ECONOMIC INTEGRATION AND CORRUPTION[¤]

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Abstract

We study the link between corruption and economic integration. Integration is modeled by a common regulation for public procurement. We show that integration resolves a terms-of-trade-driven prisoner's dilemma and will always take place in the absence of corruption. Corruption may destroy the incentives for integration. If the propensities to corruption are too di®erent, the more honest country, which bene¯ts less from integration, will not be willing to join the union. This di®erence in corruption propensities can be o®set by a di®erence in e±ciency. We also show that integration has the positive e®ect of reducing corruption.

Keywords: Corruption, procurement, economic integration

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1 Introduction

On the 28th of September 2000, the Danes rejected the Euro in a referendum (53% No, 47% Yes). Given Denmark's monetary history of an 18-year ¯xed-rate currency policy (tied to the Deutsch Mark and, since 1999, to the Euro), it is hard to believe that the Danes feared the Euro. As Detnews.com on October 1st 2000 wrote: \........the real question was not the money, it was the criterion and speed of European Integration". Indeed, a national survey held after the referendum revealed that 37% of the no-voters favor less integration while 23% have a lack of con¯dence in the European institutions; 33% fear for the Danish identity (c.f. Bering (2000)).

Denmark's behavior shows that popular support for integration is not only a function of economic calculations. Denmark has bene¯tted from being a member of the European Union (EU). This is even believed by the Danish people themselves.[1] Popular support for integration also depends on the interplay between national and supranational politics. The Danish value their political system, they have a well-functioning welfare state (social expenditure in 1995 exceeded 34% of the GDP) where corruption is basically inexistent. Therefore, the opportunity cost of the Danish to transfer sovereignty to Europe is high.

This paper formalizes the idea that economic integration is more attractive for countries with internal problems and little trust in their national government than for well-functioning countries. We will use corruption to model these internal problems. Corruption is highly correlated with other \bad country" variables, such as minimal accountability of political parties, a badly functioning juridical system etc. Moreover, recent empirical studies con¯rm the negative e®ects of corruption, especially on growth: corruption reduces the amount of private investment (Mauro (1995)), the quality of public investment (Tanzi and Davoodi (1997)) and the investment in human

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[1]In (Eurobarameter) public opinion surveys of the European Commision the Danish consistently belong to those populations that give the most positive response to the question whether or not they believe their country to have bene¯tted from being a member of the EU on average. In the survey which was collected at the same time as the referendum on the Euro was held (Eurobarometer 54), 65% of the Danish believe to have bene¯tted from EU membership while 23% believe not to have bene¯tted. Only Greece, Ireland, Luxemburg and Portugal gave a more positive response to the bene¯t question. The percentage of people who believe their country bene¯ts from the EU is 72% in Greece, 86% in Ireland, 70% in Luxembourg and 69% in Portugal. 14% in Greece, 6% in Ireland, 16% in Luxembourg and 14% in Portugal believe that their country does not bene¯t from EU membership.

capital (Mauro (1998)).

For the sake of tractability we will study a two country model and only allow for corruption in public procurement.[2] Public procurement is an important part of a country's economic activities (between 10%¡20% of GDP in most industrial countries)[3] and is a sector very prone to corruption: usually the sums of money involved are very big and the government is often the only buyer; asymmetric information makes favoritism di±cult to detect.

In our model, the citizens delegate to the government agent the responsibility to implement public procurement contracts. The commodity or public project can either be bought from a local ¯rm at a ¯xed price (sole-source procurement) or it can be purchased through international competitive bidding. On the one hand, the competitive bidding decreases the expected purchase cost. On the other hand, it involves a ¯xed organizational cost that is private information of the government agent. Competitive bidding is optimal, if its organizational cost is low compared to the size of the project. Fixed price purchase is otherwise optimal.[4] However, our government agent is self-interested and therefore corruptible. She might misrepresent these organizational costs and favor a local producer in exchange for a bribe if this maximizes her revenue. The citizens, i.e. the voters, decide the discretion of the government; they use the political system to control the government through the determination of a threshold (the size of the public project above which the government is obliged to organize international competitive bidding). The voters are both taxpayers and shareholders of the domestic ¯rm. They are thus concerned both with taxes and with pro¯t of the domestic ¯rm. They pay the same taxes but di®er in the amount of shares of the domestic ¯rm they own. In this context, the median voter approach is valid and his choice is implemented. Under this set of assumptions we show, that the higher a country's propensity for corruption, the lower the discretion granted to government agents. This is intuitive, since the

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[2]Rose-Ackerman's (1975) seminal paper on corruption also concentrated on public procurement.

[3]The cost of public projects administrated by the European Union is around 720 000 millons of Euros every year, which corresponds to 11.5% of the GDP of the member states in 1994 and is equivalent to the economy of Spain, Danemark and Belgium together.

[4]Various factors may justify choosing sole source procurement instead of competitive procurement. The administrative cost is lower, sole source procurement is faster and there might be positive strategic e®ects, e.g. repeated sole source procurement might reduce moral hazard problems due to the threat of awarding future projects to foreign ¯rms. For more details see Marshall et al. (1994) who moreover provide empirical evidence on the use of sole source procurement in the private sector.

cost of foregoing the private information of the government is lower for a more corrupt country.

If countries decide to form a union, they adopt a common legislation on procurement. In the present context, the median voters of the countries negotiate a common threshold above which each domestic government is obliged to organize a competitive bidding. This approach mimics the existing legislation on public procurement in the European Union: the member countries are obliged to use an international contest if the size of the public project exceeds the following limits: 200.000 Euros for service contracts and 5 million Euros for public works (for more details see the Green Book of Public Contracting in the European Union).

In our model popular support for the union depends on both economic calculations and the interplay between national and supranational politics. On the one hand, the economic union helps to escape a terms of trade-driven prisoner's dilemma. As in the standard literature, domestic governments only care about the pro¯t of the national ¯rms. This leads to protectionism imposing a negative externality on the other countries. An economic union internalizes this externality. On the other hand, the use of supranational policies to avoid protectionism also reduces the discretion of domestic governments; the common threshold is lower than all individual thresholds. Lower discretion leaves less room for corruption, hence is valued more by countries that have little trust in their national government.

The above argument summarizes the main idea of the paper and also applies to more general setups. Allowing for corruption in the private sector or political corruption would lead to similar results. The union will favor competition (e.g. by limiting tari®s or by reducing government subsidies to national ¯rms), thereby reducing the stake for corruption. This is all that is required for our model to work, and is a feature not restricted to public procurement. Therefore, our simpli¯cation to consider only public procurement does not seem very restrictive.

If there is no corruption, countries will always form a union in our model, since the union helps to solve the terms of trade driven prisoner's dilemma. However, a di®erence in corruption propensities can hinder union formation. The more corrupt country is more eager to establish a low common level of discretion, since it is less costly for this country to ignore the private

information of its government and its gains from trade are larger. In general, the new threshold of discretion is more binding for the less corrupt country, which is now obliged to use competitive procurement much more often than without the union. Therefore, the less corrupt country will not join the union if the difference in corruption propensities between the two countries is too big. However, this difference in corruption can be offset by a difference in efficiency, if the less corrupt country has a technological advantage and therefore benefits more from trade.

Our theoretical model has several testable implications. (i) it suggests that corruption is higher in countries where domestic firms are sheltered from foreign competition. (ii) more corrupt countries will be more in favor of integration than less corrupt countries. (iii) the willingness to accept new members into a union is decreasing in the level of corruption of the new member. Implication (i) has already been tested and confirmed by Ades and Di Tella (1999). Unfortunately, the lack of sufficient data makes a serious econometric study of the other two implications impossible. In section 2 we will present some (anecdotal) evidence, as well as some data that is consistent with our model's predictions.

Our model on corruption is related to the literature on favoritism in public procurement and the literature on the formation of economic unions and preferential trade agreements. The first paper explaining favoritism in public procurement is McAfee and McMillan (1989) using the Myerson (1981) theory of optimal auctions. This theory shows that discrimination in favor of the more disadvantaged bidders can promote competition. McAfee and McMillan (1989) argue that if the domestic firms are less efficient, this theory directly leads to domestic favoritism. Branco (1994) objected to this argument since it would imply some cases of favoritism towards less efficient foreign firms which are not observed empirically. In his model a utilitarian government cares not only about the procurement price but also about the profit of the domestic firm. The resulting optimal procurement mechanism leads to favoritism towards domestic firms. Laffont and Tirole (1991) relate favoritism with collusion. In their model the public project is characterized by its quality and price. The principal delegates the control of quality to the agent. The agent can collude with one firm and misrepresent his information about the quality in favor of this firm. If we assume

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that collusion with the domestic ¯rm is most likely, this implies favoritism towards the domestic ¯rm. Using a similar model, Vagstad (1995) introduces a superprincipal (e.g. an economic union) into a context where governments care about domestic pro¯ts, as in Branco (1994). As in our model, the role of the superprincipal is to reduce favoritism in order to internalize the trade externalities. The optimal policy of the superprincipal is to reduce the discretion of the domestic government by lowering the weight of the private information of governments in the procurement process. The contribution of our paper to this literature is to endogenize the existence of this superprincipal.

Our paper shares with the literature on the formation of an economic union that the union helps to escape a terms-of-trade-driven prisoner's dilemma.[5] This paper shows that technological di®erences on their own cannot destroy the incentives to form a union. However, di®erences in corruption propensities may do so. To our knowledge, this negative aspect of corruption has not been analyzed before. But, if a union is formed among potentially corrupt countries, the union does not only increase trade but also helps to reduce corruption, although the reasons why the union is formed are purely economical in our model. In contrast, some papers (e.g. Grossman and Helpman (1995), Krishna (1997), Maggi and Rodriguez-Clare (1998)) also consider political motives for the formation of preferential trade agreements. In those models the political pressure is exerted by special interest groups that lobby for protection, i.e. try to avoid the country opening up to trade. In those models trade agreements provide a way for the government to credibly distance itself from the lobbies. This reduces the payments from the lobbies to the government, which is similar to our model in which the union reduces bribe payments. Although we use the term corruption, our model captures rent-seeking activities in general.

The remainder of the paper is organized as follows: Section 2 presents some evidence that is consistent with our model predictions. In Section 3 the general model is described and solved for the case of homogeneous ¯rms, i.e. both countries have access to the same production tech-nology. This section isolates the e®ects on the desirability of an economic union due to di®erent

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[5]For a nice literature review on preferential trade agreements see Bhagwati et al. (1998).

propensities for corruption. Section 4 discusses the case of heterogeneous ¯rms and shows how a di®erence in honesty can be compensated by a di®erence in e±ciency making the formation of a union more feasible. Section 5 concludes. All proofs are relegated to a technical appendix.

2 Some motivating evidence

In this section we will give some evidence which is consistent with our model's predictions that more corrupt countries are more favorable towards integration, but are less acceptable as potential new members of an existing economic union. The available data is poor and the evidence is far from conclusive. In particular, we do not claim causality. We just show that at least the little data that is available (as well as casual empiricism) are not inconsistent with our model predictions.

Today, cross-country subjective measures of corruption exist for many countries. We use the Transparency International Corruption Perceptions Indices (CPI) as a measure for the degree of corruption. The index ranges between 10 (clean) and 0 (highly corrupt).[6] But there is very little data on the desirability of integration. We were only able to ¯nd some data on the European Union. Our data source is the Standard Eurobarameter surveys. We will look at the desired speed of integration as a proxy of each country's support for the European Union and the support for enlargement question. For more details see Appendix B.2.

Figure 1 shows the corruption perception index and the national means of desired speed of integration for the member countries of the European Union (except Luxembourg due to the lack of CPI data), averaged over the period 1995-1997. The underlying data is given in Appendix B.1 and B.2.1. Figure 1 suggests that there seems to be a strong negative linear relationship between the desired rhythm of integration and the index of corruption.[7] Since a higher CPI implies less

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[6]CPI is based on di®erent surveys that measure corruption within countries by gathering data about the subjective perception of corruption within the country itself (for details see Lambsdor® (1999)). The degree of corruption practiced by nationals outside the country is not included in the CPI. CPI is therefore the correct index for our purpose since we exclude international corruption by assumption.

[7]This linear relationship has been con¯rmed in various regressions. In the working paper version of the present article (Ganuza and Hauk (2001)) we ran OLS regressions using panel data for 1995-1997 controlling for log GDP per capita and transfers to / from the European Union. Sánchez-Cuenca (2000) runs an OLS regression for the year 1995 controlling for the level of social expenditure and GDP per capita. In all those regressions the corruption perception index as a explanatory variable for the level of ProEuropeanness is highly signi¯cant.

corruption, this relationship is consistent with the prediction of our theory.

Include Figure 1 around here

Figure 2 shows the corruption perception index of potential new members of the European Union and the degree of acceptability of these potential new entrants from the point of view of the current member, averaged over the period 1996-1999. The degree of acceptability is constructed as the di®erence between the percentage of people in the EU who favor including the new member and those who are against the proposed enlargement. The underlying data can be found in Appendix B.2.2

Include Figure 2 around here

Figure 2 suggests a positive linear relationship between the corruption perception index and acceptability as new members. High corruption goes hand in hand with little acceptability.[8]

Another important aspect is the popular support for entry by the potential new entrants. While there is no data available on this issue, The Economist on May 13th 2000 dedicated an article to this question with the following title that speaks for itself: \Central Europe wants to join the EU..........but the Swiss still have doubts." As can be seen in Appendix B.3 Switzerland is by far less prone to corruption than countries in Central Europe.

Anecdotal evidence also exists for the Mercosur (Argentina, Brasil, Paraguay and Uruguay). Chile was a potential member of Mercosur but did not join to keep its discretion over trade policies with third countries. The Corruption Perception Index reveals that Chile has much

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[8]In Figure 2 some of the data available in the Standard Eurobarometers is lost since only EU averages are considered; but for the support of enlargement question data on each EU country is available. This data is interesting, since our model implies that the bigger the corruption gap between two countries, the more di±cult the union formation. Therefore, the bigger the corruption gap between a given EU member and a potential new entrant, the less acceptable should the potential new entrant be. In our working paper version (Ganuza and Hauk (2001)) we ran a tentative cross-country regression of the share of the population in country x that favors admitting country y into the EU on the corruption gap between country x and country y for the year 1999. As country x we used the EU countries and as country y the potential new members of Figure 2. The result is consistent with our theory. The bigger the corruption gap, the smaller the proportion of people willing to admit the potential new entrant. The coe±cient on the corruption gap is ¡2:2370 with a t-statistic of ¡2:862 and a p-value of 0:004.

fewer corruption problems than the Mercosur countries.[9] A rough look at the data suggests that corruption levels and corruption gaps do matter for a union formation.

3 The model

We set up a simple two-country model to study the implication of corruption for the desirability of an economic union. The countries are called A and B. There is one single firm in each country. The citizens (voters) delegate to their domestic government the responsibility to implement procurement contracts, which have to be fully financed by collecting taxes t from domestic residents. The size of the procurement project $q \in \left[\underline{q}; \overline{q} \right]$ is determined by a random draw from the distribution function $g(q)$. Firm $i \in (A; B)$'s total cost of contracting the project is $c_i(q) = c_i q$, where $c_i \in \{\underline{c}; \overline{c}\}$ is the marginal cost. Firm i has low marginal cost $\underline{c}$ with probability $\circledR_i$ and high marginal cost $\overline{c}$ with probability $1 - \circledR_i$. The price of the project depends on its cost and the procurement process used by the government. The government can either buy the project at the high-cost price $\overline{c}q$ from the domestic firm or sell the project on the international market by organizing a second-price auction. Competitive bidding decreases the expected purchase cost. However, it involves a fixed organizational cost k; which is a random variable. This organizational cost captures administrative costs, costs for publicity and costly delays. The exact organizational cost depends on the type of the project: for example, delays are more costly, the more urgent is the project. As in Auriol (1998) and Marshall et al. (1994) we assume that the exact cost of organizing the auction is private information of the domestic government and will be low ($\underline{k}$) with probability $\pm$ and high ($\overline{k}$) with probability $1 - \pm$. We normalize $\underline{q} = 0$ and $\underline{k} = 0$; we refer to $\overline{k} = k$. This normalization is without loss of generality.

The government agent has to choose which procurement process to use. By assumption it is always cheaper to organize an auction for low organizational costs $\underline{k}$.[10] For high organizational

[9]For 1999, the corruption perception indices are as follows: Brasil: 4.1; Uruguay: 4.4; Argentina: 3.0; Paraguay: 2.0 and Chile: 6.9.

[10]To simplify the presentation we assume that it is cheaper to organize the auction whenever $\underline{k}$ even for the smallest project, i.e. $\circledR^2 \left[\overline{c} - \underline{c} \right] \underline{q} \geq \underline{k}$. Notice that this condition is trivially satisfied given the above normalizations.

costs $\bar{k}$ it might be cheaper to simply award the project to the domestic firm. The latter depends on the size of the project. For very large projects competitive bidding is always cheapest. Voters partially control the government's decision through the determination of a threshold q^{α} on the size of the public project beyond which competition on the international market is required. In other words, for $q > q^{\alpha}$, the government is obliged to organize the second-price auction. For $q < q^{\alpha}$, the government can choose between sole-source or competitive procurement. In the latter case, an honest government agent will make optimal use of her private information and organizes an auction if and only if the organizational cost is low.[11] However, government officials are self-interested and might not be honest if corruption maximizes their expected utility. If the organizational cost is low $\underline{k}$; a corrupt official makes a take-it-or-leave-it bribe demand to the domestic firm. If no bribe is paid, the project goes to the second-price auction. If the bribe is paid, the corrupt official awards the project to the domestic firm pretending that the cost of organizing the auction is high $\bar{k}$. In this case capture occurs.[12] If a bribe demand is made, the government official pays an idiosyncratic cost $\bar{}$ which is uniformly distributed in each country with: $\bar{} \vee [0; \bar{}_i]$, where $\bar{}_i$ is country specific and a measure of social honesty of country i.

Voters use the political system to limit the discretion of the government. They are both tax-payers and shareholders of the domestic firm. They are thus concerned both with the taxes t needed to finance the cost of the procurement project and the profits $\lvert$ of the domestic firm. They pay the same tax, but differ in the proportion ^{1} of shares of the domestic firm they own. The possession of shares can be interpreted more widely as a measure of how much a citizen is directly affected by the profits of the domestic firm. For example, some citizens are employers

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[11]We refer to this decision as optimal because it maximizes the utility of the median voter as will be seen later. This decision does not coincide with the decision a utilitarian social planner would implement nor does it coincide with cost minimization. In other words, we assume that there is no conflict of interests between an honest government agent and the median voter.

[12]We do not consider the problem of distortion, i.e. the possibility that the government agent pretends that organizational costs are low when they are high. Allowing for distortion would not affect the qualitative results of the paper. Under distortion the government agent makes a bribe demand to the domestic firm claiming low organizational costs and threatens to organize an auction if the bribe is not paid. We do not think that this story is convincing, since ex post organizational costs are observable once the auction has been organized. A high cost auction would clearly indicate the attempt of distortion and could be punished. Without the possibility to carry out the threat to organize the auction, the government agent does not have any bargaining power and cannot extract any bribe from the domestic firm.

or employees of the domestic firm while others are politicians or government agents. We assume that voters are uniformly distributed on a line segment: $\mu_i \sim U[0;1]$. The location $\mu_i \in [0;1]$ of voters determines the number of shares of the domestic firm they own. The distribution of shares is linear and increases with voter's location, i.e. it is highest for $\mu_i = 1$. Hence, there will be some location $\bar{\mu}$ such that all voters located at $\mu_i < \bar{\mu}$ have no shares and all voters $\mu_i > \bar{\mu}$ have $\frac{2(\mu_i - \bar{\mu})}{(1-\bar{\mu})^2}$ shares. We assume that $\bar{\mu} < \frac{1}{2}$. This implies that more than half of the population cares about the profits of the domestic firm. Under these assumptions the median voter approach is valid. The median voter is located at $\mu_i = \frac{1}{2} > \bar{\mu}$ and therefore owns $\lambda_M = \frac{2(\frac{1}{2} - \bar{\mu})}{(1-\bar{\mu})^2}$ shares of the firm. Since $\lambda_M < 1$ always, the median voter cares more about the total cost of the project than the profits of the domestic firm.

In the absence of an economic union, the median voter of each county chooses the level of discretion of his own country by maximizing $-t + \lambda_M \pi^D$, where π^D is the expected profit of the domestic firm in its home country. If an economic union is formed, the median voters of the two countries negotiate a common level of discretion for both countries. Any common level of discretion that is efficient and individually rational will be considered as a feasible outcome of the negotiations.

We now summarize the time sequence of the model: In step 1, the discretion of the government q^{α} is determined through the political process. In step 2, nature chooses the characteristics of the government agents, of the procurement project and of the firms in each country. The size of the procurement project q_i becomes public information. $\bar{}_i$ and k_i are private information of each government and c_i is the private information of each firm. In step 3 (procurement stage), the government has to procure the public project according to the contract law (level of discretion) that was determined in step 1. Figure 3 summarizes the timing of the model. Only step 1 (the political process) depends on whether or not a union is formed.

Introduce Figure 3: Timing of the Model around here

The model will be solved by backward induction. First we have to determine the probability

of corruption, second the expected cost of the public project and, finally, the discretion chosen in a union and in the absence of a union.

The probability of corruption

Corruption can only arise when the size of the project is below the level of discretion q^{π} granted to the government and the cost of organizing the auction is low. For the sake of simplicity we assume that the government has all the bargaining power and none of the surplus of corruption is lost.[13] The corrupt official knows that a high cost firm $\bar{c}$ cannot pay any positive bribe. He will therefore ask for a bribe which makes the low cost firm $\underline{c}$ indifferent between rejecting or accepting the bribe. The ex-ante (expected) profit of the low cost firm $\underline{c}$ if the bribe demand is rejected equals its expected profit in the second price auction, namely $(1 - \alpha_j)[\bar{c} - \underline{c}]q$. If the firm were directly awarded the project (without any bribe demand) it would make profits $[\bar{c} - \underline{c}]q$. The difference between the latter and the expected profit in the auction determines the bribe demand which is $\alpha_j[\bar{c} - \underline{c}]q$. Given this bribe demand, a government official will be honest (dishonest) if the surplus from corruption is smaller (bigger) than his personal cost of being corrupt $\bar{\theta}$. We assume that the government has to incur this personal cost if a bribe demand is made, independently of its being accepted. Hence for $\bar{\theta} < \alpha_i\alpha_j[\bar{c} - \underline{c}]q$, corruption occurs, while for $\bar{\theta} > \alpha_i\alpha_j[\bar{c} - \underline{c}]q$ the government official will be honest.[14] Using this cut-off point and the fact that the distribution of $\bar{\theta}$ is uniform, we can characterize the probability of corruption $\pi_i(q)$ in country i as:

$$\pi_i(q) = \frac{\alpha_i \alpha_j [\bar{c} - \underline{c}]q}{\bar{\theta}_i}$$

Notice that $\pi_i(q)$ is increasing in the size of the public project q and decreasing in the social level of honesty $\bar{\theta}_i$ of country i. We can also compute the aggregate probability of corruption Π_i given a level of discretion q_i^{π}

$$\Pi_i = \int_0^{q_i^{\pi}} \pi_i(q)g(q)dq = \int_0^{q_i^{\pi}} \frac{\alpha_i \alpha_j [\bar{c} - \underline{c}]q}{\bar{\theta}_i} g(q)dq$$

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[13] This assumption is not essential for the results of the model.

[14] We do not consider the possibility that the salary of the government agent depends on the total cost of the public project, i.e. that the government agent can appropriate some of the cost savings implied by the optimal procurement decision. Allowing for this possibility would obviously reduce the level of corruption but it does not modify the qualitative results of the paper.

The higher the discretion threshold of the government q_i^{π}, the higher the aggregate probability of corruption. A higher threshold level of discretion provides more opportunities for corruption. Moreover, the stake for collusion is larger. Trivially, if both countries have a common discretion threshold, the country with a higher level of social honesty $\bar{z}_i$ will be less corrupt.

The procurement stage

We now characterize the expected cost of the procurement project. We distinguish two cases:

1. If $q > q^{\pi}$, the government has to organize a second price auction. The expected cost of the project is:

$$(\bar{c} - \rho_i\rho_j[\bar{c} - \underline{c}])q + (1 - \delta)k.$$

   The result of the auction will be a marginal price of $\underline{c}$ if and only if both firms have low cost. Therefore the expected price of the auction is $(\bar{c} - \rho_i\rho_j[\bar{c} - \underline{c}])q$. Additionally, the government will have to pay the cost of organizing the auction.

2. If $q < q^{\pi}$, the government can choose whether to use competitive or sole source procurement leading to the following expected cost of the project:

$$(1 - \delta)\bar{c}q + \delta[\gamma_i(q)\bar{c} + (1 - \gamma_i(q))(\bar{c} - \rho_i\rho_j[\bar{c} - \underline{c}])]q.$$

   If organizing the auction is very costly, the project will be granted to the domestic firm at a price of $\bar{c}q$. Otherwise, there is scope for corruption. With probability $(1 - \gamma_i)$, the official is honest and the expected price of the auction is $(\bar{c} - \rho_i\rho_j[\bar{c} - \underline{c}])q$. With probability γ_i, the official is corrupt and always asks for a bribe resulting in a high price $\bar{c}q$. If the domestic firm is low cost, the bribe will be paid; otherwise the project is auctioned on the international market resulting in a high price since the domestic firm is high cost.

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Therefore, the expected cost, t, of the procurement stage is:

$$t = \int_0^{q_i^*} \beta[\theta(q)\bar{c} + (1-\theta(q))(\bar{c} - \gamma_i\gamma_j[\bar{c}-\underline{c}])]qg(q)dq$$
$$+ \int_0^{q_i^*}(1-\beta)\bar{c}qg(q)dq + \int_{q_i^*}^{\bar{q}}[[\bar{c} - \gamma_i\gamma_j[\bar{c}-\underline{c}]]q + (1-\beta)k]g(q)dq$$
$$= [\bar{c} - \gamma_i\gamma_j[\bar{c}-\underline{c}]]q_M + \int_0^{q_i^*}[1-\beta(1-\theta(q))]\gamma_i\gamma_j[\bar{c}-\underline{c}]qg(q)dq + \int_{q_i^*}^{\bar{q}}(1-\beta)kg(q)dq$$

where q_M is the expected average size of the project.

This expression captures the main trade-off faced by the median voter when choosing the level of discretion q^*. On the one hand, a higher level of discretion increases the cost of corruption (first integral). On the other hand, it reduces the organizational costs (second integral).

We can also characterize the ex ante expected profit of firm i in country i, which we will refer to as Π_i^D, and the ex ante expected profit of firm i in country j, which we will refer to as Π_i^F.

$$\Pi_i^D = \int_0^{q_i^*}[\beta\gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]q]g(q)dq + \int_0^{q_i^*}(1-\beta)\gamma_i[\bar{c}-\underline{c}]qg(q)dq$$
$$+ \int_{q_i^*}^{\bar{q}}\gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]qg(q)dq$$
$$= \gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]q_M + \int_0^{q_i^*}(1-\beta)\gamma_i\gamma_j[\bar{c}-\underline{c}]qg(q)dq$$

Π_i^D increases with the domestic level of discretion q_i^*, since the higher q_i^*, the more likely it is that the project is awarded to the domestic firm by sole-source procurement. Notice that Π_i^D is independent of the level of corruption.[15]

$$\Pi_i^F = \int_0^{q_j^*}\beta\gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]qg(q)dq + \int_{q_j^*}^{\bar{q}}\gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]qg(q)dq$$
$$= \gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]q_M - \int_0^{q_j^*}(1-\beta)\gamma_i(1-\gamma_j)[\bar{c}-\underline{c}]qg(q)dq$$

Π_i^F decreases with the foreign level of discretion q_j^* because international contests are less likely.

The choice of discretion

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[15]This result is a direct consequence of our assumption that the corrupt government has all the bargaining power and therefore appropriates all the surplus from corruption. This simplifying assumption does not affect the main results of the paper.

The level of discretion is chosen given the expected costs of the procurement stage and the expected pro¯t of the ¯rms. We will now analyze the choice of $q^\ast$ in the absence of a union and then move to the analysis in case a union is formed. For the time being, we assume that countries may di®er in the social level of honesty $\bar{}$ but have access to the same production technology, i.e. ¯rms are homogeneous in the sense that $\circledR_i = \circledR_j = \circledR$. This simpli¯cation allows us to isolate the e®ects of di®erent propensities for corruption on the desirability of an economic union. The case of heterogeneous ¯rms will be analyzed in Section 4. Without loss of generality we assume that $\bar{}_A \; _{_\ni} \; \bar{}_B$.

3.1   Homogeneous ¯rms without a union

In the absence of a union, each country votes for its own $q^\ast$ by maximizing the utility of the median voter. The median voter, as a taxpayer, is concerned about the cost of the procurement project and also about the pro¯ts of the domestic ¯rm, since he owns ^1_M shares of the ¯rm. Hereafter, we will write ^{1} instead of ^1_M for notational simplicity. We denote by $U_i(q_i; q_j) = {}_i t_i(q_i) + {}^1 \mathop{\vert}_i P(q_i) + {}^1 \mathop{\vert}_i F(q_j)$ the expected utility of the median voter in country i when the level of discretion is q_i in country i and q_j in country j. In the absence of a union, the median voter has no in°uence on the level of discretion in the foreign country and therefore takes it as given. His maximization problem therefore reduces to:

$$\max_{q_i} {}_i t_i + {}^1 \mathop{\vert}_i P:$$

The ¯rst order condition (FOC) for the median voter is:

$$\circledR^2[\bar{c} \,_i\, \underline{c}]q_i^\ast \,_i\, (1 \,_i\, \pm) \,_i\, \frac{\pm\circledR^2[\bar{c} \,_i\, \underline{c}]q_i^\ast}{\bar{}} + {}^1(1 \,_i\, \pm)^{\ni} + (1 \,_i\, \pm)k^{\ni} g(q_i^\ast) = 0 \qquad (1)$$

It is easy to see that the problem is concave ($\frac{@^2U}{@q_i^2} < 0$). As a benchmark we will consider what happens without corruption. Corruption will disappear if $\bar{} \,!\, 1$. The optimal level of discretion without corruption $q^{\ast NC}$ is just

$$q^{\ast NC} = \frac{k}{\circledR^2[\bar{c} \,_i\, \underline{c}](1 \,_i\, {}^1)}:$$

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The level q^{*NC} is easily interpreted. $\beta^2[\bar{c}-\underline{c}](1-\gamma)q^{*NC}$ is the expected saving for the median voter in the procurement price if an auction is organized, while k is the cost of organizing the auction. Therefore, for $q > q^{*NC}$ it is always optimal to organize the auction, while for $q < q^{*NC}$ it is optimal to use sole-source procurement when the cost of organizing the auction is high. q^{*NC} is increasing in the cost of organizing an auction. The level q^{*NC} is also increasing in the number of shares γ the median voter owns, because the profits of the domestic firm increase in the level of discretion. The level q^{*NC} is decreasing in the efficiency of firms; the better the technology (higher β), the bigger the expected benefits from organizing an auction, since it is more likely that competition will reduce the procurement price.

We now come back to the general case with corruption where $\bar{\gamma} < 1$. Using the implicit function theorem it can be shown that the above comparative static results are also valid for q_i^* implicitly defined in equation (1). Proposition 1 shows how corruption affects the median voter's choice of discretion.

Proposition 1 (i) The level of discretion with corruption is lower than without corruption.

(ii) The level of discretion is increasing in the social level of honesty, i.e. if $\bar{\gamma}_A > \bar{\gamma}_B$, then $q_A^* > q_B^*$.

Part (i) of Proposition 1 tells us that corruption has a shadow cost, namely the private information of the government agent is not used optimally. This idea was nicely presented by Banfield (1975):

> \[N]arrowing discretion [...] while preventing the agent from doing (corrupt) things that are slightly injurious to the principal it may at the same time prevent him from doing (non-corrupt) ones that would be very beneficial to him. If simply to prevent corruption an agent is given a narrower discretion than would be optimal if there were no corruption, whatever losses are occasioned by his having a sub-optimal breadth of discretion must be counted as costs of preventing corruption."[16]

[16]Banfield (1975), p. 590

Part (ii) of Proposition 1 holds for a similar reason: the bigger the level of social honesty, the bigger the opportunity cost to disregard the private information of the government concerning the organizational cost of the auction and therefore the higher the discretion.

Proposition 1 does not tell us how social honesty a®ects the aggregate probability of corruption. On the one hand, the more corrupt country ties its government's hands more ¯rmly and thereby reduces its aggregate probability of corruption ¡¡. On the other hand a lower level of social honesty increases the aggregate probability of corruption ¡¡. Which e®ect dominates, depends on the exact distribution of g(q). Corollary 1 shows that if g(q) is uniform, a lower level of social honesty implies a higher aggregate probability of corruption.

Corollary 1 If $\overline{}_A > \overline{}_B$ and g(q) is uniform, then $_{\overline{i} B} > _{\overline{i} A}$.

3.2 An economic union with homogeneous ¯rms

If countries A and B form a union they ¯x a common maximum level of discretion[17] q_U^{π}, which is determined in bilateral negotiation. We consider any level of discretion q_U^{π} as a possible outcome of the bilateral negotiation if it is feasible according to the following de¯nition.

De¯nition 1 q_U^{π} is a feasible outcome of the bilateral negotiation if it satis¯es the following two conditions:

1. e±ciency:

   there exists a ¾ 2 (0; 1) such that q_U^{π} 2 arg maxf¾$U_A(q_U; q_U)$ + (1 ¡ ¾)$U_B(q_U; q_U)$g

2. individual rationality (participation constraint):

   $U_i(q_U^{\pi}; q_U^{\pi})$, $U_i(q_i^{\pi}; q_j^{\pi})$ 8i; j 2 fA; Bg

De¯nition 1 states that the union should be e±cient and that no participant should be made worse o® by joining the union. These requirements are satis¯ed by most bargaining schemes.

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[17]This model ¯ts the case of the European Union very well (see introduction).

Let $q_i^{**} \in \arg\max \{U_i(q;q)\}$ denote the ideal outcome of the negotiation concerning a joint level of discretion for country i. q_i^{**} is the solution of the following problem:

$$\max_q \; -t_i + \gamma(\pi_i^P + \pi_i^F)$$

The first order condition for q_i^{**} is:

$$\beta^2[\bar{c} - \underline{c}]q_i^{**} - (1 - \tau) - \frac{\pm\beta^2[\bar{c} - \underline{c}]q_i^{**}}{\underline{\tau}} + \gamma(1-\tau) - \gamma(1-\tau)\frac{(1-\beta)^3}{\beta} + (1-\tau)k^3 g(q_i^{**}) = 0 \qquad (2)$$

Concavity is proved easily. As before, we first look at the benchmark case without corruption ($\bar{\tau} \to 1$) and its cut-off point q_i^{**NC}, which can be written as

$$q^{**NC} = \frac{k}{\beta^2[\bar{c} - \underline{c}](1 - \gamma\frac{2\beta-1}{\beta})}:$$

Since $\frac{2\beta-1}{\beta} < 1$, $q^{**NC} < q^{*NC}$. When choosing a common level of discretion for both countries the median voter has some influence on the profits of the domestic firm abroad. The typical negative trade externality when countries act in isolation is now internalized.

In this section we are assuming that the only difference between countries is their social level of honesty. Hence, in the benchmark case without corruption both countries are identical and both median voters would choose the same common level of discretion q^{**NC}. Therefore, there is no conflict of interest and the union will always be formed. The next proposition states this result.

Proposition 2 (i) Without corruption ($\bar{\tau} \to 1$) a union will always be formed.

(ii) The common level of discretion in the union is q^{**NC}.

With corruption ($\bar{\tau} < 1$), there can be some conflict of interest. Lemma 1 characterizes the ideal level of discretion in a union for country i for the general case.

Lemma 1 (i) $q_i^{**} < q_i^*$

(ii) $q_i^{**} < q^{**NC}$

(iii) Let $\bar{\tau}_A > \bar{\tau}_B$. Then $q_A^{**} > q_B^{**}$: The higher the social level of honesty, the higher the ideal level of common discretion.

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Since the median voter can a®ect the pro¯ts of the domestic ¯rm abroad, he would choose a lower level of discretion to bene¯t from increased possibilities of trade (Part (i) Lemma 1). This ideal level of discretion is lower than the discretion in the absence of corruption due to the shadow cost of corruption mentioned in Proposition 1 (Part (ii) Lemma 1). The ¯nal. part of Lemma 1 shows how di®erent levels of propensities towards corruption can cause a potential con°ict of interest between countries. The more honest country would set a higher level of discretion, since it is more costly for this country to disregard the private information of its government. Given this potential con°ict of interest, a union might not be formed. To understand whether a union is possible, Lemma 2 characterizes the necessary conditions for the possible outcomes of the bilateral negotiations q_U^α according to De¯nition 1 and Lemma 1.

Lemma 2 For $\bar{}_A > \bar{}_B$ any possible outcome q_U^α of the bilateral negotiations must satisfy the following conditions:

1. $q_B^{\alpha\alpha} < q_U^\alpha < q_A^{\alpha\alpha}$

2. $q_U^\alpha < q_B^\alpha (< q_A^\alpha)$

The ¯rst condition is implied by the requirement of e±ciency in De¯nition 1. The second condition is due to the participation constraint of the less corrupt country. If $q_U^\alpha > q_B^\alpha$, the less corrupt country would not have any bene¯ts from trade if a union is formed, since country B would not increase its openness towards trade. At the same time, country A would have to pay the cost of reducing its discretion.

Since $q_U^\alpha < q_B^\alpha$ Corollary 2 is immediate.

Corollary 2 The aggregate probability of corruption μ_i is lower in a union than without a union in both countries and $\mu_A < \mu_B$ for $\bar{}_A > \bar{}_B$.

The union promotes competition by decreasing the level of discretion of both governments. This leaves less scope for corruption. Since the level of discretion is the same for both countries,

the aggregate probability of corruption is smaller in the country with a higher level of social honesty. The promotion of trade has the positive e®ect of reducing corruption. This suggests that the union is more valuable for the country with a higher propensity for corruption. Proposition 3 states this result.

Proposition 3 If a union is created, the more corrupt country bene¯ts more than the less corrupt country. Hence for $\bar{}_A > \bar{}_B$ country B bene¯ts more than country A.

The reduction of discretion is more costly for a country that has more con¯dence in its government, since a lower level of discretion reduces the possibility of using the private information of the government in an e±cient way. Moreover, the bene¯ts from increased competition (trade) are larger for the more corrupt country because the reduction in discretion is larger for the less corrupt country. (Recall that $q_A^{\mathtt{¤}} > q_B^{\mathtt{¤}}$.) Since the bene¯ts from increased trade are smaller for the less corrupt country, they might not outweigh its cost of reducing the level of discretion. In this case, the less corrupt country will not join the union. Proposition 4 characterizes the conditions when this happens.

Proposition 4 For $\bar{}_A > \bar{}_B$ there exists a $\overline{\overline{}}_B^{\mathtt{¤}} < \overline{\overline{}}_A$ such that $8 \bar{}_B < \overline{\overline{}}_B^{\mathtt{¤}}$ no union is possible. In other words, if country B is too corrupt, country A will not agree to form a union.

The more corrupt country B is, the lower the level of discretion required for the formation of an economic union. If country B is too corrupt, country A is better o® without a union: since the level of discretion in country B is already low, the bene¯ts from trade are very small for country A while the cost of ignoring the private information of its domestic government is large. Therefore we can conclude that corruption can destroy the incentives to form a union. Nevertheless, we point out that it is not the existence of corruption as such, but rather the di®erence in the propensity of corruption that hinders the union formation. If both countries have the same propensity of corruption, they would be identical in all respects and the union would always be formed, since it would internalize the negative trade externality imposed by the choice of the median voters

without a union. In the next section we analyze how these results change if countries also differ in another aspect, namely in the level of efficiency of their firms.

4 Heterogeneous firms

We come back to the more general model with heterogeneous firms $\alpha_A \neq \alpha_B$. We introduce the following parameterization for the cost difference with $\lambda \in (\alpha; \frac{1}{\alpha})$ being a constant.[18]

$$\alpha_A = \lambda \alpha \tag{3}$$

$$\alpha_B = \frac{1}{\lambda}\alpha \tag{4}$$

With this parameterization $\alpha_i\alpha_j = \alpha^2$ and $\alpha_A(1-\alpha_B) = \alpha(\lambda-\alpha)$ and $\alpha_B(1-\alpha_A) = \alpha\left(\frac{1}{\lambda}-\alpha\right)$. If $\lambda > 1$ country A is more efficient than country B.

Lemma 3 With the parameterization (3) and (4), the difference in efficiency between country A and B does not affect their level of discretion chosen in the absence of a union.

In other words, the cost parameterization was chosen in such a way that, without a union differences in the level of discretion, are solely caused by differences in corruption propensities. This choice was made to facilitate comparison; the parameterization allows us to disentangle the incentives for the union formation due to cost differences from the incentives due to differences in levels of social honesty. We now proceed to characterizing the ideal point for a common level of discretion of each country. Again, this ideal point $q^{\ast\ast}_{\alpha_i} \in \arg\max \{U_i(q; q)\}$ is the solution to the following maximization problem.

$$\max_q \; t_i + \gamma(\Pi^D_i + \Pi^F_i)$$

The first order condition for $q^{\ast\ast}_{\alpha_i}$ is:

$$\alpha^2[\bar{c}-\underline{c}]q^{\ast\ast}_i - (1-\delta) - \frac{\delta\alpha^2[\bar{c}-\underline{c}]q^{\ast\ast}_i}{\underline{\ }_i} + \gamma(1-\delta) - \gamma(1-\delta)\frac{(1-\alpha_j)}{\alpha_j} + (1-\delta)k\,g(q^{\ast\ast}_i) = 0 \tag{5}$$

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[18]We do not consider $\lambda = \alpha$ or $\lambda = \frac{1}{\alpha}$ because the less efficient country will not benefit from increased competition (trade) with this parameters, i.e. no union will be possible.

It is easy to see that in the benchmark case without corruption $\overline{\gamma}_i \to 1$ the ideal point is

$$q_{\circledR_i}^{\square\square NC} = \frac{k}{\circledR^2[\overline{c}_i \ \underline{c}](1 \ \underline{\ }^{1} \frac{2\circledR_j \ 1}{\circledR_j})}:$$

The lower the level of e±ciency in country j, the lower the ideal point in country i. The more e±-cient country wants more openness towards trade: its e±ciency advantage increases its probability of winning the international competition. The same intuition holds with corruption if $\overline{\gamma}_A = \overline{\gamma}_B$.

Lemma 4 In the absence of corruption ($\overline{\gamma}_i \to 1$; $\overline{\gamma}_j \to 1$) or if $\overline{\gamma}_A = \overline{\gamma}_B$, the more e±cient country chooses a lower ideal point for the common level of discretion. If the union is formed, the more e±cient country bene¯ts more from the union.

Without a union, both countries choose the same level of discretion. If a union is formed, both countries can also in°uence the foreign pro¯ts of their domestic ¯rms, which induces them to choose a lower level of discretion than in the absence of a union. Since the more e±cient country is more likely to win the auction, it bene¯ts more if the level of discretion is reduced.

For the case of homogeneous ¯rms we have shown that if there is no con°ict of interest, either because there is no corruption (Proposition 2) or because the propensities for corruption are the same (Proposition 4), a union will always be formed. These results might appear to be the result of the fact that without a con°ict of interest due to corruption countries were identical. In the case of heterogeneous ¯rms there is always a potential for a con°ict of interest. Nevertheless, Proposition 5 shows that di®erences in e±ciency do not hinder the union formation.

Proposition 5 In the absence of corruption ($\overline{\gamma}_i \to 1$; $\overline{\gamma}_j \to 1$) or if $\overline{\gamma}_A = \overline{\gamma}_B$ a union will be formed for 8γ.

The underlying intuition is the following. Any decrease in discretion is more bene¯cial for the more e±cient country. The less e±cient country is willing to reduce discretion in the union to some extent to internalize the negative trade externality. A union is always possible since the more e±cient country prefers the less e±cient country's ideal point for the union to the status

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quo (no union). Hence, the potential conflict of interest caused by differences in efficiency does not destroy incentives for integration. We will now examine what happens if countries also differ in their propensities towards corruption. We start by characterizing the countries' ideal outcomes of bilateral negotiations.

Lemma 5 Let $\bar{c}_A > \bar{c}_B$.

    (i) If $\omega < 1$, $q_B^{**} < q_A^{**}$ always.

    (ii) If $\omega > 1$ it is ambiguous which country chooses a lower cutoff point as its ideal outcome of bilateral negotiations.

In part (i) of Lemma 5 the more corrupt country is also more efficient. This country wants a smaller joint level of discretion because it benefits more from increased trade and is more willing to disregard the private information of its government. The incentives to reduce discretion due to the efficiency advantage and due to corruption reinforce each other. In part (ii) of Lemma 5 the more corrupt country is less efficient. Which country is more willing to reduce discretion depends on the relative weights of the incentives to reduce discretion due to corruption and due to efficiency.

Compared to the case of homogenous firms, if $\omega < 1$ the conflict of interest between the two countries is aggravated. If $\omega > 1$ the conflict of interest is mitigated since the country that is more reluctant to reduce discretion (the less corrupt country) benefits more from trade. Proposition 6 extends Proposition 4 to the case of heterogeneous firms, and shows that differences in efficiency complicate the union formation if $\omega < 1$ and facilitate the union formation if $\omega > 1$.

Proposition 6 For $c_A > c_B$ there exists a $\bar{c}_B^*(\omega) < \bar{c}_A$ such that $8c_B < \bar{c}_B^*(\omega)$ no union is possible. $\bar{c}_B^*(\omega)$ decreases if ω increases.

The more efficient country A is, the higher are its benefits from increased trade. These increased gains from trade allow country A to accept higher corruption in the partner country. In other words, a difference in honesty can be compensated by a difference in efficiency increasing the set of parameters for which a union is possible.

Technological di®erences between countries may produce a con°ict of interest related to the choice of the common procurement legislation but they do not destroy the incentives to form a union. In contrast, di®erences in propensities of corruption can hinder the union formation. If, however, the less corrupt country is more e±cient the union formation is more likely compared to the case in which ¯rms are homogeneous.

5   Conclusion

Although corruption usually transcends the national level,[19] theoretical research on corruption has mainly concentrated on the domestic perspective. In the present paper we studied the link between corruption and some aspects of trade, namely international public procurement. In particular, we study the incentives of countries to form an economic union. In the absence of a union, each country decides its own procurement law, ignoring the e®ect of this law on the other country. When a union is formed, this externality is internalized, resulting in a lower level of discretion for domestic governments. The reduction in discretion leads to a lower level of corruption. Therefore, the promotion of trade has the positive e®ect of reducing corruption. This positive e®ect is more valuable for the country with a higher propensity for corruption, which is therefore the main supporter of the economic union. However, the more honest country will not join a union if the propensities of corruption are too di®erent. On the one hand, the reduction in discretion is more costly for the more honest country, where the government is trusted to make the right decision. On the other hand, the status quo without a union is more favorable for the more honest country (with more opportunities for trade), since the corrupt country chooses a lower level of discretion and therefore is more open to trade. Therefore, corruption can hinder the union formation.

If countries di®er not only in their propensities for corruption but also in their technological capabilities, a big di®erence in propensities for corruption can be o®set by a di®erence in e±ciency,

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[19]International organizations have long recognized that corruption is a supranational problem: e.g. OECD countries recently approved the \Convention on Combating Bribery of Foreign Public O±cials in International Business Transactions".

making a union formation more likely. This result might be important, since in general less corrupt countries tend to be more e±cient.

Many economic consequences of integration are achieved through political means. Common legislation and supranational and intergovernmental institutions are political mechanisms that imply changes to the political system of member states of an economic union, since some sovereignty has to be transferred to the supranational level. Models of economic integration have mainly focused on purely economical aspects. While our model clearly follows the instrumental approach - support for integration is a function of its costs and bene⁻ts - we also consider that countries with better functioning political systems might be more reluctant to transfer sovereignty. To our knowledge this is the ⁻rst model to formalize this institutional hypothesis.

A Mathematical Appendix

Proof of Proposition 1

Using the implicit function theorem in the FOC (equation (1)),we obtain

$$\frac{@q_i^{\alpha}}{@^{-}} = -\frac{\frac{@^2 U}{@q_i @^{-}}}{\frac{@^2 U}{@q_i^2}} > 0:$$

This conclude the proof since the case without corruption is equivalent to $^{-}\,!\,\,1$. ■

Proof of Corollary1

If $g(q)$ is uniform, then $-_i = \int_0^{q_i^{\alpha}} \frac{\otimes^2[\overline{c}_i\,\underline{c}]q}{-_i}\frac{1}{b}dq = \frac{\otimes^2[\overline{c}_i\,\underline{c}]}{-_i}\frac{q_i^{\alpha 2}}{2b}$. Therefore, $-_B > -_A$ if and only if $\frac{q_A^{\alpha 2}}{-_A} < \frac{q_B^{\alpha 2}}{-_B}$. Subtracting the FOC of the medium voter (equation (1)) in country B divided by $g(q_B^{\alpha})$ from the FOC of the medium voter in country A divided by $g(q_A^{\alpha})$ we obtain:

$$-(1-\pm)(1-^1)\otimes^2[\overline{c}_i\,\underline{c}](q_A^{\alpha}\,_i\,q_B^{\alpha}) = \pm\,\mathsterling\otimes^2[\overline{c}_i\,\underline{c}]^{\alpha 2}\left[\frac{q_A^{\alpha 2}}{-_A}\,_i\,\frac{q_B^{\alpha 2}}{-_B}\right]^{\#}$$

Since $q_A^{\alpha} > q_B^{\alpha}$, the left hand side is negative, which implies that $\frac{q_A^{\alpha 2}}{-_A} < \frac{q_B^{\alpha 2}}{-_B}$. ■

Proof of Proposition 2

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In absence of corruption $U_A(q_U; q_U) = U_B(q_U; q_U)$. $q_U^{\alpha} = q^{\alpha\alpha NC}$ $2 \arg\max\{U_i(q_U; q_U)\} \forall i, j \in \{A, B\}$ satisfy trivially the two requirement to be a feasible outcome of the bilateral negotiation: efficiency and individual rationality.

1. $q^{\alpha\alpha NC}$ $2 \arg\max\{\frac{3}{4}U_A(q^{\alpha\alpha NC}; q^{\alpha\alpha NC}) + (1 - \frac{3}{4})U_B(q^{\alpha\alpha NC}; q^{\alpha\alpha NC})\}$ is satisfied since $U_A(q_U; q_U) = U_B(q_U; q_U)$ and $q^{\alpha\alpha NC}$ $2 \arg\max\{U_A(q_U; q_U)\}$:

2. $U_i(q^{\alpha\alpha NC}; q^{\alpha\alpha NC}) \geq U_i(q^{\alpha NC}; q^{\alpha NC}) \forall i, j \in \{A, B\}$ is satisfied since $U_A(q_U; q_U) = U_B(q_U; q_U)$ and $q^{\alpha\alpha NC}$ $2 \arg\max\{U_A(q_U; q_U)\}$:

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Proof of Lemma 1

(i) Immediate from comparing the first order condition of a union (equation (2)) with the FOC in the absence of a union (equation (1)).

(ii) and (iii) Using the implicit function theorem it is easy to see that $\frac{\partial q_i^{\alpha\alpha}}{\partial \gamma_i} > 0$. ∎

Proof of Lemma 2

Efficiency requires the following first order condition of q_U^{α}

$$\beta^2[\bar{c} - \underline{c}]q_U - (1 - \pm) - \frac{\pm\beta^2[\bar{c} - \underline{c}]q_U}{2}\frac{\frac{3}{4}\bar{\gamma}_A + (1 - \frac{3}{4})\bar{\gamma}_B}{\bar{\gamma}_A\bar{\gamma}_B} + \eta(1 - \pm)\frac{2\beta - 1}{\beta} + (1 - \pm)k g(q_U) = 0 \qquad (6)$$

Equation (6) is identical to equation (2) except for one term: in equation (6) $\frac{\pm\beta^2[\bar{c} - \underline{c}]q_U}{2}\frac{\frac{3}{4}\bar{\gamma}_A + (1 - \frac{3}{4})\bar{\gamma}_B}{\bar{\gamma}_A\bar{\gamma}_B}$ appears instead of $\frac{\pm\beta^2[\bar{c} - \underline{c}]q_U}{2}\frac{1}{\bar{\gamma}_i}$: Hence, condition 1 follows from the following inequality

$$\frac{1}{\bar{\gamma}_A} = \frac{\bar{\gamma}_B}{\bar{\gamma}_A\bar{\gamma}_B} < \frac{\frac{3}{4}\bar{\gamma}_A + (1 - \frac{3}{4})\bar{\gamma}_B}{\bar{\gamma}_A\bar{\gamma}_B} < \frac{\bar{\gamma}_A}{\bar{\gamma}_A\bar{\gamma}_B} = \frac{1}{\bar{\gamma}_B}:$$

Condition 2 is derived from the participation constraint of the less corrupt country. If $q_U^{\alpha} > q_B^{\alpha}$ then $U_A(q_U^{\alpha}; q_U^{\alpha}) < U_A(q_A^{\alpha}; q_B^{\alpha})$ since q_A^{α} $2 \arg\max\{U_A(q; q_B)\} \forall q_B$ and $U_A(q; q_B)$ decreases in q_B. ∎

Proof of Corollary 2

Immediate given Lemma 2 ∎

Proof of Proposition 3

By Lemma 2 we know that $q_U^* < q_B^*$. We need to show that $U_A(q_U^*; q_U^*) - U_A(q_A^*; q_B^*) < U_B(q_U^*; q_U^*) - U_B(q_B^*; q_A^*)$: In order to do so we add and subtract $U_A(q_B^*; q_B^*)$ to the left hand side of the inequality and $U_B(q_B^*; q_B^*)$ to the right hand side. We obtain:

$$U_A(q_U^*; q_U^*) - U_A(q_B^*; q_B^*) + U_A(q_B^*; q_B^*) - U_A(q_A^*; q_B^*)$$

$$< U_B(q_U^*; q_U^*) - U_B(q_B^*; q_B^*) + U_B(q_B^*; q_B^*) - U_B(q_B^*; q_A^*) \tag{7}$$

A sufficient condition for (7) to hold is that the following two inequalities are satisfied.

$$U_A(q_B^*; q_B^*) - U_A(q_A^*; q_B^*) < U_B(q_B^*; q_B^*) - U_B(q_B^*; q_A^*) \tag{8}$$

$$U_A(q_U^*; q_U^*) - U_A(q_B^*; q_B^*) < U_B(q_U^*; q_U^*) - U_B(q_B^*; q_B^*): \tag{9}$$

(8) is immediate given $q_A^* \in \arg\max\{U_A(q; q_B)\}$ $\forall q_B$; $U_A(q_B^*; q_B^*) - U_A(q_A^*; q_B^*) < 0$, and given that $U_B(q_B; q_A)$ is decreasing in q_A, $U_B(q_B^*; q_B^*) - U_B(q_B^*; q_A^*) > 0$

In order to show (9) we calculate $U_i(q_U^*; q_U^*) - U_i(q_B^*; q_B^*)$:

$$U_i(q_U^*; q_U^*) - U_i(q_B^*; q_B^*) = \int_{q_U^*}^{q_B^*} [1 - \pm(1 - \circ_i(q))] \, {}^{\circledR 2}[\bar{c} - \underline{c}] q g(q) dq -$$
$$\int_{q_U^*}^{q_B^*} (1 - \pm) k g(q) dq - \int_{q_U^*}^{q_B^*} (1 - \pm) {}^{\circledR 2}[\bar{c} - \underline{c}] q g(q) dq + \int_{q_U^*}^{q_B^*} (1 - \pm) {}^{\circledR} (1 - {}^{\circledR}) [\bar{c} - \underline{c}] q g(q) dq$$

We wish to show:

$$U_A(q_U^*; q_U^*) - U_A(q_B^*; q_B^*) - U_B(q_U^*; q_U^*) + U_B(q_B^*; q_B^*) < 0 \tag{10}$$

Using the above expression, (10) becomes:

$$\int_{q_U^*}^{q_B^*} [1 - \pm(1 - \circ_A(q))] \, {}^{\circledR 2}[\bar{c} - \underline{c}] q g(q) dq - \int_{q_U^*}^{q_B^*} [1 - \pm(1 - \circ_B(q))] \, {}^{\circledR 2}[\bar{c} - \underline{c}] q g(q) dq$$

$$= \int_{q_U^*}^{q_B^*} [\pm(\circ_A(q) - \circ_B(q))] \, {}^{\circledR 2}[\bar{c} - \underline{c}] q g(q) dq$$

$$> 0 \text{ since } \circ_A(q) < \circ_B(q)$$

This concludes the proof. ∎

Proof of Proposition 4

Given $q_A^{\alpha} \in \arg\max\{U_A(q;q_B)\} \, \forall q_B$, and $q_A^{\alpha\alpha} \in \arg\max\{U_A(q;q)\}$ we can de¯ne the following cuto® point $\hat{q}_B$ for the level of discretion chosen in the domestic context by country B re°ecting $\bar{\theta}_B$:

$$U_A(q_A^{\alpha};\hat{q}_B) = U_A(q_A^{\alpha\alpha};q_A^{\alpha\alpha})$$

where $U_A(q_A^{\alpha\alpha};q_A^{\alpha\alpha})$ is the maximum expected utility that the median voter of country A can obtain by forming a union with B. Given that $U_A(q_A^{\alpha};q_B)$ is decreasing in q_B; if $q_B^{\alpha} < \hat{q}_B$, no union can be formed; the union violates country A's participation constraint. De¯ne $\bar{\theta}_B^{\alpha}$ as the level of social honesty of country B that results in $q_B^{\alpha} = \hat{q}_B$; where $q_B^{\alpha} \in \arg\max\{U_B(q;q_A)\} \, \forall q_A$. We know that $\frac{\partial q_B^{\alpha}}{\partial \bar{\theta}_B} > 0$, hence $\bar{\theta}_B < \bar{\theta}_B^{\alpha}$ implies $q_B^{\alpha} < \hat{q}_B$ and therefore country A's participation constraint is violated for $\forall \bar{\theta}_B < \bar{\theta}_B^{\alpha}$. ∎

Proof of Lemma 3

The ¯rst order condition with heterogeneous ¯rms in the absence of a union is:

$$\otimes_i \otimes_j [\bar{c} - \underline{c}] q_i^{\alpha} - (1 - \pm) - \frac{\pm \otimes_i \otimes_j [\bar{c} - \underline{c}] q_i^{\alpha}}{\bar{\theta}_i} + {}^1 (1 - \pm)^{\grave{}} + (1 - \pm) k^{\grave{}} g(q_i^{\alpha}) = 0 \qquad (11)$$

Given (3) and (4), $\otimes_i \otimes_j = \otimes^2$, hence the FOC for heterogeneous ¯rms (equation (11)) is identical to the FOC of homogeneous ¯rms (equation (1)) in the absence of a union. ∎

Proof of Lemma 4

Without loss of generality let country A be more e±cient, i.e. $\lambda > 1$. Assume $\bar{\theta}_A = \bar{\theta}_B$. The case without corruption ($\bar{\theta}_A \to 1$ and $\bar{\theta}_B \to 1$) is just a special case of $\bar{\theta}_A = \bar{\theta}_B$.

(i) We will ¯rst show that the more e±cient country chooses a lower $q_i^{\alpha\alpha}$. The FOC for the ideal point of a common level of discretion for country i with heterogeneous ¯rms has been derived in equation (5). Equation (5) for country A di®ers from equation (5) for country B in only one term: we have to compare $\frac{(1-\otimes_B)}{\otimes_B} = \frac{1-\otimes}{\otimes}$ (country A) with $\frac{(1-\otimes_A)}{\otimes_A} = \frac{1-\lambda\otimes}{\lambda\otimes}$ (country B). $\frac{1-\otimes}{\otimes} > \frac{1-\lambda\otimes}{\lambda\otimes}$ if $\lambda > 1$. Hence $q_A^{\alpha\alpha} < q_B^{\alpha\alpha}$

(ii) We will now show that $U_A(q_U;q_U) - U_A(q_A^{\alpha};q_B^{\alpha}) > U_B(q_U;q_U) - U_B(q_B^{\alpha};q_A^{\alpha}) \, \forall q_U \in [q_A^{\alpha\alpha};q_B^{\alpha\alpha}]$; i.e. the more e±cient country bene¯ts more from a union. To prove that country A bene¯ts more

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is equivalent to proving that

$$U_A(q_U; q_U) \ i \ U_B(q_U; q_U) > U_A(q_A^\alpha; q_B^\alpha) \ i \ U_B(q_B^\alpha; q_A^\alpha) 8 q_U \ 2 \ [q_A^{\alpha\alpha}; q_B^{\alpha\alpha}]$$

This holds if $U_A(q; q) \ i \ U_B(q; q)$ is decreasing in q since $q_A^\alpha = q_B^\alpha$ for $\overline{}_A = \overline{}_B$ and $q_U < q_A^\alpha = q_B^\alpha$ (see equation (11)). Notice that

$$U_A(q; q) \ i \ U_B(q; q) = cte \ i \ \int_0^q {}^1 (1 \ i \ \pm)^2 [\tau \ i \ \underline{c}] \frac{!^2 \ i \ 1}{!} {}^\circledR q g(q)$$

which is obviously decreasing in q. ∎

Proof of Proposition 5

Let $! > 1$ and $\overline{}_A = \overline{}_B$. The case without corruption ($\overline{}_A \ ! \ 1$ and $\overline{}_B \ ! \ 1$) is just a special case of $\overline{}_A = \overline{}_B$. Since $q_B^{\alpha\alpha} \ 2 \ \arg\max U_B(q; q)$, it is the case that $U_B(q_B^{\alpha\alpha}; q_B^{\alpha\alpha}) > U_B(q_B^\alpha; q_A^\alpha)$. This and part (ii) of Lemma 4 implies that $U_A(q_B^{\alpha\alpha}; q_B^{\alpha\alpha}) > U_A(q_A^\alpha; q_B^\alpha)$. Therefore, $q_B^{\alpha\alpha}$ is always a possible outcome for q_U. ∎

Proof of Lemma 5

By lemma 1 if $^\circledR_A = {}^\circledR_B$ and $\overline{}_A > \overline{}_B$, $q_B^{\alpha\alpha} < q_A^{\alpha\alpha}$. By lemma 5 if $\overline{}_A = \overline{}_B$ the more e±cient country chooses a lower $q_i^{\alpha\alpha}$. If $! < 1$, the two e®ects reinforce each other, hence $q_B^{\alpha\alpha} < q_A^{\alpha\alpha}$. If $! > 1$ the two e®ects go into di®erent directions, therefore the ambiguity. ∎

Proof of Proposition 6:

Country A will not form a union for any q_B^α such that:

$$i \underbrace{\frac{t_A(q_A^\alpha) + {}^1 \ i \ {}^D_A(q_A^\alpha; !)}{z}}_{W_1(q_A^\alpha; !)} + i \underbrace{\frac{{}^1 \ i \ {}^F_A(q_B^\alpha; !)}{z}}_{W_2(q_B^\alpha; !)} > i \underbrace{\frac{t_A(q_A^{\alpha\alpha}) + {}^1 \ i \ {}^D_A(q_A^{\alpha\alpha}; !) + {}^1 \ i \ {}^F_A(q_A^{\alpha\alpha}; !)}{z}}_{W_3(q_A^{\alpha\alpha}; !)}$$

or equivalently

$$W = i \int_{q_A^{\alpha\alpha}}^{q_A^\alpha} 1 \ i \ \pm \ \mu 1 \ i \ \frac{{}^{\circledR 2} [\tau \ i \ \underline{c}] q}{\overline{}_A} \P \ {}^{\circledR 2} [\tau \ i \ \underline{c}] q g(q) dq + \int_{q_A^{\alpha\alpha}}^{q_A^\alpha} (1 \ i \ \pm) k q(g) dq$$

$$i \ {}^1 \int_{q_A^{\alpha\alpha}}^{q_B^\alpha} (1 \ i \ \pm)^\circledR (! \ i \ ^\circledR) [\tau \ i \ \underline{c}] q g(q) dq + {}^1 \int_{q_A^{\alpha\alpha}}^{q_A^\alpha} (1 \ i \ \pm) {}^{\circledR 2} [\tau \ i \ \underline{c}] q g(q) dq > 0$$

$W = 0$ defines $\overline{q}_B^{\text{¤}}$ which corresponds to a $\overline{}_B^{\text{¤}}(!)$. By the implicit function theorem:

$$\frac{@\overline{}_B}{@!} = ¡ \frac{\frac{@W}{@!}}{\frac{@W}{@\overline{}_B}} = ¡ \frac{\frac{@W_1(q_A^{\text{¤}};!)+@W_2(q_B^{\text{¤}};!)¡@W_3(q_A^{\text{¤¤}};!)}{@!}}{\frac{@W_1(q_A^{\text{¤}};!)+@W_2(q_B^{\text{¤}};!)¡@W_3(q_A^{\text{¤¤}};!)}{@\overline{}_B}}$$

The numerator can be rewritten as

$$\frac{@W(!)}{@!} = ¡^1 \int_{q_A^{\text{¤¤}}}^{q_B^{\text{¤}}} (1 ¡ \pm)^{\circledR} [\overline{c} ¡ \underline{c}] qg(q)dq < 0$$

The denominator can be calculated explicitly as:

$$\underbrace{\frac{@W_1(q_A^{\text{¤}};!)}{@q_A^{\text{¤}}}}_{=0}\frac{@q_A^{\text{¤}}}{@\overline{}_B} + \underbrace{\frac{@W_1(q_B^{\text{¤}};!)}{@q_B^{\text{¤}}}}_{<0}\underbrace{\frac{@q_B^{\text{¤}}}{@\overline{}_B}}_{>0} ¡ \underbrace{\frac{@W_1(q_A^{\text{¤¤}};!)}{@q_A^{\text{¤¤}}}}_{=0}\frac{@q_A^{\text{¤¤}}}{@\overline{}_B} < 0$$

Hence

$$\frac{@\overline{}_B}{@!} < 0$$

∎

B   Data Appendix

B.1   Corruption in the EU

The following table summarizes the corruption perception index (source: Transparency International) The corruption perception index varies between 0 and 10. The higher the index, the less corrupt a country. Luxembourg is omitted due to the lack of data.

country	1995 CPI	1996 CPI	1997 CPI
A	7.13	7.59	7.61
B	6.85	6.84	5.25
D	8.14	8.27	8.23
DK	9.32	9.33	9.94
E	4.35	4.31	5.9
F	7.0	6.96	6.66
FIN	9.12	9.05	9.48
GR	4.04	3.42	5.35
I	2.99	5.01	5.03
IRL	8.57	8.45	8.28
NL	8.69	8.71	9.03
P	5.56	6.53	6.97
S	8.87	9.08	9.35
UK	8.57	8.44	8.22

B.2 The Standard Eurobarometer Surveys

The Standard Eurobarameter surveys are conducted on behalf of the European Commission twice a year. The regular sample size is 1000 people aged ¯fteen years and over per country.[20] While a set of identical questions is asked in each Member State in each survey, the set of questions di®er with di®erent surveys. The following two questions are of interest for our theoretical model:

1. (the second question of) the so-called Eurodynamometer, namely: \Which (speed of European Uni¯cation) corresponds best to what you would like?"

   Responses can be graduated from 1=stand still to 7=as fast as possible.

2. support for enlargement of the European Union: \Do you favor each of the following countries becoming part of the European Union in the future?"

   Three answers are possible (i) in favor, (ii) against, (iii) don't know.

B.2.1 Eurodynameter

The Eurodynameter ranges from 1=stand still to 7= as fast as possible. The table below

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[20]Exceptions are Germany (1000 in former East and 1000 in former West Germany) and UK (1000 in Britain and 300 in Northern Ireland).

reports the country averages. The data is taken from the Standard Eurobarometer 44, 46, and 48.

country	integration 1995	1996	1997
A	3.95	4.73	4.56
B	4.59	4.47	4.42
D	4.28	4.03	4.1
DK	3.92	3.64	4.42
E	5.41	5.32	5.39
F	4.82	4.59	4.86
FIN	3.9	3.73	3.84
GR	5.7	5.41	5.59
I	5.63	5.54	5.58
IRL	5.1	5.0	4.88
NL	4.9	4.56	4.86
P	5.15	5.53	5.72
S	3.82	3.71	3.89
UK	4.41	3.85	3.51

B.2.2   Support for enlargement and corruption

The following table reports the corruption perception index (CPI) of potential new members of the European Union and their degree of acceptability on average for European Union members (EU15). The data for support for enlargement (EU15) is taken from Eurobarometers 51, 49, 47 and 45. The first value refers to the percentage of EU members who are in favor of entry of the potential new EU member, the second value refers to the precentage who are against this enlargement.

	1999		1998		1997		1996	
	CPI	EU15	CPI	EU15	CPI	EU15	CPI	EU15
Switzerland	8.9	70-13	8.9		8.61	72-12	8.76	72-14
Norway	8.9	70-12	9.0		8.92	69-13	8.87	70-15
Estonia	5.7		5.7	41-32				
Hungary	5.2	46-31	5.0	53-24	5.18	49-28	4.86	51-30
Czech R.	4.6	40-35	4.8	48-28	5.2	43-33	5.37	44-36
Poland	4.2	43-35	4.6	49-29	5.08	46-33	5.57	49-33
Lithuania	3.8	35-39		41-33		35-37		37-40
Slovak R.	3.7	35-39	3.9	43-32		36-38		38-41
Turkey	3.6	29-47	3.4		3.21	32-45	3.54	36-44
Latvia	3.4	35-38	2.7	41-32		36-37		38-39
Bulgaria	3.3	35-40	2.9	42-33		37-37		37-42
Romania	3.3	33-43	3.0	39-37	3.44	35-42		38-42

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