in all regions. Finally,  $A_k$  is per capita asset holding in region  $k$  and  $D$  represents dividends.<sup>11</sup>

The consumption index  $C_k$  is given by

$$C_k = \left[ \sum_{i=1}^{n_k} c_{ik}^{\frac{\epsilon-1}{\epsilon}} + \sum_{s \neq k}^m \sum_{i=1}^{n_s} c_{is}^{\frac{\epsilon-1}{\epsilon}} \right]^{\frac{\epsilon}{\epsilon-1}}, \quad (2)$$

where  $\epsilon > 1$  is the elasticity of product substitution,  $c_{ik}$  is consumption of good  $i$  produced in region  $k$  and  $c_{is}$  is consumption of good  $i$  produced in region  $s$ . Lastly,  $n_k$  and  $n_s$  are the number of goods produced in region  $k$  and region  $s$ , respectively.

The price index of consumption goods in region  $k$  is

$$p_k = \left[ \sum_{i=1}^{n_k} p_{ik}^{1-\epsilon} + \sum_{s \neq k}^m \sum_{i=1}^{n_s} p_{is}^{1-\epsilon} \right]^{\frac{1}{1-\epsilon}},$$

where  $p_{ik}$  and  $p_{is}$  are the prices of good  $i$  in region  $k$  and  $s$ . In this standard framework, households obtain the optimal expenditure plan by setting

$$\frac{\dot{E}_k}{E_k} = r - \rho \quad (3)$$

and, given this time path for expenditures, maximize (2) subject to  $E$ . This yields the following demand schedules:

$$c_{ik}^k = E_k \frac{p_{ik}^{-\epsilon}}{p_k^{1-\epsilon}}$$

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<sup>11</sup>In free entry/exit equilibrium, profits will always be zero implying that this term can be omitted without loss of generality.



and

$$c_{ik}^s = E_k \frac{p_{is}^{-\epsilon}}{p_k^{1-\epsilon}}.$$

The first equation is the demand for good  $i$  when good  $i$  is produced in the same region where it is consumed. The second equation represents the demand of good  $i$  in region  $k$  when it is produced in a region different from  $k$ . Using these individual demand curves, total demand faced by firm  $i$  from region  $k$  is

$$X_{ik} = LE_k \frac{p_{ik}^{-\epsilon}}{p_k^{1-\epsilon}} + \sum_{s \neq k}^m LE_s \frac{p_{ik}^{-\epsilon}}{p_s^{1-\epsilon}} = \frac{LE_k}{p_{ik}} \frac{p_{ik}^{1-\epsilon}}{p_k^{1-\epsilon}} + \sum_{s \neq k}^m \frac{LE_s}{p_{ik}} \frac{p_{ik}^{1-\epsilon}}{p_s^{1-\epsilon}} \equiv S_{ik}^k \frac{LE_k}{p_{ik}} + \sum_{s \neq k}^m S_{ik}^s \frac{LE_s}{p_{ik}}, \quad (4)$$

where  $S_{ik}^s \equiv \frac{p_{ik}^{1-\epsilon}}{p_s^{1-\epsilon}}$  is the the share of country  $s$ 's market captured by firm  $i$  from region  $k$  and  $p_s$  is the price index of consumption goods in region  $s$ . Notice that firm  $i$  in region  $k$  faces a price elasticity of demand given by

$$\xi_{ik} \equiv \frac{\partial X_{ik}}{\partial p_{ik}} \frac{p_{ik}}{X_{ik}} = \frac{LE_k [\epsilon S_{ik}^k - (\epsilon - 1)(S_{ik}^k)^2] + \sum_{s \neq k}^m LE_s [\epsilon S_{ik}^s - (\epsilon - 1)(S_{ik}^s)^2]}{LE_k S_{ik}^k + \sum_{s \neq k}^m LE_s S_{ik}^s}. \quad (5)$$

### 3.2 Production Technology

Each firm produces output with technology

$$X_{ik} = z_{ik}^\theta (L_{x_{ik}} - \phi), \quad (6)$$

where  $X_{ik}$  is output of firm  $i$  in region  $k$  and  $L_{x_{ik}}$  is labor used in production by this firm. The firm's knowledge (or patent stock) is given by  $z_{ik}$ , while  $\phi > 0$  is a fixed and sunk cost of production.

Firms invest in R&D in order to accumulate cost reducing innovations that are patented. These innovations are specific to the firm, but the R&D process produces knowledge that is useful to other firms. Since  $\theta \in (0, 1)$ , labor productivity increases with the patent stock. Technological innovations evolve according to the following condition

$$\dot{z}_{ik} = L_{z_{ik}} \left[ z_{ik} + \gamma \sum_{j \neq i}^{n_k} z_{jk} + \gamma \sum_{s \neq k}^m \sum_{j=1}^{n_s} z_{js} \right] \equiv L_{z_{ik}} Z_{ik}, \quad (7)$$

where  $Z_{ik}$  is the productivity of labour in R&D. Equations 6 and 7 imply that individual firms use their own, proprietary knowledge in producing output, but all firms benefit from the R&D of other firms in the market. We assume that technological spillovers are transmitted through trade

so that the relevant knowledge base depends on the level of economic integration. The parameter  $\gamma \in (0, 1)$  determines the share of privately developed R&D that becomes publicly available. If the firm allocates  $L_{z_{ik}}$  units of labor to R&D in an interval of time  $dt$ , it produces  $\dot{z}_{ik}$  new patents.

### 3.3 Government and Rent Seeking

We model rent-seeking as a simple relationship between firms and a government whose role is to balance its budget. The government collects taxes in a lump-sum fashion from consumers and redistribute them to firms. The budget constraint is given by

$$mLT = \sum_{k=1}^m \sum_{i=1}^{n_s} Q_{ik},$$

where  $Q_{ik}$  denotes the rents transferred to firm  $i$  in region  $k$ . The government is constrained as to the amount of rents it can give out by the technology<sup>12</sup>

$$Q_{ik} = f(L_{Q_{ik}}, mn), \quad (8)$$

where  $L_{Q_{ik}}$  is the amount of resources (in the form of labour) that the firm dedicates to influencing the government. We assume that the government is not completely free to transfer funds from consumers to firms. It faces institutional and political constraints. In particular, we assume that, although the government is responsive to firms' rent-seeking activity, it faces increasing costs to doing so. From the firm's perspective, this means that the marginal product of rent seeking is positive, but decreasing in the number of firms vying for the government's favours. Formally, we assume: (i)  $f_1 > 0$  and (ii)  $f_2 < 0$ .

Note that this simple technology is consistent with two aspects of rent seeking that are widely described in the literature. First, rent seeking is a directly unproductive activity in that firms dedicate real resources to obtain a profit without producing any good or service (along the lines of Baghwati, 1982). Secondly, competition between different special interests reduces the returns to rent seeking (along the lines of Becker, 1983). It should be interpreted as a reduced form of a more structural model where firms can capture shares of government income by manipulating the political system to implement policies (e.g. trade, fiscal) or regulations (e.g. product and environmental standards) to their advantage. In the political market the government lives only for one period. At the beginning of each period, firms simultaneously choose rent seeking effort  $L_{Q_{ik}}$  given the amount of political competition (the number of firms active in the political market  $mn$ ).

A simple function that captures these ideas has the following form:

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<sup>12</sup>See Brou and Ruta (2007) for further discussion of this model and for alternative specifications of rent seeking games in this set up.

$$Q_{ik} = \left( \frac{L_{Q_{ik}}}{mn} \right)^v, \quad (9)$$

where  $v \in (0, 1)$  is the elasticity of government provided rents (transfers) to lobbying pressures. This, in turn, will depend on institutional variables such as transparency, accountability of bureaucrats and politicians and, more generally, on the checks and balances on government activity. The larger is  $v$ , the lower the quality of institutions (the more the government is responsive to lobbying), the higher is the transfer that firm  $i$  in region  $k$  receives from the government for a given amount of rent seeking effort ( $L_{Q_{ik}}$ ) and competition in the political market ( $mn$ ).

Implicit in this technology is the idea that political markets are analogous to economic markets. In an oligopoly a' la Cournot for instance, as the number of competing firms increases economic market power decreases. Each firm is less able to extract profits and economic outcomes (quantities and the price) move towards the first best (price equal marginal cost and profits equal zero). In political markets - as captured by technology (9), increasing the number of competitors reduces power concentration (what we refer to as the political power) and lowers firms' ability to appropriate rents. At the limit for very large numbers of competitors, outcomes of the political market (rents and lobbying efforts) move towards the first best (where both variables are equal to zero). This is true in the classic rent seeking model of Tullock (1980). Lane and Tornell (1999) show that this result also holds in the Markov Perfect Equilibrium of a dynamic game where multiple interest groups have direct access, through government transfers, to the resources of other groups.

At this point, it is useful to discuss the differences between the market for consumption goods -the *economic* market- and the market for rents (what we refer to as the *political* market). Firms compete for favours from the government in a way that is fundamentally different from the way in which they compete for market share. In the economic market, firms are oligopolists, offering differentiated goods and engaging in Bertrand competition. Competition takes place over prices and firms can capture market share away from their competitors by investing in cost-reducing R&D. As just described, in the political market firms compete with each other by lobbying the government in order to receive the same good: government granted rents. This is, in effect, a game of distribution where the government has no inherent preference for one firm over the other. Economic and political markets are linked by the fact that the total rents paid out by the government must be raised through taxation. This has a negative income effect on consumers, who reduce their demand for all goods. Firms do not fully internalize this effect on their profits.

## 4 Market structure, rent seeking and growth

Market structure plays an important role in the general equilibrium of this economy. In order to establish equilibrium market structure, we first consider the behavior of firms who take the number of competitors as given. Firms maximize their stock market value through the choice of pricing strategy, R&D expenditure, and rent seeking expenditure. Entry/exit decisions then determine the number of active firms. Once the behavior of firms is established, market clearing conditions determine the general equilibrium of the economy. In order to keep the analysis clear, we focus on a symmetric equilibrium.

Following Peretto (2003) we give an informal description of the Nash equilibrium in the manufacturing sector.<sup>13</sup> Firms choose time paths of price, R&D spending and rent seeking expenditure in order to maximize the present discounted value of net cash flow. This value must be driven to zero by the (costless) entry/exit of competitors.

### 4.1 The firm's problem

For firm  $i$  in region  $k$ , the present discounted value of net cash flows is

$$V_{ik}(t) = \int_t^{\infty} e^{-\int_t^{\tau} r(s)ds} \pi_{ik}(\tau) d\tau,$$

where instantaneous profits are given by

$$\pi_{ik} = p_{ik}x_{ik} + Q_{ik} - L_{x_{ik}} - L_{z_{ik}} - L_{Q_{ik}}. \quad (10)$$

The firm will maximize  $V$  subject to technological and institutional constraints (6) and (8), total demand (4), taking as given the number of active firms and its competitors' pricing, innovation and rent seeking strategies. We assume that the initial knowledge is given and equal for all firms in all regions.

#### 4.1.1 Optimal price and R&D strategy

The optimal Bertrand-Nash price strategy is

$$p_{ik} = \frac{\xi_{ik}}{\xi_{ik} - 1} z_{ik}^{-\theta}, \quad (11)$$

where  $\xi_{ik}$ , as defined in equation (5), is the price elasticity of demand faced by the firm.

Firm  $i$  invests in innovations up to the point where the value of innovations  $q_{ik}$  equals its cost

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<sup>13</sup>A formal definition can be found in Peretto (1996).

$$q_{ik} = \frac{1}{Z_{ik}}. \quad (12)$$

Returns to innovations must satisfy the arbitrage condition

$$r = \frac{\partial \pi_{ik}}{\partial z_{ik}} \frac{1}{q_{ik}} + \frac{\dot{q}_{ik}}{q_{ik}}. \quad (13)$$

Substituting (6) and (4) into the profit function (10), taking derivatives with respect to  $z_{ik}$ , using the optimal Bertrand-Nash price strategy and rearranging terms, the return on innovation (condition 13) can be rewritten as

$$r = \frac{\theta(\xi_{ik} - 1)}{\xi_{ik}} \left[ S_{ik}^k LE_k + \sum_{s \neq k}^m S_{ik}^s LE_s \right] \frac{Z_{ik}}{z_{ik}} - \frac{\dot{Z}_i}{Z_i}. \quad (14)$$

#### 4.1.2 Optimal rent seeking

When choosing the optimal amount of resources ( $L_{Q_{ik}}$ ) to devote to rent seeking activity, firm  $i$  equates the marginal benefit of one additional unit of labor used in rent seeking with its marginal cost ( $f_1 = 1$ ) given the number of competitors in the political market. Using the explicit functional form (9), the optimal amount of resources employed in rent seeking is

$$L_{Q_{ik}} = \Delta (mn)^{-\frac{v}{1-v}}, \quad (15)$$

where  $\Delta \equiv v^{\frac{1}{1-v}}$ . Substituting the optimal lobbying strategy into  $Q_{ik}$ , we obtain the equilibrium amount of rents that firm  $i$  in region  $k$  can extract by lobbying the government of the political union:

$$Q_{ik} = \frac{\Delta}{v} (mn)^{-\frac{v}{1-v}}. \quad (16)$$

#### 4.1.3 Free entry and exit

Consider next the entry/exit decisions of firms. We assume that the cost of entry is zero. In an equilibrium with free entry, the present discounted value of a firm is driven to  $V_{ik} = 0$ . Moreover, stock prices must satisfy the arbitrage condition

$$r = \frac{\pi_{ik}}{V_{ik}} + \frac{\dot{V}_{ik}}{V_{ik}}.$$

Together, these conditions imply that profits,  $\pi_{ik}$ , must equal zero at all time.

From the production function (6), note that  $L_{x_{ik}} = x_{ik}z_{ik}^{-\theta} + \phi$ . Substituting this into the profit function (10), we get  $\pi_{ik} = (p_{ik} - z_{ik}^{-\theta})x_{ik} + Q_{ik} - \phi - L_{z_{ik}} - L_{Q_{ik}}$ . Using demand function (4), the profit function becomes

$$\pi_{ik} = (p_{ik} - z_{ik}^{-\theta}) \left[ S_{ik}^k \frac{LE_k}{p_{ik}} + \sum_{s \neq k}^m S_{ik}^s \frac{LE_s}{p_{ik}} \right] + Q_{ik} - \phi - L_{z_{ik}} - L_{Q_{ik}}.$$

We use the price strategy, (11), to substitute for  $z_{ik}^{-\theta}$  in the last condition. Rearranging terms, we can write the zero profit condition as

$$\frac{1}{\xi_{ik}} \left[ S_{ik}^k LE_k + \sum_{s \neq k}^m S_{ik}^s LE_s \right] + \Omega_{ik} = \phi + L_{z_{ik}}, \quad (17)$$

which states that firms net cash flow from operations just cover their fixed and R&D costs.

#### 4.1.4 The symmetric equilibrium

We focus now on the symmetric equilibrium and denote variables without subscripts as industry averages. Symmetry across countries implies that  $Z = z[1 + \gamma(mn - 1)] \Rightarrow \frac{Z}{z} = [1 + \gamma(mn - 1)] \equiv \alpha(mn)$ . The term  $\alpha$  represents the productivity of labor in R&D and is an increasing function of the number of firms in the economic market. Note that, with entry costs equal to zero, the number of firms is a jumping variable and is constant along the balanced growth path. Similarly, it can be shown that  $\frac{\dot{z}}{z} = \alpha L_z$  and  $\frac{\dot{Z}}{Z} = \frac{\dot{z}}{z}$ .

The price elasticity of demand (equation 5) simplifies to

$$\xi = \epsilon - (\epsilon - 1) \frac{1}{mn}. \quad (18)$$

Intuitively, the number of firms in the economic market - the term  $mn$  in condition (18) - affects economic competition between firms. As this number increases, consumers have access to more varieties of consumption goods to choose from and the price elasticity of demand faced by each firm increases.

From the rate of return to innovation (14) and the zero profit condition (17), we obtain

$$r = \frac{LE\alpha\theta(\xi - 1)}{n\xi} - \alpha L_z. \quad (19)$$

The rate of return to innovation captures some important characteristics of R&D. The term  $\frac{LE}{n\xi}$  represents the *gross-profit effect* that depends on total sales per firm  $\frac{LE}{n}$  and the mark-up  $\frac{1}{\xi}$ . The term  $\theta(\xi - 1)$  is the *business-stealing effect* - by investing in cost reducing innovations, firms lower

prices and expand their market share. Spillovers (represented by the term  $\alpha$ ) have two distinct effects, one negative and one positive. Firms realize that their own R&D will make their competitors more productive, but they also benefit from the R&D undertaken by other firms. Note that there is no direct effect of rent seeking activity on the return to innovation. Indirectly, however, rent seeking reduces consumers' expenditure on consumption goods ( $E$ ) through taxation. Rent seeking effectively reduces the size of the economic market, as we will discuss later.

Equilibrium cash flows generated by rent seeking activities are obtained by equations (15) and (16) and can be summarized in the following expression:

$$\Omega = Q - L_Q = \left(\frac{1}{v} - 1\right)\Delta(mn)^{-\frac{v}{1-v}}. \quad (20)$$

An exogenous increase in competition in the political market -an increase in  $mn$ - reduces the returns to rent seeking ( $\Omega$ ). It is important to highlight the role that checks and balances on government activity play in this model. The more responsive the government is to lobbying (the higher  $v$ ), the tougher is effective competition in the political market and the lower the returns from rent seeking ( $\frac{\partial \Omega}{\partial v} < 0$ ). As  $v$  increases, devoting resources to lobbying is more profitable, because the government will provide larger rents for each additional worker employed in rent seeking. However, since this is true for all firms, lower checks and balances on government activity induce more lobbying by all firms. In equilibrium, this reduces the ability of each firm to extract resources through lobbying.

In symmetric equilibrium, the zero profit condition simplifies to

$$\frac{LE}{n\xi} + \Omega = \phi + L_z. \quad (21)$$

This condition captures the idea that firms' net cash flows must, in equilibrium, just cover the sunk costs of operation. The left-hand side consists of gross cash flows from the economic market ( $\frac{LE}{n\xi}$ ) and cash flows from the political market ( $\Omega$ ). The right-hand side is made up of the exogenous fixed cost of production and the dynamic, endogenous fixed cost of keeping up with the level of innovation.

## 4.2 Equilibrium market structure

The final step in order to derive the equilibrium number of firms in this economy is to obtain an expression for equilibrium expenditures. From condition (10), the zero profit condition can be rewritten as

$$p_{ik}x_{ik} + Q_{ik} = L_{xik} + L_{zik} + L_{Qik}.$$

Then, summing across firms and imposing the labor market clearing condition in region  $k$ ,  $L = \sum_{i=1}^{n_k} (L_{xik} + L_{zik} + L_{Qik})$ , the zero profit condition can be written as

$$L = \sum_{i=1}^{n_k} (p_{ik}x_{ik} + Q_{ik}).$$

Imposing symmetry and using condition (4), we have per capita expenditures

$$E = 1 - \frac{nQ}{L}. \quad (22)$$

Notice that, perhaps not surprisingly, rent seeking activities reduce per capita equilibrium expenditures. This provides the main link between the economic and political market. Moreover, since  $n$  is constant along the balanced growth path,  $E$  is constant over time. Jointly with condition (3), this implies that  $r = \rho$  in equilibrium.

Now substitute equilibrium expenditures (22) into the rate of return to innovation (19), to obtain the optimal investment strategy  $L_z$  as a function of the number of firms. Then substitute this into the zero profit condition (21), we get

$$\frac{L [1 - \theta(\xi(mn) - 1)]}{n\xi(mn)} \left[ 1 - \frac{nQ(mn)}{L} \right] + \Omega(mn) + \frac{\rho}{\alpha(mn)} = \phi. \quad (23)$$

The price elasticity of demand  $\xi(mn)$ , equilibrium rents  $Q(mn)$  and returns from rent seeking  $\Omega(mn)$  are expressed as functions of the number of firms and are given by equations (18), (16) and (20), respectively. This condition implicitly determines the equilibrium number of firms in an economic and political union with rent seeking. It can be shown that the left-hand side of equation (23) is everywhere decreasing in  $n$ , thus implying that the equilibrium exists and is unique. Notice that the market structure of this economy depends on the interaction of firms in the economic and political markets. In particular, rent seeking activities provide an extra source of cash flows to firms ( $\Omega$ ), but also reduce sales because of the effect of higher taxes on equilibrium expenditures.

In order to highlight the role played by rent seeking in this economy, we consider the equilibrium that would arise in the absence of rent seeking. Firms would receive no cash flows from the political market ( $\Omega = 0$ ) and consumers pay no taxes ( $E = 1$ ). The equilibrium number of firms would be determined by

$$\frac{L [1 - \theta(\xi(mn) - 1)]}{n\xi(mn)} + \frac{\rho}{\alpha(mn)} = \phi. \quad (24)$$

Comparing conditions (23) and (24), we see that rent seeking has two effects on the equilibrium number of firms. First, it shrinks the effective size of the economic market by reducing equilibrium expenditure. Second, it increases cash flows by creating rents. The two effects



work in opposite directions. Formally, the difference between conditions (24) and (23) is the term  $\Omega(mn) - \frac{L[1-\theta(\xi(mn)-1)]}{n\xi(mn)} \frac{nQ(mn)}{L}$ . This term represents, for a given level of competition, the total contribution of rent seeking activity to the firm's revenue. When it is negative, rent seeking reduces the number of firms that the market supports in equilibrium. A sufficient condition for this term to be negative (i.e. rent seeking leads to exit) is  $v > (1 - \frac{1}{\epsilon})(1 + \theta) \equiv \tilde{v}$ .<sup>14</sup> If the government is highly responsive to lobbying pressures, rents are large but the cost of obtaining them is also large. For this reason, rent seeking has a negative effect on profits. With free entry/exit, this means that fewer firms can survive in equilibrium.<sup>15</sup>

### 4.3 Equilibrium growth

Along the balanced growth path, both consumers' expenditures and the number of firms are constant. The rate of cost reduction then determines the growth of output and consumption. We can define it as

$$g \equiv \theta \frac{\dot{z}}{z} = \theta \alpha L_z. \quad (25)$$

From condition (19), we have the firm's R&D strategy as a function of total expenditures. Firms take the number of competitors in the economic and political market as given and choose the optimal level of R&D using

$$L_z = \frac{LE\theta(\xi - 1)}{n\xi} - \frac{\rho}{\alpha}.$$

The equilibrium number of firms, in turn, is endogenous and determined by the zero profit condition. Substituting the zero profit condition (21) into the last equation and using the definition of growth yields the equilibrium growth rate of the economy

$$g = \theta \frac{\theta \alpha (mn) [\xi(mn) - 1] [\phi - \Omega(mn)] - \rho}{1 - \theta [\xi(mn) - 1]}. \quad (26)$$

This condition is a modified version of the firm's R&D decision which takes into account that firms have perfect foresight and correctly perceive the effect of parameter changes on their

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<sup>14</sup>More precisely, the necessary and sufficient condition is given by  $v > \frac{(\xi-1)(1+\theta)}{\xi}$ . Note that the *RHS* depends on  $n$ . In particular, for  $n = 1$ , the *RHS* = 0 and as  $n \rightarrow \infty$ , *RHS*  $\rightarrow (1 - \frac{1}{\epsilon})(1 + \theta)$ . So that this condition will always hold for low  $n$  and a sufficient condition for it to always hold is  $v > \tilde{v}$ .

<sup>15</sup>This result is broadly consistent with the evidence in Djankov et al. (2002) and, particularly, in Perotti and Volpin (2005), who find in a cross section of 38 countries that lower quality of institutions and accountability of the government -a higher  $v$  in our model- is associated with lower firm entry. Note, however, that our logic is different from theirs in that, rather than being directed at raising barriers to entry of new firms, rent seeking itself works as a barrier by raising operational costs for active firms and reducing revenues from the economic market.

profits and, based on this, choose whether to be active or not. The equilibrium number of active firms determines competition in the economic and political markets, R&D, pricing and rent seeking strategies and, ultimately, long run growth.

Notice that, according to condition (26), an increase in competition in economic and political markets has a positive effect on growth. A larger number of firms competing in the political market drives down the equilibrium amount of per firm net rents. An increase in the number of competitors in the economic market implies an increase of knowledge spillovers, a positive business stealing effect and a negative gross profit effect. The first two (positive) effects, however, dominate the second. Overall, an increase in the number of firms interacting in the economic and political market leads to more resources devoted to R&D and higher growth.

To see this, define the growth rate under no rent seeking:

$$g^{nrs} = \theta \frac{\theta \alpha(mn) [\xi(mn) - 1] \phi - \rho}{1 - \theta [\xi(mn) - 1]}.$$

Note that the growth rate in condition (26) can also be written as

$$g = g^{nrs} - \frac{\theta \alpha(mn) [\xi(mn) - 1] \Omega(mn)}{1 - \theta [\xi(mn) - 1]},$$

where the first term is the equilibrium growth rate in the absence of rent seeking activity, while the second term represents the direct effect of rent seeking on growth.

Rent seeking affects the growth rate of the economy in two ways. First, the growth rate of a rent seeking economy,  $g$ , has an additional (negative) term for any number of firms  $n$ . Second, the equilibrium number of firms is influenced by rent seeking (i.e. it is lower for  $v > \tilde{v}$ ) and the functions  $g(n)$  and  $g^{nrs}(n)$  are both increasing in their arguments.

In economies with poor institutions ( $v > \tilde{v}$ ), rent seeking activities reduce the growth rate for two reasons. The first effect is a direct one and is common to other models of rent seeking and growth: firms use real resources in rent seeking instead of investing them in production and R&D. This waste of resources into an unproductive activity reduces the growth potential of the economy. The second effect of rent seeking on growth is an indirect one. Rent seeking activity has a negative effect on the market structure. The equilibrium returns that a firm gets from rent seeking expenditures does not offset the losses from wasted resources on the size of the economic market. This reduction in gross profits forces some firms out of the market. Lower competition in the economy reduces the incentive to innovate of active firms, thus negatively affecting the long run rate of growth. In economies with effective checks and balances on government activity (i.e. for  $v$  sufficiently low), on the other hand, the indirect effect of rent seeking on market structure is positive. This counteracts the negative direct effect of rent seeking on growth.

## 5 The effects of (dis)integration

In this section we start by studying the effects of a break up of the political union on market structure, rent seeking and economic growth, while keeping the degree of economic integration constant. We then take a novel look at the effects of trade liberalization in a politically divided world and, finally, study the growth consequences of economic *and* political integration.

We start by giving definitions of what we mean by economic and political (dis)integration.

- *Economic integration*: firms can sell their products in all regions with no limits (quotas, tariffs, etc.). The relevant number of firms in the economic market under economic integration is  $mn$ , where  $m$  is the number of regions in the economic union and  $n$  is the domestic (i.e. regional) number of firms. Since it is through their competition and interaction in the goods market that firms learn from each other, the relevant number of firms for spillovers is also  $mn$ .
- *Economic disintegration*: firms are only allowed to sell products in their home (i.e. regional) market. The number of competitors in the economic market is  $n$ .
- *Political integration*: a union government has the power to set policy. Under political integration firms seek rents by lobbying the union government. The relevant number of firms active in rent seeking -i.e. the numbers of competitors in the political market- is  $mn$ , where  $m$  is the number of regions in the political union.
- *Political disintegration*: policy is set by local governments. Under political separation firms seek rents by lobbying local authorities. Therefore, the relevant number of competitors in the political market is  $n$ .

In order to simplify the discussion and notation to be used in this section, we will define the following possibilities. A situation where there is both political and economic integration will be called *full integration* and relevant variables will be denoted with  $FI$ . The opposite case of political and economic disintegration will be called *autarky* and relevant variables will be denoted with  $A$ . The case of economic integration and political disintegration will be referred to as *political separation* and relevant variables will be denoted with  $PS$ . The final case of political integration and economic disintegration will not be dealt with as it has little real world relevance.

Our definition of political (dis)integration is admittedly restrictive along several dimensions (see also the discussion of this point in section 6), however it allows us to focus on the implications that a larger political market has for rent seeking and its effect -through this channel- on economic growth. Underlying this definition there are two simplifying assumptions that need to be discussed. First, after a political break up, a firm in region  $s$  cannot lobby the government of region  $s'$ . In

theory foreign lobbies can influence the home government<sup>16</sup>, however the logic of our results would not change if we allow foreign rent seekers to be active in the home political market provided that they face higher costs of lobbying the home government (for instance, due to worse connections with home bureaucrats and politicians or because of taboos about governments accepting support from foreign firms). Second, one could argue that a political break up leads to a fall of the size of the “political pie” that rent seekers can distort to their advantage, which lowers the return from rent seeking, which -in turn- lowers rent seeking activity. In our model this is not the case because overall rents ( $nQ$ ) and taxes are endogenous and can increase or decrease under political separation.<sup>17</sup> Moreover, our argument would still be valid with a fixed budget, whereby political disintegration reduces public budgets available to local governments proportionally.<sup>18</sup>

### 5.1 The economic effects of political disintegration

We assume that the political union of previous sections breaks up. Regions -now sovereign countries- maintain economic unity (e.g. form a common market with no internal tariffs), but retain full political independence. The following proposition establishes what happens to the equilibrium market structure when a political union breaks up.

**Proposition 1.** *The number of active firms decreases under political disintegration if  $v > \tilde{v}$*

**Proof:** In this case the price elasticity of demand  $\xi(mn)$  and R&D productivity  $\alpha(mn)$  remain as under full economic integration, while for equilibrium rents  $Q(mn)$  and lobbying  $L_Q(mn)$  we set  $m = 1$ . Compare condition (23) with the equilibrium number of firms under political separation implicitly determined by the following equation

$$\frac{L[1 - \theta(\xi(mn) - 1)]}{n\xi(mn)} \left[ 1 - \frac{nQ(n)}{L} \right] + \Omega(n) + \frac{\rho}{\alpha(mn)} = \phi. \quad (27)$$

For a given  $n$  the right-hand side is the same, while the left-hand side is larger in the case of full integration if  $v > \tilde{v}$ . To see this, we consider the condition under which this statement holds.

$$\Omega(mn) - \frac{[1 - \theta(\xi(mn) - 1)]}{\xi(mn)} Q(mn) > \Omega(n) - \frac{[1 - \theta(\xi(mn) - 1)]}{\xi(mn)} Q(n)$$

Substituting in the expressions for  $\Omega$ , this simplifies to

<sup>16</sup>Evidence by Gawande et al (2004) shows that this is in fact the case for trade policy in the US.

<sup>17</sup>The effect of political disintegration on total rents depends on the quality of institutions. We have that  $\frac{\partial nQ}{\partial m} < 0$   $\forall v > 0$  and  $\frac{\partial nQ}{\partial n} = \frac{1-2v}{1-v} \Delta n^{-\frac{v}{1-v}} < 0$  for  $v > \frac{1}{2}$ . Therefore, political disintegration increases total rents on impact. However, as firms enter or exit the market, total rents can increase or decrease depending on the quality of institutions.

<sup>18</sup>This can be easily proved using a rent seeking model a' la Tullock (1980) with fixed budgets respectively equal to  $\bar{b}$  and  $m\bar{b}$  under political separation and integration. The proof is available upon request.

$$[Q(mn) - Q(n)] \left[ 1 - v - \frac{1 - \theta(\xi(mn) - 1)}{\xi(mn)} \right] > 0.$$

Since  $Q(n) > Q(mn)$  for any  $n$ , this condition becomes

$$\left[ 1 - \frac{(\xi - 1)(1 + \theta)}{\xi v} \right] > 0.$$

A sufficient condition for this to hold is  $v > \frac{(\epsilon-1)(1+\theta)}{\epsilon} \equiv \tilde{v}$ .

When the number of countries in the political union falls, the left-hand side of (27) is lower for any number of firms per country,  $n$ . At the number of firms that existed under full integration, call it  $n^{FI}$ , cash flows are not sufficient to cover the firms' fixed costs and some firms will exit the market. The equilibrium number of firms under political separation is smaller than the equilibrium number of firms under integration (i.e.  $n^{PS} < n^{FI}$ ) if  $v > \tilde{v}$ .

The move from political integration to separation has the initial effect of decreasing the number of firms competing for political favors from  $mn$  to  $n$ . As domestic firms take advantage of greater returns to rent seeking (and increase their lobbying effort), the size of the goods market is eroded. Gross profits of firms are affected in opposite ways by the increase in revenues from the political market and the fall of revenues from the economic market. This second (negative) effect dominates the first when governments are more responsive to firms' lobbying ( $v > \tilde{v}$ ), because both total rents and the cost of obtaining them increase with political disintegration. As rent seeking activities increase, at least some firms in (the newly formed) countries with low quality of institutions close down their activities. On the other hand, political disintegration might have the opposite effect on market structure if governments are not too responsive to lobbying. For low values of  $v$ , the increase in returns from rent seeking activities due to political disintegration can have a positive (general equilibrium) effect on firms' cashflows. This will induce at least some firms to become active.

We now turn our attention to the effects on economic growth of the break up of a political union. The main result is summarized in the following proposition.

**Proposition 2.** *Political disintegration has two effects on the growth rate of the economy: i) a direct effect, which is always negative; and ii) an indirect effect (through market structure), which is negative if  $v > \tilde{v}$*

**Proof:** First, we show that for any given  $n$  the growth rate schedule under full integration, given by condition (26), is always above the growth rate schedule under political separation given by

$$g^{PS} = \theta \frac{\theta \alpha(mn) [\xi(mn) - 1] [\phi - \Omega(n)] - \rho}{1 - \theta [\xi(mn) - 1]}. \quad (28)$$

Note that  $-\Omega(mn) \equiv L_Q(mn) - Q(mn) > -\Omega(n) \equiv L_Q(n) - Q(n)$  for a given  $n$ .

Now, compare the growth schedule under full integration (26) and under political separation (28). Then note: 1. for a given number of firms the growth rate is larger under full integration than under political separation; 2. growth under both political regimes is increasing in the number of firms and  $n^{PS} < n^{FI}$  if  $v > \tilde{v}$ .

The effect of a political break up on economic growth can be split into two parts (refer to Figure 1). First, the reduction in competition in the political market initially increases the political power of firms as well as the rents earned by each firm. Consequently, there is a reduction in the resources available for productive activities. For any given  $n$  the growth schedule shifts down. Second, if the quality of institutions is poor ( $v > \tilde{v}$ ), the initial increase in rent seeking has a negative effect on gross profits and reduces the number of firms that the market supports in zero profit equilibrium. The fall in active firms reduces competition in economic and political markets, thus leading to less innovation and even more rent seeking by individual firms. In Figure 1, the vertical line representing the equilibrium number of firms shifts to the left. The two effects work in the same direction and the equilibrium growth rate of the economy jumps down from point  $FI$  to point  $PS$ . On the other hand, if the quality of institutions is high ( $v$  low), firms' entry counteracts the negative direct effect of political disintegration on economic growth. In this case, the ultimate effect on the growth rate is ambiguous.

## 5.2 Economic and political integration, rent seeking and growth

We first take a novel look at how economic integration affects market structure, rent seeking and economic growth in a politically disintegrated world. We define economic integration as the move from autarky to free trade (i.e. from regime  $A$  to  $PS$ ). We argue that political disintegration reduces the benefits that can be reaped by economic integration.

Consider a world of full disintegration in which each region is an independent political entity and only domestic firms produce for domestic consumption. In this world, the price elasticity of demand  $\xi$ , equilibrium rents  $Q$  and returns from rent seeking  $\Omega$  are given respectively by equations (18), (16) and (20) with  $m = 1$ . Similarly, R&D productivity in absence of international trade is given by  $\alpha = [1 + \gamma(n - 1)]$ .<sup>19</sup> Opening trade implies the following change in market structure and rent seeking:

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<sup>19</sup>One could assume that knowledge is free to move under autarky without changing the qualitative results of this section.

**Proposition 3.** *Economic integration reduces the equilibrium number of firms in each country*

**Proof:** Consider the case of economic integration in the absence of political integration (i.e. the move from autarky to political separation). Recall that the equations that determine the equilibrium number of firms represent the zero profit condition: cash flows from the goods market,  $\frac{L[1-\theta(\xi(n)-1)]}{n\xi(n)} \left[1 - \frac{nQ(n)}{L}\right]$ , plus cash flows from rent seeking,  $\Omega(n)$ , must just cover the fixed cost  $\phi$ . The direct effect of economic integration on cash flows is simply  $\frac{L[1-\theta(\xi-1)]}{n\xi}$  and it is clear to see that this term falls as the level of competition increases in the goods market. The equilibrium market structure under political separation is given by

$$\frac{L[1-\theta(\xi(mn)-1)]}{n\xi(mn)} \left[1 - \frac{nQ(n)}{L}\right] + \Omega(n) + \frac{\rho}{\alpha(mn)} = \phi, \quad (29)$$

while in case of autarky, the equilibrium number of firms is given by

$$\frac{L[1-\theta(\xi(n)-1)]}{n\xi(n)} \left[1 - \frac{nQ(n)}{L}\right] + \Omega(n) + \frac{\rho}{\alpha(n)} = \phi. \quad (30)$$

Suppose we start from the equilibrium market structure under autarky, call it  $n^A$ . When trade is opened, competition in economic markets becomes tougher on impact -i.e. the number of firms jumps from  $n^A$  to  $mn^A$ . The price elasticity of demand and R&D productivity increase from  $\xi(n^A)$  and  $\alpha(n^A)$  to  $\xi(mn^A)$  and  $\alpha(mn^A)$ , respectively and cash flows from the goods market fall for any level of  $n$ . Since firms are no longer able to cover the fixed cost of production, some firms must exit the market. In the new equilibrium the market structure implies a lower number of firms (i.e.  $n^{PS} < n^A$  where  $n^{PS}$  is the equilibrium number of firms under political separation).

Economic integration increases competition in previously closed economies and drives out of the market some domestic firms that could survive under a protectionist regime. The global number of firms is lower in an economically integrated world than in a world of countries producing and consuming in autarky. The intuition is as follows. On impact, trade liberalization increases competition in the goods market, thus reducing cash flows for each firm.<sup>20</sup> This is not a sustainable situation since firms are no longer able to cover the fixed cost of production. Some firms must drop out of the market and as they do, cashflows from both the goods market and rent-seeking increase up to the point where the zero-profit condition is satisfied. In terms of figure 2, the vertical line representing the equilibrium number of firms shifts to the left. The fall in each country of the number of firms reduces competition in the political market and increases rent seeking under political disintegration.

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<sup>20</sup> Similarly, the increase in spillovers under economic integration has a positive effect on productivity  $\alpha$  and induces higher R&D spending. This also contributes to an increase in the operational costs of firms.

The effect of economic integration on growth in a politically divided world is ambiguous in this model. For a given number of domestic firms, the growth rate is always higher under economic integration than autarky, because the price elasticity of demand,  $\xi$ , and R&D productivity,  $\alpha$ , are larger. Foreign competition decreases the economic market power of each firm and increases the stock of knowledge available making R&D more attractive causing growth to rise. To see this, simply compare the following two equations representing the growth rate under autarky and political separation in a divided world and recall that  $\alpha(n)$  and  $\xi(n)$  are increasing in their argument:

$$g^A = \theta \frac{\alpha(n) [\xi(n) - 1] [\phi - \Omega(n)] - \rho}{1 - \theta [\xi(n) - 1]} \quad (31)$$

and

$$g^{PS} = \theta \frac{\alpha(mn) [\xi(mn) - 1] [\phi - \Omega(n)] - \rho}{1 - \theta [\xi(mn) - 1]}. \quad (32)$$

In terms of figure 2, this implies that the growth schedule shifts up when trade is opened. However, the change in market structure and the increase in rent seeking activities negatively affect the economic performance of countries in the long run. The interaction of these political and economic effects determines the rate of growth of the economy.<sup>21</sup> Nonetheless, the next proposition shows that growth is unambiguously higher when economies open to trade and integrate politically (i.e. when we move from regime *A* to *FI*).

**Proposition 4.** *Economic growth increases under full (economic and political) integration*

**Proof:** First, we show that the global number of firms increases when going from autarky to full (economic and political) integration. Note that the condition that determines the number of firms in each region under *FI* is

$$\frac{L [1 - \theta(\xi(mn) - 1)]}{n\xi(mn)} \left[ 1 - \frac{nQ(mn)}{L} \right] + \Omega(mn) + \frac{\rho}{\alpha(mn)} = \phi.$$

If we denote the global number of firms by  $M = mn$ , then this can be re-written as

$$\frac{mL [1 - \theta(\xi(M) - 1)]}{M\xi(M)} \left[ 1 - \frac{MQ(M)}{mL} \right] + \Omega(M) + \frac{\rho}{\alpha(M)} = \phi.$$

The left hand side of this expression is the same as that used to determine the number of firms in each region in the case of autarky (equation 30) except that gross profits from the economic

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<sup>21</sup>In this model, a global reduction in tariffs has qualitatively similar effects to the move from autarky to trade. The reason is that, by exposing domestic firms to tougher international competition, a fall in tariffs raises incentives to engage in R&D. This has a positive direct effect on growth, but also forces some domestic firms out of the market.



market are multiplied by  $m$  and total taxes are divided by  $m$ . It follows that, even though it is possible that the number of firms in each region falls, the global number of firms is higher under full integration:  $M^{FI} = mn^{FI} > n^A$ .

We can now consider growth. The growth rate under full integration is given by

$$g^{FI} = \theta \frac{\theta\alpha(mn) [\xi(mn) - 1] [\phi - \Omega(mn)] - \rho}{1 - \theta [\xi(mn) - 1]} = \theta \frac{\theta\alpha(M) [\xi(M) - 1] [\phi - \Omega(M)] - \rho}{1 - \theta [\xi(M) - 1]}$$

This function is the same as that for growth under autarky. Since this function is increasing in its argument and given that we have shown  $M^{FI} > n^A$ , it follows immediately that growth under full integration is greater than under autarky.

Economists widely agree that a move from autarky to (free or restricted) trade can cause the number of firms in each country to fall. The novel implication of our work is that economic integration implies an increase of rent seeking activities at the local level. This is due to the homogenization effect of trade liberalization. A number of theoretical arguments have been proposed in the literature that suggest the losses from the closing of domestic firms is more than offset by efficiency gains (e.g. production is taken over by lower cost firms). Here we argue that, when firms participate in the political market, the elimination of domestic firms can be particularly damaging because it makes rent seeking a much more appealing proposition for the remaining domestic firms. In this model, the above effects take place in the following way. Opening the market to trade increases economic competition and results in greater price competition which requires greater R&D expenditures. But as domestic firms drop out of the market, political power is concentrated and rent seeking becomes more attractive.<sup>22</sup> This draws resources away from R&D. The overall effect of economic integration on R&D (and therefore growth) is ambiguous. This might sound odd at first, however it is highly plausible that firms that were once protected by trade restrictions turn their efforts to influence their government to obtain different forms of favors once these restrictions are no longer in place (public transfers are likely to be good substitutes for tariffs and quotas from the firm's perspective).<sup>23</sup> The fact that fewer firms are active after economic integration makes rent seeking more profitable for the surviving firms. Political integration, by increasing competition in the political market, offsets this mechanism. This explains why economic integration alone has an ambiguous effect on growth, but economic and political integration have an unambiguous positive effect on the long run rate of growth. Figure 2 shows the equilibrium under autarky and political

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<sup>22</sup>Notice that the fall in competition in the political market increases rent seeking no matter what the quality of institutions is (i.e. independently of the level of  $v$ ). The extent of this increase, however, is clearly related to the checks and balances on government activity and the accountability of bureaucrats and politicians (i.e. larger increases in rent seeking for higher values of  $v$ ).

<sup>23</sup>One can also think of the raise of specific national regulations aimed at preserving profits of domestic firms in a world of increased economic integration.

disintegration ( $A$ ), under economic integration in a politically divided world ( $PS$ ) and with full political and economic integration ( $FI$ ).

It should be noted, however, that other effects of free trade might be in place, even if not explicitly modeled in this paper. Economic integration is generally perceived as beneficial to the quality of institutions.<sup>24</sup> In this model an improvement in the quality of institutions (a reduction of  $\nu$ ) reduces the amount of rent seeking, thus freeing up resources for productive activities and increasing growth, even if no political integration takes place. In conclusion, it is possible that the overall effect of economic integration on rent seeking is a positive one, with trade liberalization leading to a reduction of unproductive activities. Nonetheless, our main point is still valid: for a given level of institutional quality, political integration increases competition in the political market and induces potential rent seekers to shift focus to productive activities, thus partially offsetting the negative effects on growth due to the reduction of active firms caused by economic integration.

## 6 Discussion

To draw policy implications from a stylized model as this one is difficult, but tempting. We briefly try to discuss some applications. First, most of the recent political break ups, from USSR to Montenegro, took place in countries where the quality of institutions were low. Political disintegration in the former Soviet Union in particular has been accompanied by an incredible increase in rent seeking activities and an astonishing fall in growth rates. The two are obviously related to the collapse of the socialist system of production and the transition to a market economy. However, it is tempting to argue that the political break up per se had effects on both rent seeking and growth as predicted by this model.

Second, economic integration in Europe has been accompanied by some degree of political integration. Several regulations are de facto chosen at the EU level. In other cases, in particular state aids to firms (that closely resemble the kind of transfers that we have in our model), national governments have been limited by the Treaties in their ability to decide policy and the European Commission has been empowered with enforcement. In both cases, we argue that the underlying reason is to avoid that rent seeking activities (aiming at favorable regulations or at receiving transfers from national governments) would undermine the benefits of establishing a single market in Europe.

Finally, pressures for the political independence of Quebec from the rest of Canada have resurfaced in the last few years. An argument often mentioned in favor of independence is that, with the implementation of the North American Free Trade Agreement (NAFTA), the economic

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<sup>24</sup>Empirical evidence suggests that more open economies tend to be associated with better institutions (see Rodrik, Subramanian and Trebbi, 2004). However, the causal relationship is not obvious.

costs of political independence are low (possibly zero in a perfectly integrated market). Similar arguments often arise in Europe, where some regions and/or ethnic or linguistic minorities (as Scotland or Catalonia) feel that with economic integration with the rest of the continent, political separation becomes more viable. A shortcoming of this argument is that it fails to realize that a political break up might have *per se* effects on economic growth and that these effects might be magnified (not lowered) by economic integration.

Overall this model reaches conclusions on the relationship between economic integration and political separatism that are analogous to other recent arguments that emerged in the literature. First, the view that integrated economic markets need political as well as legal and social institutions for their effective functioning (see Rodrik, 2000, and Wolf, 2004). Second, the view that the proliferation of borders reduces trade (and, therefore, growth) even when countries share culture, language and institutions (McCallum, 1995). Third, the view that globalization is creating new policy externalities and this leads national governments to choose worse economic policies (Broner and Ventura, 2006, and Epifani and Ganica, 2006, among others).

We conclude this section with some important caveats. The issue of political (dis)integration is clearly a complex one and requires more theoretical and empirical work. To address it in a formal and tractable model, we focus on integration between identical countries. Extending the analysis by introducing asymmetries across countries -in the quality of institutions, in the initial stock of knowledge, etc.- will provide new insights.<sup>25</sup> Second, as stressed earlier, political (dis)integration might imply an endogenous change of institutions, while our results depend on the assumption that institutions do not change. Last, we focus on an admittedly narrow definition of what constitutes the political sphere. This allows us to focus on the specific channel through which political (dis)integration affects growth in this model, but leaves behind many important aspects, as heterogeneity of policy preferences across countries (and regions) that has been at the core of research in this area.<sup>26</sup> More in general, a better understanding of how the world political and institutional structure will and shall change as economic integration proceeds (a question well beyond the scope of this paper) represents an important avenue for future research.<sup>27</sup>

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<sup>25</sup>For instance, Brou and Ruta (2006) study political integration of a rich and a poor country in a microfounded model of special interest politics and find that cross country asymmetries affect policy and the gains from political integration.

<sup>26</sup>Introducing, for example, an exogenous cost of heterogeneity as in Alesina et al. (2000) would create a trade off between the benefits of economic and political integration and the cost of a more heterogeneous political union.

<sup>27</sup>On this point, see also the model of Etro (2006) and, for an insightful discussion, Licandro and Ventura (2006).

## 7 Conclusions

This paper presents an endogenous growth model with rent seeking and studies the economic effects of political separation in an economically integrated world and of the interaction between economic and political integration. The political break up or integration of countries affects the rate of growth of the economy through a change in competition for rent seeking, which in turn has an influence on market structure and incentives to R&D. This effect of political (dis)integration is distinct from the one traditionally highlighted in the literature that works through the size of the economic market (see Alesina, Spolaore and Wacziarg, 2005).

The model shows that the effects of political (dis)integration on growth depend on initial conditions, in particular the quality of institutions. Political disintegration leads to greater rent seeking relative to R&D and lower economic growth in countries where checks and balances on government activity and accountability of bureaucrats and politicians are poor. In countries with good institutions, instead, the effects of political disintegration are in principle ambiguous (however, the ambiguity is removed when a political break up is accompanied by economic disintegration). A second result is that economic integration drives out of the market some domestic firms that could survive in a protectionist regime and affects rent seeking activity. This cost in terms of rent seeking is larger in a politically divided world. Overall, these findings suggest that political disintegration can reduce the growth benefits that can be reaped through economic integration.

## References

- [1] Aghion, P., Acemoglu, D. and F. Zilibotti, 2006, Distance to Frontier, Selection and Economic Growth, Forthcoming, *Journal of the European Economic Association*.
- [2] Alesina, A., I. Angeloni and F. Etro, International Unions, *American Economic Review*, 95:3, 602-615.
- [3] Alesina, A. and E. Spolaore, 2003, *The size of Nations*, MIT Press, Cambridge.
- [4] Alesina, A., E. Spolaore and R. Wacziarg, 2000, Economic Integration and Political Disintegration, *American Economic Review*, 90:5, 1276-1296.
- [5] Alesina, A., E. Spolaore and R. Wacziarg, 2004, Trade, Growth and the Size of Countries, in Philippe Aghion and Steven Durlauf (eds.), *Handbook of Economic Growth*, Vol. 1, Part 2, Chapter 23, 1499-1542, Amsterdam, North Holland.
- [6] Angeletos, G.M. and T. Kollintzas, 2000, Rent-Seeking/Corruption and Growth: A Simple Model, CEPR Discussion Paper No. 2464, May 2000.
- [7] Barelli, P. and S. de A. Pessoa, Rent Seeking and Capital Accumulation, mimeo, University of Rochester.
- [8] Bellettini, G. and G. Ottaviano, 2005, Special Interests and Technological Change, *Review of Economic Studies*, 72, 43-56.
- [9] Bhagwati, 1982, Directly Unproductive, Profit-Seeking (DUP) Activities, *Journal of Political Economy*, 90:5, 988-1002.
- [10] Baumol, W.J., 1990, Entrepreneurship: Productive, Unproductive and Destructive, *Journal of Political Economy*, 98, 893-921.
- [11] Becker, G. S., 1983, A Theory of Competition among Pressure Groups for Political Influence, *Quarterly Journal of Economics*, 101, 371-400.
- [12] Bolton, Patrick and Gerard Roland, 1997, The Breakup of Nations: A Political Economy Analysis, *Quarterly Journal of Economics*, 112 (4), 1057-90.
- [13] Braun, M., Hausmann R. and L. Pritchett, 2004, The Proliferation of Sovereigns: Are There Lessons for Integration?, in *Integrating the Americas: FTAA and Beyond*, A. Estevadeordal, D. Rodrik, A.M. Taylor, and A. Velasco eds., Harvard University Press, Cambridge.
- [14] Broner, F. and J. Ventura, 2006, Globalization and Risk Sharing, mimeo, CREI and Universitat Pompeu Fabra.
- [15] Brou, D. and M. Ruta, 2006, Special Interests and the Gains from Political Integration, *Economics and Politics*, 18:2, 191-218.

- [16] Brou, D. and M. Ruta, 2007, Rent Seeking, Market Structure and Growth, mimeo, European University Institute.
- [17] Buchanan, James M., 1990, An American Perspective on Europe's Constitutional Opportunity, *Cato Journal*, 10:3, 619-630.
- [18] Casella, Alessandra and Jonathan S. Feinstein, 2002, Public Goods in Trade: On the Formation of Markets and Jurisdictions, *International Economic Review*, 43, 2, 437-462.
- [19] Djankov, S., La Porta, R., Lopez de Silanes, F. and A. Shleifer, 2002, The Regulation of Entry, *Quarterly Journal of Economics*, 113, 1-37.
- [20] Epifani, P. and G. Gancia, 2006, On Globalization and the Growth of Governments, mimeo, CREI and Universitat Pompeu Fabra.
- [21] Etro, F., 2006, Political Geography, *Public Choice*, 127:3-4, 321-343.
- [22] Gawande, K., Krishna, P. and M. Robbins, 2004, Foreign Lobbies and US Trade Policy, NBER WP No. 10205, January 2004.
- [23] Ginsborg, Paul, 1990, *History of Contemporary Italy: Society and Politics 1943-1988*, Penguin USA.
- [24] Grossman, G. and H. Helpman, 1991, *Innovation and Growth in the Global Economy*, MIT University Press, Cambridge.
- [25] Hamilton, Alexander, James Madison and John Jay, 1987, *The Federalist Papers*, Penguin Books, London.
- [26] Hume, D., 1752, Idea of A Perfect Commonwealth, in *Essays, Moral, Political and Literary*, Eugene F. Miller ed., Liberty Fund, Inc., 1987.
- [27] Krueger, A.O., 1974, The Political Economy of the Rent Seeking Society, *American Economic Review*, 64:3, 291-303.
- [28] Krusell, P. and J.V. Rios-Rull, 1996, Vested Interests in a Positive Theory of Stagnation and Growth, *Review of Economic Studies*, 63, 301-329.
- [29] Licandro, O., 2004, The Impact of Regional Integration on Economic Convergence and Growth, mimeo, European University Institute.
- [30] Licandro, O. and J. Ventura, Economic Integration and Political Structure, downloadable at: [http://www.iadb.org/intal/aplicaciones/uploads/ponencias/Foro\\_ELSNIT\\_2006\\_04\\_01\\_LicandroVentura.pdf](http://www.iadb.org/intal/aplicaciones/uploads/ponencias/Foro_ELSNIT_2006_04_01_LicandroVentura.pdf)
- [31] Mauro, P., 1995, Corruption and Growth, *Quarterly Journal of Economics*, 110:3, 681-712.
- [32] McCallum, J., 1995, National Borders Matter: Canada-U.S. Regional Trade Patterns, *American Economic Review*, 85:3, 615-623.

- [33] Milanovic, B., 1996, Nations, Conglomerates and Empires: The Trade-off Between Income and Sovereignty, World Bank Policy Research Working Paper 1675, October 1996.
- [34] Mokyr, J., 1998, The Political Economy of Technological Change: Resistance and Innovation in Economic History, in M. Berg and K. Bruland, eds., *Technological Revolutions in Europe*, Cheltenham, Edward Elgar Publishers, 1998, 39-64.
- [35] Murphy, K. M., Shleifer, A. and R.W. Vishny, 1991, The Allocation of Talent: Implications for Growth, *Quarterly Journal of Economics*, 106, 503-530.
- [36] Olson, Mancur, 1982, *The Rise and Decline of Nations*, Yale University Press.
- [37] Parente, S.L. and E.C. Prescott, *Barriers to Riches*, MIT University Press, Cambridge.
- [38] Peretto, Pietro, 1996, Sunk Costs, Market Structure and Growth, *International Economic Review*, 37:4, 895-923.
- [39] Peretto, Pietro, 2003, Endogenous Market Structure and the Growth and Welfare Effects of Economic Integration, *Journal of International Economics*, 60, 177-201.
- [40] Perotti, E. and P. Volpin, 2005, Lobbying on Entry, mimeo, University of Amsterdam.
- [41] Persson, T. and G. Tabellini, 2003, *The Economic Effects of Constitutions*, MIT University Press, Cambridge.
- [42] Rivera-Batiz, L. and P. Romer, Economic Integration and Endogenous Growth, *Quarterly Journal of Economics*, 106, 531-556.
- [43] Rodrik, D., 2000, How Far Will International Economic Integration Go?, *Journal of Economic Perspectives*, 14(1): 177-186.
- [44] Rodrik, D., Subramanian, A. and F. Trebbi, 2004, Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development, *Journal of Economic Growth*, 9:2, 131-165.
- [45] Ruta, M., 2005, Economic Theories of Political (Dis)integration, *Journal of Economic Surveys*, 19:1, 1-21.
- [46] Ruta, M., 2005, Lobbying for Decentralization, mimeo, European University Institute.
- [47] Spinelli, A., 1957, *Manifesto dei Federalisti Europei*, Guanda Editore, Parma.
- [48] Spolaore, E. and R. Wacziarg, 2005, Borders and Growth, *Journal of Economic Growth*, 10:4, 331-386.
- [49] Tullock, G., 1980, Efficient Rent Seeking, in J.M. Buchanan, R. D. Tollison and G. Tullock (eds.), *Toward a Theory of the Rent Seeking Society*, Chapter 6, College Station, Texas: Texas A&M University Press, 97-112.

- [50] Wolf, M., 2004, One Economy, Many States: The Political Economy of Globalization, Thirteenth Annual IEA Hayek Memorial Lecture, Institute of Economic Affairs, London.



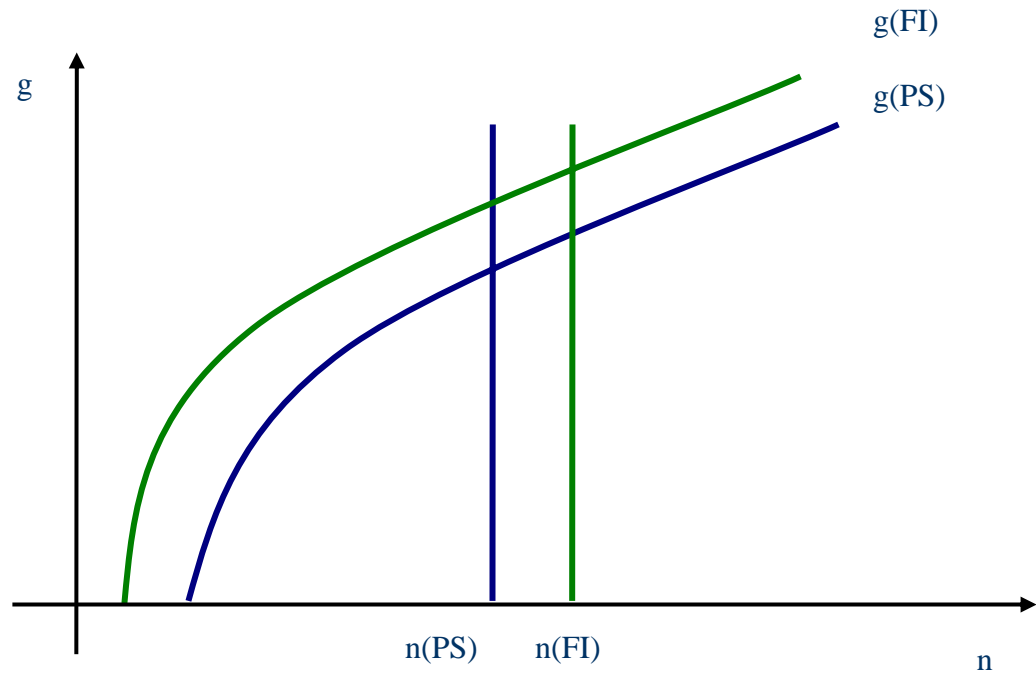


Figure 1: The economic effects of political integration

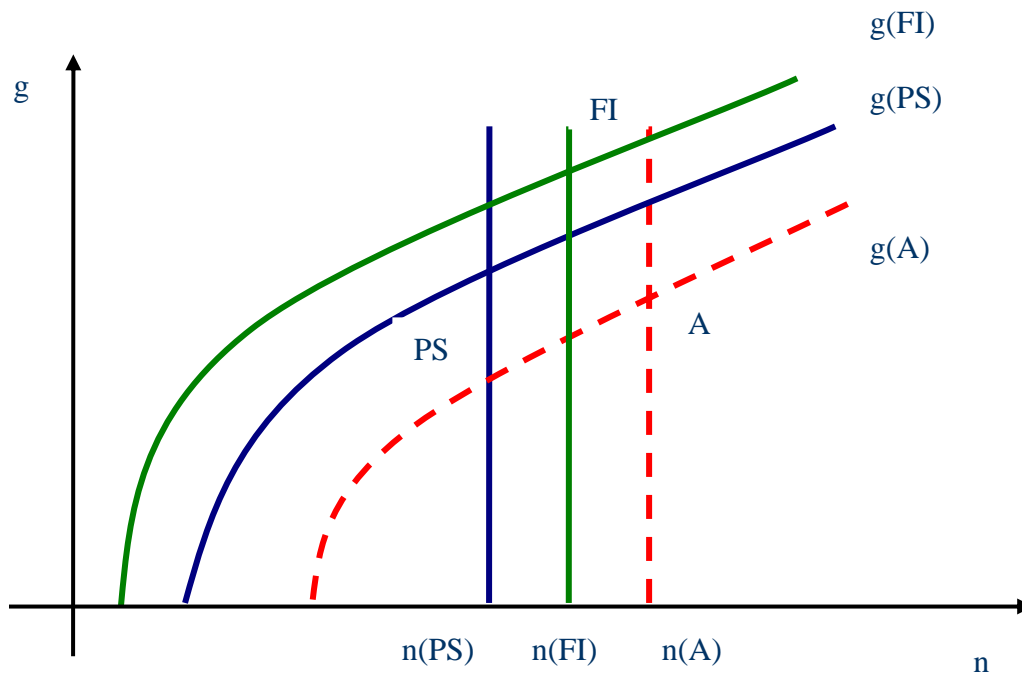


Figure 2: The economic effects of economic and political integration