

Deffains, Bruno; Demougin, Dominique M.

**Working Paper**

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SFB 649 Discussion Paper, No. 2006,027

**Provided in Cooperation with:**

Collaborative Research Center 649: Economic Risk, Humboldt University Berlin

*Suggested Citation:* Deffains, Bruno; Demougin, Dominique M. (2006) : Institutional competition, political process and holdup, SFB 649 Discussion Paper, No. 2006,027, Humboldt University of Berlin, Collaborative Research Center 649 - Economic Risk, Berlin

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# Institutional Competition, Political Process and Holdup

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This research was supported by the Deutsche  
Forschungsgemeinschaft through the SFB 649 "Economic Risk".

<http://sfb649.wiwi.hu-berlin.de>  
ISSN 1860-5664

SFB 649, Humboldt-Universität zu Berlin  
Spandauer Straße 1, D-10178 Berlin



SFB 649 ECONOMIC RISK BERLIN

# Institutional Competition, Political Process and Holdup

Bruno Deffains\* and Dominique Demougin<sup>† ‡</sup>

April 7, 2006

## Abstract

We compare the effect of legal and institutional competition for the design of labor institutions in an environment characterized by holdup problems in human and physical capital. We compare autarky with the two country case, assuming that capital is perfectly mobile and labor immobile. We distinguish two cases. In the first, the political system is free from capture, while in the second, we examine the case where labor captures the institutional design problem. We find that in the former case, a competition of systems reduces welfare while in the latter it improves the overall outcome.

## 1 Introduction

Globalization has led to an accrued interest in the relationship between the legal and institutional design of societies and their respective economic performance (e.g. Botero, Djankov, La Porta, Lopez-de-Silanes and Shleifer (2004), and Caballero, Covan, Engel and Micco (2004), World Bank Doing Business Report (2006)). In this paper, we focus on the design of the legal and institutional framework governing labor relationships and we analyze the impact of globalization thereon.

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<sup>‡</sup>Demougin is grateful for hospitality and support of the University Nancy 2 and the BETA. This research was supported by the Deutsche Forschungsgemeinschaft through the SFB 649 “Economic Risk”.

The last decades have been marked by great improvements in the theory of the firm. After a slow start to Coase's (1937) seminal paper on the nature of the firm, we have witnessed in the literature of thirty years a plethora of theoretical contributions discussing and explaining the boundary of the firm and its internal organization. Recent articles by Garrouste and Saussier (2005) and Gibbons (2005) in a conference volume published by the *Journal of Economic Behavior & Organization* summarized some of the main currents in that development. Elemental arguments for the existence and organization of firms refer to theories based on asymmetric information (and the need of incentive systems), the existence of transaction costs, the reality of incomplete contracts and opportunistic behavior, the ensuing importance of delegation problems, and the allocation of property rights.

Though many theoretical contributions in the theory of the firm ignore (or take for granted) the underlying legal and institutional framework, authors are well aware of its importance. For example, incentive contracts may need interpretation by judges to implement them. Alternatively, in the case of incomplete contracts, negotiation over appropriable quasi-rents will be affected by the parties' respective bargaining power. The latter should be influenced by the legal and institutional setup, by courts behavior, and by societal norms. An example that has been developed in the recent literature concerns the rules and regulations guiding corporate governance to address the risk of investor's expropriation (see e.g. Rajan and Zingales (1998) and the literature therein).

The legal and institutional environment influence the underlying trade-offs which theorists have found to justify the existence of the firm, its boundary and its internal organization. Consequently, legal and institutional framework indirectly affects the functioning and the efficiency of the firm and, by aggregation, of the entire economy. This raises a normative question as to how that setup should be designed. The question becomes all the more urgent with economic development and the exponential growth in international trade for goods and services over the last fifty years. In this increasingly globalized world, we are witnessing an enhanced competition between institutional systems, in particular, between legal orders. More recently, we observe grass root movements advocating against the globalization. They argue that the process not only generates (winners and) losers, but more importantly that it reduces the ability of national states to design institutions addressing market failures.

In this paper, we use a simple model to address some of these issues. We consider an environment characterized by incomplete contracts leading to multiple holdup problems. The legal and institutional framework is then designed to mitigate the ensuing inefficiencies. With respect to the pol-

icy variables, what we have in mind are employment laws (regulating dismissal procedures and employment conditions), collective relation laws (co-determination, conflict resolution mechanisms), social security laws as well as institutions that implement these laws.<sup>1</sup> In the model, we abstract from the specifics of these laws and their implementation. Instead, we capture the sum of all these different effects by one single variable, specifically, the bargaining power of labor in a Nash bargaining context. In practice, there are many ways in which the legal and institutional environment shapes the abilities of parties to appropriate fractions of the quasi rents. For example, it is well known that increasing the workers outside opportunity (for instance raising welfare payments) has the same effect as raising the bargaining power of workers in a Nash bargaining context.<sup>2</sup> Another example concerns the freedom of incorporations. According to this, companies incorporated in one state have the right to operate in any other and states compete for companies to incorporate in their jurisdictions. Recent judgements of the European Court of Justice have reaffirmed the principle of freedom of establishment in EU.<sup>3</sup> An obvious immediate effect is a decreasing in the bargaining power of workers. Further examples include direct changes in labor laws. For instance, in the German reform package “Agenda 2010” law have increased the possibility for one firm to lend workers to other firm (the key issue is that it undermines wage agreements between a firm and a union, thereby, decreases bargaining power of workers). Other examples include variations in severance package, the propensity of courts to directly allocate a fraction of the rent resulting from specific investments in case of a layoff etc...<sup>4</sup>

In the model, we contrast two possibilities. First, we consider a closed economy and assume that the political process selects bargaining power to maximize society’s total welfare. Thus, we initially ignore distortions in the political process resulting from lobbying or other influence activities.<sup>5</sup> In the environment analyzed, the welfare maximizing bargaining power balances the negative effects of a misallocation of capital between firms against an under-investment in specific human capital by the worker. Next, we examine the impact of institutional competition between two identical states on the design process assuming that capital is perfectly mobile while labor is

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<sup>1</sup>See Botero, Djankov, La Porta, Lopez-de-Silanes and Shleifer (2004) for an extended list of policy measures (Table I). About the effect of change in employment law and the importance of courts to complete contracts see also Macleod and Nakavachara (2006).

<sup>2</sup>See, Binmore, Rubinstein and Wolinsky (1986) together with Rubinstein (1982).

<sup>3</sup>See, Fluck and Mayer (2005) for an analysis.

<sup>4</sup>See, Macleod and Nakavachara (2006), and Gabuthy and Muthoo (2005).

<sup>5</sup>For a similar approach and a thorough discussion of the assumption, see Sinn (2003, p. 9).

immobile. In the non-cooperative equilibrium, we find that each country distorts its institutional design, increasing the bargaining power of producers in an attempt to attract foreign capital. Due to the symmetry assumption, neither country can succeed in their endeavor. In the Nash equilibrium each country uses its own capital only. However, the institutional design has been distorted, thus, lowering the overall welfare.

The foregoing heuristic illustrates the costs associated with the systems competition; it traps the institutional design stage in a *prisoners' dilemma game*. In the above model, it increases the inefficiencies providing an argument against systems competition. We conclude with a cautionary note using a second best argument. We apply the same framework to solve for an alternative example where the political process itself is initially distorted through lobbying activities. Considering rent seeking activities, we derive the institutional structure which would emerge if the institutional design process is captured by one party. Specifically, we consider the case where labor representatives have managed to capture the institutional design stage to the advantage of workers. Not surprisingly, in autarky the resulting allocation of bargaining power is skewed in favor of labor lowering overall welfare. Embedding the model in a two countries environment, we find, just as before, that the prisoners' dilemma game generates incentive to reduce the bargaining power of labor. However, this time it is welfare enhancing because the bargaining power of labor was initially excessive. The example illustrates the well known result, that in an initially inefficient environment, a distortionary policy may become welfare enhancing. We could have derived a similar conclusion for a capture by the factor capital. The formalization is more elaborate, however, because it requires distinguishing for labor supply between skilled and unskilled labor. Notwithstanding the additional complexity, the basic intuition would remain the same.

Our paper belongs to a class of so called Tiebout models (Tiebout, 1956). Unlike the standard approach in that literature, we are not interested in the effect of interstate competition on the supply of public goods financed through taxation. Rather we are looking at the supply of legal and institutional environment designed to reduce the organizational costs of firms. We focus here on organizational costs induced by holdup problems in the firm. The traditional approach of institutions considers that market failures explain the nature and the form of organizational arrangements (Coase (1960), Demsetz (1967), and North and Thomas (1971)). We can observe that the legal and institutional setup could further reduce transaction costs and inefficiencies (which implies to consider also the risk of capture by rent seekers). The paper is also related to the current debate on the effect of systems competition. The conclusions of that literature are contrasted. Some authors,

in the tradition of Hayek and Schumpeter, advocate systems competition as a mean to induce efficiency (e.g. Mahoney (2001), Ogus (2003)). Others disagree claiming that it would lead to a “race to the bottom”. For example, in the case of taxation, Mintz and Tulkens (1986) and Wildasin (1988) find that the Nash equilibrium in jurisdictional competition is generally non optimal. A similar result is shown by Romano (2005) in the case of competition concerning corporate charters or by Fluck and Mayer (2005) for corporate governance, freedom of reincorporation and competition law. For criminal law, Marceau and Mongrain (2004) show how competition between jurisdictions in crime protection can lead to over-deterrence. A recent book by Sinn (2003) summarizes the main argument against systems competition arguing that it amounts to a *reintroduction of the market by the back door*. Applying the heuristic to the institutional design, his main argument would be that in a well functioning democracy the legal framework should have been structured to counter market failures. In such a setup, introducing systems competition would reintroduce *the failures that originally caused the government to take action* and that the failures would *show up again at the higher level of government competition*.

The remaining of the paper is organized as follows. In section (2.), we present the model. The specificity of the model is that it leads to holdup problems because the respective parties must invest before they agree to a specific labor contract. In section (3.), we identify the first-best solution. Next, we derive in (4.) the parties investment decisions and solve the regulator problem in autarky. In section (5.), we consider the result of systems competition with no capture of the political process. Following, we analyze the effects of capture by labor in (6.) Finally, section (7.) offers some concluding remarks.

## 2 The model

We consider a static environment with two identical countries. In each country, the economy is made up of a regulator, two sectors and an initial capital stock  $K$ . In each sector, there is one representative firm. Even though the number of players is small, we assume competitive behavior.<sup>6</sup> Physical capital is assumed to be a productive input that cannot be directly consumed.

The two representative sectors stand for two different technologies in the production of a single consumption good. In sector 1, the technology is

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<sup>6</sup>The requirement is not very restrictive since we could easily introduce a large number of identical players.

assumed to employ capital only.<sup>7</sup> For the representative firm in that sector, production is given by  $g(k_1) = \lambda k_1^\gamma$ , with  $\lambda > 0$  and  $0 < \gamma < 1/2$ .<sup>8</sup> In the second sector, the representative firm owns a production technology that requires capital and one unit of labor. Labor can increase productivity by investing in human capital. We denote by  $f(k_2, h_2)$  the production function and assume  $f(k_2, h_2) = k_2^\gamma + \phi h_2^\delta$ , with  $\phi > 0$  and  $0 < \delta \leq 1/2$ . The parameters  $\phi$  and  $\lambda$  are useful to discuss the effects of varying the significance of human capital and the relative importance of the two sectors.

The separability condition is an important restriction not allowing us to study the impact of complementarity between the factors of production on the allocation of bargaining power. However, for the purpose of analyzing the effect of legal and institutional competition, the reduction of complexity allows us to more easily isolate the effect of changes in the institutional setup.

The capital market is taken to be perfectly competitive. Firms can acquire physical capital at the rental rate  $r$ . From the point of view of the worker, acquiring human capital is costly. Without loss of generality, we measure the costs of human capital by  $h$ , i.e. we represent human capital in terms of its acquisition costs.

We assume that the parties must invest before they meet. After the firm and the worker have invested, they are matched up. Once matched the parties' outside opportunity is taken to be zero. We follow the recent labor literature by assuming that firms cannot make take-it-or-leave-it offers and that the parties must, instead, negotiate the division of the quasi-surplus.<sup>9</sup> Consequently, each side faces a holdup problem in their respective investment decision. We assume that the outcome of the negotiations can be represented as the outcome of a Nash bargaining game where  $\alpha$  denotes the bargaining power of labor.<sup>10</sup> As discussed in the introduction, we interpret  $\alpha$  as reflecting the legal and institutional framework which is exogenous at the bargaining stage.

The exact timing of the game is as follows. In the first step, the political process determines  $\alpha$ . For this stage, we distinguish four possible scenarios; autarky with and without rent seeking activities, and trade between two identical countries again with and without predatory behavior. In the case

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<sup>7</sup>Intuitively, this sector stands for markets where the assumption regarding perfect competition are nearly satisfied and there are no holdup problems.

<sup>8</sup>The parametric restriction is important to guarantee that the second order condition is satisfied.

<sup>9</sup>See Grossman and Hart (1986), Pissarides (2000) and the literature therein.

<sup>10</sup>The Nash bargaining solution comes from the cooperative game theory. However, it is well known that its use can be justified using non-cooperative bargaining à la Rubinstein (Rubinstein (1982) and Binmore, Rubinstein and Wolinsky (1986)).



of trade, we assume that capital is perfectly mobile while labor is immobile.<sup>11</sup> In order to analyze the effect of legal and institutional competition, we only consider situations where the countries do not cooperate to determine  $\alpha$ . Instead, we assume that they play simultaneously. In the second stage, the firms and the worker invest in physical and human capital respectively. In the third step, the firm in sector 2 is matched with the worker and the two parties bargain over the division of the quasi-surplus. Finally, production takes place, the factors are paid and consumption occurs.

### 3 The first-best solution

We start with the benchmark case where there are no market imperfections. In that case, there is no need of adjusting the institutional design allocating bargaining power between the parties since the economy would attain the first best solution characterized by:

$$\begin{cases} k_1^{FB} = \frac{\lambda^{\frac{1}{1-\gamma}}}{1+\lambda^{\frac{1}{1-\gamma}}} K \\ k_2^{FB} = \frac{1}{1+\lambda^{\frac{1}{1-\gamma}}} K \\ h_2^{FB} = [\phi\delta]^{\frac{1}{1-\delta}} \end{cases} \quad (1)$$

### 4 Autarky

In this section, we consider the case of a single country with no trade. We apply backward induction. We start with the individual economic agents assuming that the institutional design problem has been resolved and the bargaining power has already been allocated between the parties. Next, we consider the resulting market equilibrium. Given that we are in a one good economy and that only the representative firm in sector 2 uses labor, the only relevant market determines the allocation of capital between the two sectors. Finally, we consider the institutional design problem assuming that society anticipates the impact of her decision on welfare.

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<sup>11</sup>The result of the analysis would extend to situations where labor is also mobile, but its mobility is more costly than that of capital.

## 4.1 The parties investment decisions under holdup

We first consider the firm in sector 1. Its decision problem is simply to select physical capital to maximize profit. Given the market rental rate  $r$ , the firm solves<sup>12</sup>

$$\max_{k_1} g(k_1) - rk_1 \quad (2)$$

Taking the first order condition and solving implies:

$$k_1 = \left( \frac{\lambda\gamma}{r} \right)^{\frac{1}{1-\gamma}} \quad (3)$$

The investment decision of the second firm and the worker's problem are jointly determined as the outcome of a prisoners' dilemma game. Using backward induction, we start at the bargaining stage. At this point in time, the parties that are matched have already invested in  $h_2$  and  $k_2$ . The negotiation between the parties solely involves the division of the quasi-surplus  $f(k_2, h_2)$ . At that point in time the investment costs of both parties are sunk. Since we have assumed that the outcome of negotiation can be represented by the solution of a Nash bargaining problem, the worker's wage,  $s$ , is the solution to the maximization of the Nash product

$$\max_w [f(k_2, h_2) - s]^{1-\alpha} [s]^\alpha \quad (4)$$

From the first order condition, we obtain the parties' respective shares of the quasi-rent. It is easily verified that the firm receives  $(1 - \alpha) f(k_2, h_2)$  and the worker obtains  $\alpha f(k_2, h_2)$ .<sup>13</sup>

Going one step back in the game, the parties decide on their respective investment choices anticipating the outcome of the wage negotiation. Thus, the worker will decide his level of human capital by solving

$$\max_{h_2} \alpha f(k_2, h_2) - h_2 \quad (5)$$

The worker's optimization implies:

$$h_2 = [\alpha\phi\delta]^{\frac{1}{1-\delta}} \quad (6)$$

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<sup>12</sup>Whenever possible without confusion, we will drop the subscript referring to the sector.

<sup>13</sup>We do not consider here the possibility that the worker obtains the profit of the firm that he works for. Otherwise, the worker is obviously not a worker in the classical sense. An obvious setup is to implicitly assume a "replica" economy where the worker owns fractions of other firms.

Similarly, the firm will solve

$$\max_{k_2} (1 - \alpha) f(k_2, h_2) - rk_2, \quad (7)$$

which yields the investment decision rule:

$$k_2 = \left[ (1 - \alpha) \frac{\gamma}{r} \right]^{\frac{1}{1-\gamma}}. \quad (8)$$

The respective decision rules reflect the regulator's problem, since there is no  $\alpha$  inducing firms and the worker to jointly implement first best decisions.

## 4.2 The market equilibrium

At the equilibrium both firms maximize their respective profits, the worker maximizes his utility, and the capital market clears, i.e.  $K = k_1 + k_2$ . Taking  $\alpha$  as given and eliminating  $r$ , this yields:

$$\begin{cases} k_1^* = \frac{\left[ \frac{\lambda}{1-\alpha} \right]^{\frac{1}{1-\gamma}} K}{1 + \left[ \frac{\lambda}{1-\alpha} \right]^{\frac{1}{1-\gamma}}} \\ k_2^* = \frac{1}{1 + \left[ \frac{\lambda}{1-\alpha} \right]^{\frac{1}{1-\gamma}}} K \\ h_2^* = [\alpha \phi \delta]^{\frac{1}{1-\delta}} \end{cases} \quad (9)$$

Comparing the above condition with the first best decision, we observe that with  $\alpha = 0$  the allocation of capital between the two sectors is first best whereas the worker does not invest in any human capital. At the other extreme for  $\alpha = 1$  the worker's decision is first best, but firm 2 does not invest in capital (one could say that the capital allocation between the two sectors is maximally inefficient). It is easily verified that between these two extreme values, investments in human capital are increasing in  $\alpha$  and converge toward first best, whereas the allocation of physical capital worsens converging to the maximally inefficient case.

This analysis contributes to understanding the effect of a parameter change. On one side, an increase in  $\phi$  means that human capital becomes more important thereby raising the marginal benefit of an increase in  $\alpha$ . In the other side, an increase in  $\lambda$  means that the marginal return to capital in sector 1 increases relative to that of sector 2. As a result, capital moves to sector 1, thus, for any  $\alpha$  reducing the demand for capital in sector 2. It also means that the marginal costs of an increase in  $\alpha$ , due to the misallocation

of capital between the two sectors, is lower the larger  $\lambda$ . The intuition is straightforward; increasing the share to labor raises the worker's incentive to invest in human capital. However, it simultaneously lowers the firm's output share thereby reducing its incentive to invest.?

### 4.3 Institutional design with an efficient political process

In this subsection, we work under the hypothesis that the political system functions efficiently avoiding lobbying activities leading to capture by one of the interested parties. As a result, we suppose that society allocates bargaining power to the respective parties to maximize its overall welfare. That is society solves:

$$\max_{\alpha} w(\alpha) = g[k_1^*(\alpha)] + [f(k_2^*(\alpha), h_2^*(\alpha)) - h_2^*(\alpha)] \quad (10)$$

Due to autarky framework, observe that in the above objective function, we ignore rental payments to capital. Indeed, the market equilibrium condition implies that  $r[K - k_1^*(\alpha) - k_2^*(\alpha)] = 0$ .

**Proposition 1** *The function  $w(\alpha)$  is concave and has an interior solution over the set  $\alpha \in [0, 1]$ .*

**Proof.** Substituting the functional forms, we have

$$w(\alpha) = \underbrace{\frac{1 + \lambda \left[\frac{\lambda}{1-\alpha}\right]^{\frac{\gamma}{1-\gamma}}}{\left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma}}}_{=A(\alpha)} K^{\gamma} + \underbrace{\phi [\alpha\phi\delta]^{\frac{\delta}{1-\delta}} - [\alpha\phi\delta]^{\frac{1}{1-\delta}}}_{=B(\alpha)}$$

We proceed in two steps. We first show that  $A(\alpha)$  is decreasing concave with  $A'(0) = 0$  and, second, that  $B(\alpha)$  is increasing concave in  $\alpha$  with  $B'(1) = 0$ . The definition of  $A(\alpha)$  implies:

$$A'(\alpha) = -K^{\gamma} \frac{\frac{\gamma}{1-\gamma} \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \frac{\alpha}{1-\alpha}}{\left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}} \implies A'(\alpha) < 0, A'(0) = 0 \text{ and}$$

$$A''(\alpha) = -K^{\gamma} \frac{\gamma \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \left(\alpha\gamma + (1-\gamma) + [(1-\gamma) - \alpha\gamma] \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)}{(1-\gamma)^2 (1-\alpha)^2 \left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+2}} < 0$$

$$\begin{aligned}
B(a) &= \phi [\phi\delta]^{\frac{\delta}{1-\delta}} \alpha^{\frac{\delta}{1-\delta}} (1 - \alpha\delta) \implies \\
B'(a) &= \xi \frac{\delta}{1-\delta} \alpha^{\frac{-1+2\delta}{1-\delta}} (1 - \alpha) \implies B'(\alpha) > 0, B'(1) = 0 \text{ and} \\
B''(\alpha) &= \psi \left( \frac{-1 + 2\delta}{1 - \delta} \alpha^{\frac{-1+2\delta}{1-\delta}-1} (1 - \alpha) - \alpha^{\frac{-1+2\delta}{1-\delta}} \right) < 0
\end{aligned}$$

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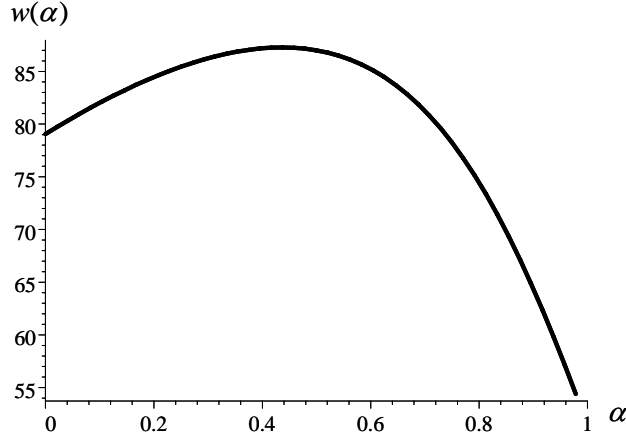


Figure 1: Welfare in Autarky

In figure 1, we represent an example with the following parameter values;  $K = 5000, \gamma = 0.5, \phi = 8, \lambda = 0.5$  and  $\delta = 0.5$ . It yields  $h_2^* = [\alpha 4]^2$  and  $k_2^* = 5000 \left( 1 + \left[ \frac{0.5}{1-\alpha} \right]^2 \right)$ . The proposition verifies that with all other allowed parameter values, we would obtain a similar shaped welfare function. In the example evaluating the first order condition at zero and solving for  $\alpha$  yields  $\alpha^* = 0.44$ . The figure shows how in a world burdened with holdup problems the institutional setup may play a significant role in shaping production and welfare. For parsimony, we introduced in the model a strong restriction by ignoring the complementarity between physical and human capital. Obviously, adding such a complementarity would only enhance the marginal effects at the extreme points  $\alpha = 0$  and  $\alpha = 1$  where either one or the other party has the entire bargaining power. Thus again, we would obtain an interior solution (even though without additional restrictions the objective function may in fact not be concave).

## 5 Competition of systems with no capture

In this section, we introduce a second country that is assumed perfectly symmetrical to the first. Thus, we have two countries denoted by  $i = A, B$ . Since we are only considering a static environment, we also assume that the countries have the same initial capital stock. Regarding mobility, we assume that capital is perfectly mobile while labor is perfectly immobile. Obviously, this is an extreme requirement, particularly in light of the increased labor migrations observed in the last decades, especially in the European context. Nevertheless, we introduce the assumption to capture the idea that it is more costly for labor than capital to move to across countries because of language, religion and other social barriers. We initially assume that the political system is free from capture in order to fully focus on the impact of introducing a competition of systems in an environment characterized by trade. The competition of systems should be understood as a non-cooperative contest in the legal and institutional design underlying labor relations. Specifically, the countries are assumed to set their  $\alpha^A, i = A, B$  simultaneously in a non-cooperative fashion to maximize their respective objective functions resulting from the political process.

### 5.1 The market equilibrium with trade

In the context of our model, the countries can only trade physical capital against the consumption good. Taking the institutional setup as given, i.e. for a given  $\alpha^A$  and  $\alpha^B$ , competition in the capital market leads to an allocation of capital characterized by four equations:

$$\left\{ \begin{array}{l} (1 - \alpha^A) f_k(k_2^A, h_2^A(\alpha^A)) = g_k(k_1^A) \\ (1 - \alpha^B) f_k(k_2^B, h_2^B(\alpha^B)) = g_k(k_1^A) \\ g_k(k_1^B) = g_k(k_1^A) \\ 2K = k_1^A + k_2^A + k_1^B + k_2^B \end{array} \right. \quad (11)$$

The first two equations simply state that in each country, the investors' marginal product of capital must be equalized across the two sectors. Observe that we dropped the rental rate of capital which obviously equalizes the marginal products of capital (i.e.  $r = g_k(k_j^B), j = 1, 2$ ). The third equation requires the rental rate of capital to be equalized across countries. Finally, the last equality reflects capital market clearing. Given that labor is not mobile, workers' decisions with respect to their investments in human capital

are unaffected by the possibility of trade, and solely determined by the local institutional framework.

Using the capital market clearing condition and noting that the third equation in the above system implies  $k_1^A = k_1^B$ , we find that the equation system reduces to a two by two system. Solving for the capital market equilibrium, we obtain for country  $A$ :

$$\begin{cases} k_1^A(\alpha^A, \alpha^B) = \frac{2 \left[ \frac{\lambda}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}}}{1 + \left[ \frac{1-\alpha^B}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}} + 2 \left[ \frac{\lambda}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}}} K \\ k_2^A(\alpha^A, \alpha^B) = \frac{2}{1 + \left[ \frac{1-\alpha^B}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}} + 2 \left[ \frac{\lambda}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}}} K \end{cases} \quad (12)$$

A symmetrical result obtains for country  $B$ .

## 5.2 Institutional design with systems competition

In this section, we consider the following scenario. We assume that initially each country lived in autarky. Thus, its institutional setup obtains from the analysis in 4.3 and yields  $\alpha^i = \alpha^*$ . We then remove the barrier to trade and assume that the countries compete with one another in the institutional design. As a result, the countries play a prisoners' dilemma game to determine the respective  $\alpha^i$ . Just as in the autarky case, we assume that the political process of each country is efficient, maximizing the overall welfare of their respective constituencies. At that stage each country maximizes its own welfare taking the institutional environment of the other country as given. Thus, in the case of country  $A$ , the political process is assumed to maximize  $W(\alpha^A, \alpha^B)$ , i.e.:

$$\begin{aligned} \max_{\alpha^A} g \left[ k_1^A(\alpha^A, \alpha^B) \right] + \left[ f(k_2^A(\alpha^A, \alpha^B), h_2^*(\alpha^A)) - h_2^*(\alpha^A) \right] \\ + g_k(k_1^A(\alpha^A, \alpha^B)) (K - k_1^A(\alpha^A, \alpha^B) - k_2^A(\alpha^A, \alpha^B)) \end{aligned} \quad (13)$$

Two remarks are in order. First, note that  $g_k(k_1^A(\alpha^A, \alpha^B))$  stands for the rental rate of capital determined through the market equilibrium with trade. Second, unlike in the case of autarky market equilibrium does not imply that  $K - k_1^A - k_2^A = 0$  since a country may either become a net importer or exporter of capital. The latter point is of particular importance. It means that the institutional designer will be aware that they (and the competing country) can adjust the institutional framework to affect the capital allocation.

**Proposition 2**  $(\alpha^A, \alpha^B) = (\alpha^*, \alpha^*)$  is not a Nash equilibrium for the game with no capture and with systems competition.

**Proof.** To prove the claim, we simply show that  $W_{\alpha^A}(\alpha^*, \alpha^*) < 0$ . Substitution of the respective function implies:

$$W = \frac{2^\gamma \left(1 + \lambda \left[\frac{\lambda}{1-\alpha^A}\right]^{\frac{\gamma}{1-\gamma}}\right)}{\underbrace{\left(1 + \left[\frac{1-\alpha^B}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}} + 2 \left[\frac{\lambda}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}}\right)^\gamma}_{=C(\alpha^A, \alpha^B)}} K^\gamma + \underbrace{\phi \left[\alpha^A \phi \delta\right]^{\frac{\delta}{1-\delta}} - \left[\alpha^A \phi \delta\right]^{\frac{1}{1-\delta}}}_{=B(\alpha^A)} \quad (14)$$

The last two terms, which capture the effect of the institutional framework on human capital, are the same as in the autarky case. We know from the proof of proposition 1 that  $B(\alpha^A)$  is increasing. To verify the claim, all we need to show is that  $C_\alpha(\alpha^*, \alpha^*) < A_a(\alpha^*)$ . From the above definition, we have

$$C_{\alpha^A}(\alpha^A, \alpha^B) = 2^\gamma K^\gamma \frac{\frac{1}{1-\alpha^A} \frac{\gamma}{1-\gamma} \left\{ \lambda \left[\frac{\lambda}{1-\alpha^A}\right]^{\frac{\gamma}{1-\gamma}} - \left( \left[\frac{1-\alpha^B}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}} + 2 \left[\frac{\lambda}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}} \right) \right\}}{\left(1 + \left[\frac{1-\alpha^B}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}} + 2 \left[\frac{\lambda}{1-\alpha^A}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}}$$

Thus, setting  $\alpha^A = \alpha^B = \alpha$ , we have

$$C_{\alpha^A}(\alpha, \alpha) = K^\gamma \frac{\gamma}{1-\gamma} \frac{\left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \left(1 - \frac{2}{1-\alpha}\right)}{2 \left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}}$$

Taking  $A_a(\alpha)$  from the proof of proposition 1, we see that  $C_{\alpha^A}(\alpha, \alpha) < A_a(\alpha)$  since

$$\begin{aligned} \frac{\gamma}{1-\gamma} \frac{\left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \left(1 - \frac{2}{1-\alpha}\right)}{2 \left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}} &< - \frac{\frac{\gamma}{1-\gamma} \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \frac{\alpha}{1-\alpha}}{\left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}} \\ \Leftrightarrow \frac{\left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \left(1 - \frac{2}{1-\alpha}\right)}{2} &< - \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \frac{\alpha}{1-\alpha} \\ \Leftrightarrow \frac{1}{2} &< - \frac{\alpha}{1-\alpha} + \frac{1}{1-\alpha} = 1 \end{aligned}$$

proving the claim. ■

The argument follows the typical prisoners' dilemma logic. Supposing that country  $B$  were to keep its institutional framework as in autarky, i.e.



set  $\alpha^B = \alpha^*$ , country  $A$  would find it advantageous to reduce the bargaining power of its own labor. The heuristic is as follows; holding  $k_1^A + k_2^A = K$  country  $A$  would face the same costs and benefits as in autarky. However in addition it is able to attract capital from country  $B$ . Ignoring the latter effect, we know from the autarky result that at  $(\alpha^A, \alpha^B) = (\alpha^*, \alpha^*)$  all the other marginal effects must add up to zero. However, since attracting additional capital obviously raises overall welfare, it becomes advantageous for country  $A$  to adjust its institutional framework to attract capital. To do so the country reduces  $\alpha^A$  increasing the demand of capital in its sector 2.

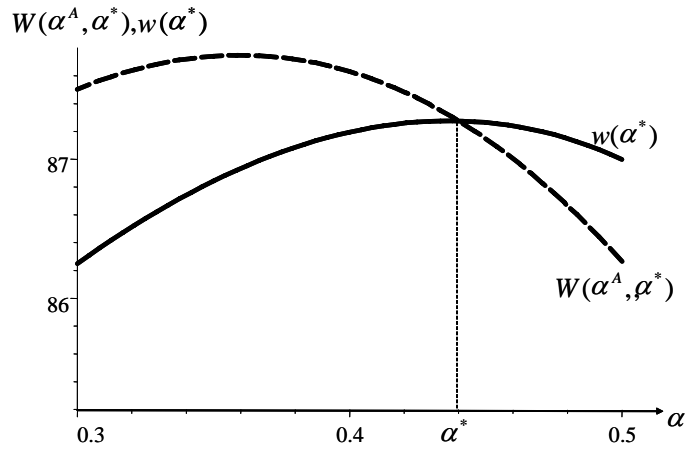


Figure 2: Institutional competition with no capture

Figure 2 provides a geometrical representation of the foregoing result for the same parameters as figure 1. The solid curve yields the welfare function in autarky. The dashed curve yields country  $A$ 's welfare function under the assumption that  $\alpha^B = \alpha^*$ . By reducing the bargaining power of labor, the country would reduce its investments in human capital and raise the interest rate. The latter would attract capital and improve the allocation of capital across the two sectors.

Of course, in a prisoners' dilemma game, the dashed curve is only a fleeting illusion. Due to the perfect symmetry between the countries,  $B$  has a the exact same incentive to reduce its bargaining power. Intuitively, we would expect from the foregoing that the Nash equilibrium resulting from systems competition leads to less bargaining power. It is easily verified that the intuition is correct if we limit attention to symmetric equilibria.

**Proposition 3** *Let  $\alpha^{**}$  denote a symmetric Nash equilibrium for the case of no capture and under systems competition, then  $\alpha^{**} < \alpha^*$ .*

**Proof.** At the symmetric Nash equilibrium, we have

$$\begin{aligned} C_\alpha(\alpha^{**}, \alpha^{**}) + B_\alpha(\alpha^{**}) &= 0 \\ \implies A_\alpha(\alpha^{**}) + B_\alpha(\alpha^{**}) &> 0 \end{aligned}$$

■

The economic interpretation is that as each country tries to attract capital, it will reduce  $\alpha$ . Consequently, at the equilibrium level, the bargaining power of labor reduces to  $\alpha^{**} < \alpha^*$ . In the case of the parameters used in the foregoing figures the optimal  $\alpha$  characterizing the institutional setup drops from  $\alpha^* = 0.44$  to  $\alpha^{**} = 0.35$ .

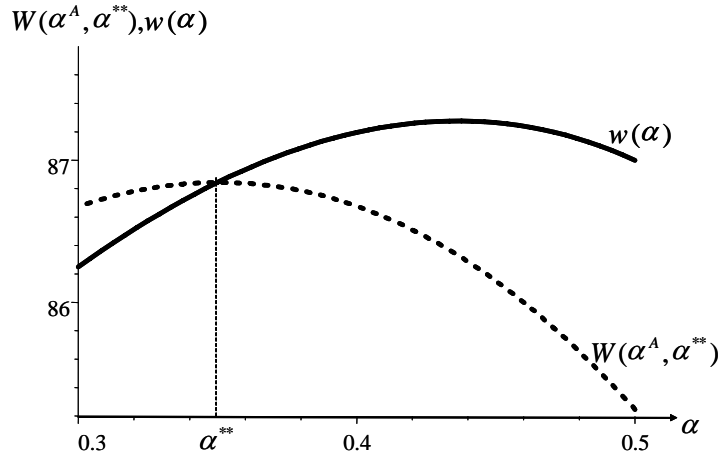


Figure 3: Welfare loss with system competition

Thus, the model predicts that under systems competition between two countries that have an efficient political system free from capture, the institutional design of the labor market would suffer; overall welfare would be reduced and, more especially, the immobile factor would be losing. The central argument leading to the result is reminiscent of the logic described by Sinn (2003). If institutions underlying the labor market have been designed to maximize welfare and counter some of the weaknesses of the perfectly competitive system than *the failures that originally caused the government to take action .... show up again at the higher level of government competition.*

The result suggests that if countries, with a well functioning political system, decide to switch from an autarkic environment to a free trade situation, they might be better off negotiating to find the cooperative solution. Thus, instead of a competition of systems, this tends to favor a politically

negotiated “harmonization” approach.<sup>14</sup> In our model, it would mean that the countries agree to implement  $\alpha^*$ .<sup>15</sup> Of course, the conclusion has been derived under the assumption that the political system performs well enough to avoid capture by either of the interested parties. In the remaining, we consider the polar case.

## 6 Capture by labor

In this section, we consider one of two possible cases; the situation where labor representatives dominate the political process at the institutional design stage. Specifically, we assume that through lobbying, strikes or other activities of unions, the institutional design maximizes the rent obtained by labor in sector 2. Contemporary economic history shows periods of capture by capital as well as by labor. As discussed in the introduction, the symmetric case where the institutional design stage has been captured by capital could also be analyzed. However, in our model systems competition could not possibly introduce any beneficial effect since its impact, if any, would be to further increase the bargaining power of firms. Slightly adjusting the model, for example by distinguishing between unskilled and skilled labor, and introducing mobility in the latter case, would add a countervailing effect reinserting the beneficial impact of systems competition. The coexistence of three factors (capital, skilled labor and unskilled labor) creates technical complications, but the underlying intuition should be the same.

### 6.1 Autarky

In our framework, the workers receive the share  $\alpha$  of the appropriable quasi-rent in sector 2. In addition, they incur the cost of investment in human capital. Given the foregoing assumption, the institutional setup is designed to maximize the resulting utility

$$\begin{aligned} u &= \alpha f(k_2^*(\alpha), h_2^*(\alpha)) - h_2^*(\alpha) \\ &= \alpha \frac{K^\gamma}{\left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^\gamma} + (1 - \delta) \delta^{\frac{\delta}{1-\delta}} \phi^{\frac{1}{1-\delta}} \alpha^{\frac{1}{1-\delta}} \end{aligned} \quad (15)$$

---

<sup>14</sup>A final conclusion would require, however, to model the negotiation game between countries. Intuitively though, assuming a Rubinstein type bargaining one would expect the efficient solution to emerge.

<sup>15</sup>Note that embedding the foregoing game in a repeated framework would most likely not yield  $\alpha^*$  because politicians are short-lived. As in the foregoing footnote, a complete analysis would require to model the political process between the two countries.

It is easily seen that this function is not necessarily concave because the second term is increasing convex in  $\alpha$  throughout. Nevertheless, maximizing  $u$  with respect to  $\alpha$  yields an interior solution. To see this, observe that taking the derivative of (15) with respect to the bargaining power,

$$u_\alpha = K^\gamma \frac{1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}} \left(1 - \frac{\alpha}{1-\alpha} \frac{\gamma}{1-\gamma}\right)}{\left(1 + \left[\frac{\lambda}{1-\alpha}\right]^{\frac{1}{1-\gamma}}\right)^{\gamma+1}} + \delta^{\frac{\delta}{1-\delta}} \phi^{\frac{1}{1-\delta}} \alpha^{\frac{\delta}{1-\delta}}, \quad (16)$$

we find  $u_\alpha(0) > 0$  and  $u_\alpha(1) = -\infty$ . Figure 4 yields the shape of  $u(\alpha)$  for the parameter values used in the foregoing sections. Defining with  $\alpha_L^*$  labor's preferred level of bargaining power, we find  $\alpha_L^* = 0.69$  for the example.

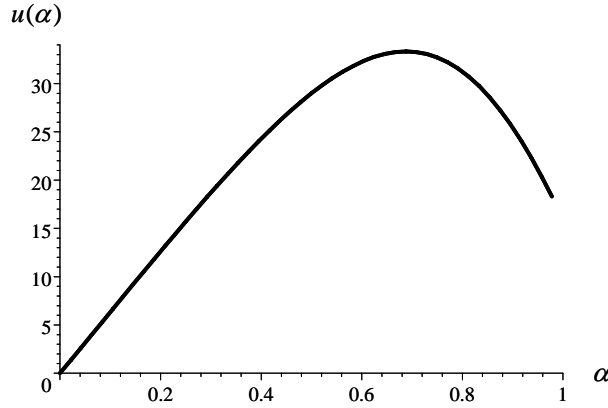


Figure 4: Labor's utility in the case fo capture

As one would intuitively expect, we observe that labor finds it optimal to expand its bargaining power compared to the welfare maximizing  $\alpha^*$ . Together with figure 1, we see that in our numerical example capture by labor in the autarky framework implies a reduction in the overall welfare of about 10%.

## 6.2 Systems competition with capture

We conclude by examining the impact of institutional competition. To do so, we again focus on the case of perfectly identical countries.

We assume that in both countries labor has captured the institutional design. We denote by  $U(\alpha^A, \alpha^B)$  the objective function of the labor representative in country  $A$ . Using the market allocation of capital in the case

of trade, we find for the objective function determining the allocation of bargaining power:

$$U(\alpha^A, \alpha^B) = \alpha \frac{2}{1 + \left[ \frac{1-\alpha^B}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}} + 2 \left[ \frac{\lambda}{1-\alpha^A} \right]^{\frac{1}{1-\gamma}}} K + (1-\delta) \delta^{\frac{\delta}{1-\delta}} \phi^{\frac{1}{1-\delta}} \alpha^{\frac{1}{1-\delta}} \quad (17)$$

Applying again the same parameters as in the foregoing figures yields:

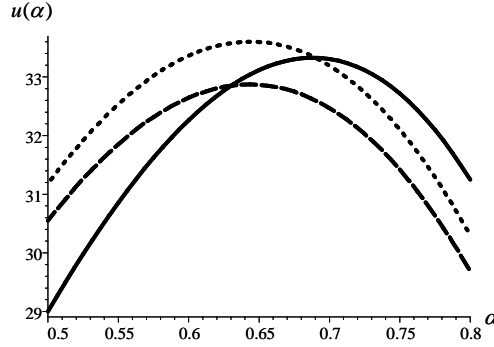


Figure 5: Systems competition with capture by labor

The full line is  $u(\alpha)$ . The dotted line is the objective function  $U(\alpha^A, \alpha_L^*)$ . Just as in the case with no capture, the prisoners' dilemma suggests to the decision maker that he can do better than  $\alpha_L^*$  by reducing the bargaining power of labor and attracting capital into the country. But obviously, in equilibrium this is not possible. At the Nash equilibrium, both countries have lowered their bargaining power. In the numerical example, it  $U_{\alpha^A}(\alpha_L^{**}, \alpha_L^{**}) = 0$  yields  $\alpha_L^{**} = 0.63 < 0.69 = \alpha_L^*$ . However, the competition, which seems undesirable from the point of view of the decision maker, turns out to be a blessing from the point of view of society as a whole. Specifically in the numerical example it allows welfare to increase by 5%.

## 7 Conclusion

This paper studies the effects of systems competition when the regulator may use institutional design for two different purposes: to reduce the inefficiencies of organizations and to attract some of the mobile factors. We show that the two objectives are not well aligned. In particular, due to the prisoners' dilemma the countries cannot succeed in attracting the mobile factor. In this context, the situation of the political process is of first importance. If

the political process is efficient, systems competition undermine the institutional design. In contrast, with a capture by rent seekers – especially by the immobile factor – we find that systems competition could improve economic efficiency.

In our model, we assume incomplete contracts introducing two separate holdup problems. The legal and institutional design allocates bargaining power in order to balance the ensuing inefficiencies. Increasing the bargaining power of labor is useful because it guarantees that labor will have an incentive to invest in human capital. On the other hand, it reduces the firm’s incentive to invest in physical capital. While our choice to exploit these holdup problems was useful, it is not the only way to create a link between economic efficiency and the legal and institutional design. For instance, one could analyze a situation as in Bental and Demougin (2006) substituting for the holdup in human capital a moral hazard problem thereby affecting the trade-offs. More generally, any of the theories justifying the existence of firms based on market failures should also introduce a possibility of a legal and institutional design problem.

We conjecture that all these design problems would lead to similar results. Thus, altogether, we concur with Sinn (2003) that systems competition is costly provided that the *hand of the state is benevolent*. At the other extreme however, when the state is better described as a *grabbing hand*, systems competition may provide a powerful disciplining device, thereby forcing the underlying political decision mechanism to increase welfare. Whether the hand of the states is best described as benevolent or grabbing is an empirical issue, going beyond the scope of this paper.

In addition, our paper suggests a mitigated interpretation of empirical results concerning the comparison of legal and institutional systems in terms of economic performance. A suggestive, yet potentially misleading, interpretation would be that countries which have the best economic results should be copied. However, in our analysis this conclusion is obviously erroneous. For instance, considering the numerical example for the case of a well functioning political system, assume the following situation; country  $A$  keeps its legal and institutional environment as in autarky, i.e.  $\alpha = 0.44$ , while country  $B$  plays the non-cooperative strategy  $\alpha = 0.35$ . As a result, country  $A$  would become a net exporter of capital, loosing almost 10% of its capital base (440.5) while, on the other hand, country  $B$  would increase its capital by the same quantity. Altogether, the capital labor ratio in the  $B$  economy would dwarf that of country  $A$  by 20%. With respect to welfare, country  $B$  would outperform country  $A$  by significant amount ( $W^A = 83.7 < 90.2 = W^B$ ).<sup>16</sup>

<sup>16</sup>Similar results hold for output with  $Y^A = 87$  and  $Y^B = 92$ .

Despite these numbers, we should not conclude that country  $B$  is doing the right thing. Indeed, if country  $A$  were to imitate country  $B$  the overall economy would converge to the suboptimal Nash equilibrium presented in the paper (i.e.  $W^A = W^B = 86.2$ ). In contrast, if country  $B$  were to imitate country  $A$  the overall welfare would be raised ( $W^A = W^B = 88.5$ ).

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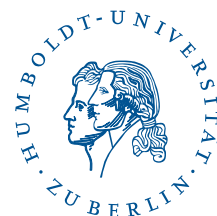
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This research was supported by the Deutsche  
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