

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 different, the more honest country, which benefits less from integration, will not be willing to join the union. This difference in corruption propensities can be offset by a difference in efficiency. We also show that integration has the positive effect of reducing corruption.

Keywords: Corruption, procurement, economic integration

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1 Introduction

This paper formalizes the institutional hypothesis that economic integration is more attractive for countries with internal problems and little trust in their national government than for well-functioning countries. These countries are less reluctant to transfer sovereignty to a supernational organization since their national institutions are not very reliable.¹ A casual look at the data suggests that this might indeed be the case in the European Union (EU). Figure 1 plots the corruption perception index (CPI) as a proxy for a nation's trust in their institutions against the national means of desired speed of integration for the EU countries averaged over the period 1995-1997.² The figure suggests a strong negative linear relationship between the desired rhythm of integration and the index of corruption.³ Since a higher CPI implies less corruption, this relationship is consistent with the institutional hypothesis.

Include Figure 1 around here

In our model we will use corruption to represent internal problems of a country. 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 confirm the negative effects of corruption on the amount of private investment (Mauro (1995)), the quality of public investment (Tanzi and Davoodi (1997)) and the investment in human capital (Mauro (1998)).

For the sake of tractability we will study a two country model and only allow for corruption in public procurement.⁴ Public procurement is an important part of a country's economic activities

¹The institutional hypothesis has been defined e.g. in Sanchez-Cuenca (2000).

²For more details and the underlying data see Appendix B1 and B2.

³This linear relationship has been confirmed 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. Sanchez-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 is a highly significant explanatory variable for the level of ProEuropeanness.

⁴Rose-Ackerman's (1975) seminal paper on corruption also concentrated on public procurement.

(between 10% and 20% of GDP in most industrial countries)⁵ 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 difficult to detect.

In our model, the citizens delegate to an official (bureaucrat) the responsibility to implement public procurement contracts. The commodity or public project can either be bought from a local firm at a fixed 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 fixed organizational cost that is private information of the bureaucrat. Competitive bidding is optimal if its organizational cost is low compared to the size of the project. Otherwise, fixed price purchase is optimal.⁶ However, our bureaucrat 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 their bureaucracy. They use the political system to control the bureaucracy through the determination of a threshold (the size of the public project above which each bureaucrat is obliged to organize international competitive bidding). Voters pay the same taxes per capita but benefit to different extents from the profits of the domestic firm. 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 level of the discretion granted to its bureaucracy. This is intuitive, since the cost of foregoing the private information of a bureaucrat 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 an international auction has to be organized. This approach mimics the existing legislation on public

⁵The cost of public projects administrated by the European Union is around 720,000 millions 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, Denmark and Belgium together.

⁶Various factors may justify choosing sole source procurement instead of competitive procurement. The administrative cost may be lower, sole source procurement is faster and there might be positive strategic effects, e.g. repeated sole source procurement might reduce moral hazard problems due to the threat of awarding future projects to foreign firms. For a discussion of this issue in the public procurement setting see McMillan (1998). See also Marshall et al. (1994) and Auriol (1998) who assume (like the present paper) that sole source procurement has lower transaction costs than competitive procurement.

procurement in the European Union: the member countries are obliged to use an international contest if the size of the public project exceeds 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 trade-driven prisoner's dilemma. As in the standard literature, our median voters (who define the preferences of the domestic governments) only care about the profit of the national firms. 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 bureaucrats; the common threshold is lower than all individual thresholds. Less discretion leaves less room for corruption, hence is valued more by countries that have little trust in their national bureaucracy. However, the new discretion threshold is less attractive for the less corrupt country which is now obliged to use competitive procurement more often, disregarding the private information of its better bureaucrats. The less corrupt country might therefore not be willing to join the union. This difference in corruption propensities can be offset by a difference in efficiency, if the less corrupt country has a technological advantage and therefore benefits more from trade.

The above argument summarizes the main idea of the paper and also applies to more general setups. All that is needed is a potential surplus from the adaptation of common rules. These common rules reduce the national discretion and different countries will have different opportunity costs of reducing their discretion. Therefore the model itself could be generalized to include a wide range of cases and variables. For example, allowing for corruption in the private sector or political corruption would lead to similar results. The union will favor competition (e.g. by limiting tariffs or by reducing government subsidies to national firms), thereby reducing the possibility of corruption. This is all that is required for our model to work, and it is a feature not restricted to public procurement. Therefore, our focus on public procurement does not seem very restrictive.

Our model of corruption is related to the literature on favoritism in public procurement and the literature on the formation of economic unions and preferential trade agreements. Our procurement model is similar to that of Auriol (1998) who examines the optimal delegation framework to efficiently respond to the risk of corruption. The present paper adds two dimensions to Auriol (1998): it considers how the corruption problem in procurement affects the incentives of countries to form an economic union and it introduces the costs of democracy by replacing the benevolent abstract principal of Auriol (1998) by voters who regulate the government agent via a simple but sub-optimal mechanism.⁷ This simple mechanism is interesting to study because it is easy to enforce and because it nicely mimics the existing legislation of the European Union.

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.⁸ 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. Lafont and Tirole (1991) relate favoritism to 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 that collusion with the domestic firm is most likely, this implies favoritism towards the domestic firm. Using a similar model, Vagstad (1995) introduces a superprincipal (e.g. an economic union) into a context where governments care about domestic profits, as

⁷As a referee pointed out the median voter approach is not necessary to get our results. A three-tier-hierarchy where the top layer has a preference for cost savings over domestic profits and domestic profits over foreign profits would yield the same results. The advantage of using the median voter approach is that it provides a rationale for the preferences of the top layer in the hierarchy. This top layer is not a social planner (is not maximizing social welfare).

⁸Trionfetti (2000) shows that the data provide overwhelming evidence that the import shares of commodities and goods in the public sector (e.g. computers, cars, airplanes, etc...) are systematically lower than the import shares of the private economy, strongly suggesting the presence of some form of pervasive discriminatory behavior.

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 can also be regarded as a contribution to the literature on the formation of an economic union and other preferential trade agreements.⁹ We show that technological differences on their own cannot destroy the incentives to form a union. However, differences in corruption propensities may do so. To our knowledge, this negative aspect of corruption has not been analyzed before.

The remainder of the paper is organized as follows: in Section 2 the general model is described and solved for the case of homogeneous firms, i.e. both countries have access to the same production technology. Section 3 discusses the case of heterogeneous firms. Section 4 concludes. All proofs are relegated to a technical appendix.

2 The model

We set up a simple two-country model to study the implications 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 bureaucrats the responsibility to implement procurement contracts, which are fully financed by collecting taxes t from domestic residents (voters). The size of the procurement project $q \in [0, \bar{q}]$ 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 $c_i \in [c, \bar{c}]$ is marginal cost. Firm i has low marginal cost c with probability θ_i and high marginal cost \bar{c} with probability $1 - \theta_i$. The price of the project depends on its cost and the procurement process used. For the sake of simplicity we assume that the project is sufficiently important that it must be undertaken. Hence, the bureaucrat can either buy the

⁹For a nice literature review on preferential trade agreements see Bhagwati et al. (1998).

project at the high-cost price \bar{c}_q from the domestic firm or sell the project on the international market by organizing a second-price auction without a reserve price.¹⁰ Competitive bidding decreases the expected purchase cost. However, it involves a fixed organizational cost which is a random variable.¹¹ This organizational cost mainly captures administrative costs, costs for publicity and costly delays (c.f. Auriol (1998)). 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 Marshall et al. (1994) we assume that the exact cost of organizing the auction is private information of the domestic bureaucrat and will be equal to zero (low) with probability $\frac{1}{2}$ and k (high) with probability $1 - \frac{1}{2}$. We normalize $q = 0$. This normalization is without loss of generality.

The bureaucrat has to choose which procurement process to use. By assumption it is always cheaper to organize an auction if the organizational cost is low. For high organizational costs 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 bureaucrat's decision through the determination of a project size q^* above which competition on the international market is required. In other words, for $q > q^*$, the bureaucrat is obliged to organize the second-price auction. For $q < q^*$, the bureaucrat can choose between sole-source or competitive procurement. In the latter case, an honest bureaucrat will make optimal use of her private information and organize an auction if and only if the organizational cost is low.¹² However, bureaucrats are self-interested and might not be honest if corruption maximizes their expected utility. If the organizational cost is low, a corrupt bureaucrat makes a take-it-or-leave-it bribe demand to the domestic firm.¹³ If no bribe is paid, the project goes to the second-price

¹⁰This second price auction is not optimal given the assumptions of the model. Using sequential offers would reduce costs without risking no production. First offer the contract to one of the firms at price \underline{c} . Then, if the firm rejects, buy from the other firm at price \bar{c} . However, this is an artifact of using a two-point cost distribution and would not be generalizable. We therefore do not consider sequential offers but a second-price auction instead.

¹¹The assumption that there is only one single firm in each country is made for simplicity. We would get the same results with domestic competition as long as organizing a domestic competition for procurement is cheaper than organizing an international auction.

¹²We refer to this decision as optimal because it maximizes the utility of the median voter as will be seen later. This decision is not the decision a utilitarian social planner would implement nor does it minimize costs.

¹³We do not consider the problem of extortion, i.e. the possibility that the bureaucrat pretends that organizational costs are low when they are high. Under extortion the government bureaucrat makes a bribe demand to the domestic firm claiming low organizational costs and threatens to organize an auction if the bribe is not paid. Such bribes are not an equilibrium if the cost of running an auction is known by the bureaucrat ex ante and is observable ex post

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. We refer to this phenomenon as corruption. If the bureaucrat solicits a bribe, she pays an idiosyncratic cost τ_i which is uniformly distributed in each country with: $\tau_i \in [0; \bar{\tau}_i]$, where $\bar{\tau}_i$ is country specific and a measure of social honesty of country i .¹⁴

Voters use the political system to limit the discretion of the bureaucrats. Individuals pay identical taxes, but different individuals are affected in different ways by the profits π_i of the domestic firm. We model this by assuming that voters hold shares in the domestic firm. We assume that voters are uniformly distributed on a line segment: $\mu_i \in U[0; 1]$. 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 a continuous function of μ_i with two assumptions: (i) There is a location $\bar{\mu}$ such that all voters located at $\mu_i < \bar{\mu}$ have no shares, (ii) the distribution of shares is linear $A\mu_i + B$ and increases with voter's location, i.e. it is highest at $\mu_i = 1$. These two assumptions imply that a voter located at μ_i ; with $\mu_i > \bar{\mu}$ has $\frac{2(\mu_i - \bar{\mu})}{(1 - \bar{\mu})^2}$ shares.¹⁵ We assume that $\bar{\mu} < \frac{1}{2}$, hence 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 $\theta_M = \frac{2(\frac{1}{2} - \bar{\mu})}{(1 - \bar{\mu})^2}$ shares of the firm. Since $\theta_M < 1$ 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 country chooses the level of (as we assume). Under these assumptions a high cost auction would be a direct proof of (extortion) corruption. However, extortion may arise if the bureaucrat only receives an imperfect signal on organizational cost or if the cost of running an auction is not ex post observable (for example because it might be difficult to disentangle the cost of running an auction from other costs). While introducing extortion would complicate the presentation of the model and it would increase the cost of providing discretion to the bureaucrats, we do not expect any changes in the qualitative results of the model. For a model in which extortion is considered explicitly, see Auriol (1998).

¹⁴The parameter τ_i summarizes potential costs of corruption. The distributions of these idiosyncratic costs τ_i are likely to differ across countries. For example, τ_i includes the cost of being caught and punished. This cost must depend on the effectiveness of the country's legal system. τ_i also includes psychological and social costs (social norms) and these costs are likely to depend on the religion, cultural traditions and political institutions, etc....

¹⁵The distribution of shares is continuous and all voters located at $\mu_i < \bar{\mu}$ have no shares, hence (i) $A\bar{\mu} + B = 0$. The sum of shares has to be a constant and can be normalized to 1, therefore we obtain a second constraint on the distribution of shares: (ii) $\int_{\bar{\mu}}^1 (A\mu_i + B)d\mu_i = 1$: Solving this system we obtain, that a voter located at μ_i ; with $\mu_i > \bar{\mu}$ has $\frac{2(\mu_i - \bar{\mu})}{(1 - \bar{\mu})^2}$ shares.

discretion of his own country by maximizing $\pi_i + \alpha_M \pi_i^D$, where π_i^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.¹⁶ Any common level of discretion that is efficient and individually rational will be considered as a feasible outcome of the negotiations.¹⁷

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

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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^a granted to the bureaucrat and the cost of organizing the auction is low. For the sake of simplicity we assume that the bureaucrat has all the bargaining power and none of the surplus of corruption is lost.¹⁸ The corrupt bureaucrat knows that a high cost firm \bar{c} cannot pay any positive bribe.

¹⁶Notice that in our model the median voter defines the preferences of the government. Hence negotiation among median voters is equivalent to negotiation among governments.

¹⁷An alternative procedure to determine the level of discretion in the union could be to implement the choice of the median voter of the union. It can be shown that the preferences of the median voter of the union have to be between the preferences of the two median voters of each country. Therefore, the choice of the median voter of the union is one of the feasible outcomes of our bargaining procedure.

¹⁸This assumption is not essential for the results of the model.

She will therefore ask for a bribe which makes the low cost firm indifferent between rejecting or accepting the bribe. The ex-ante (expected) profit of the low cost firm if the bribe demand is rejected equals its expected profit in the second price auction, namely $(1 - \theta_j)[\bar{c}_i - c]q$. If the firm were directly awarded the project (without any bribe being demanded) it would make profits $[\bar{c}_i - c]q$. The difference between the latter and the expected profit in the auction determines the bribe demand which is $\theta_j[\bar{c}_i - c]q$. Given this bribe demand, a bureaucrat will be honest (dishonest) if the surplus from corruption is smaller (larger) than her personal cost of being corrupt δ . We assume that the bureaucrat has to incur this personal cost if a bribe demand is made, independently of its being accepted. Hence for $\delta < \theta_i \theta_j [\bar{c}_i - c]q$, corruption occurs, while for $\delta > \theta_i \theta_j [\bar{c}_i - c]q$ the bureaucrat will be honest.¹⁹ Using this cut-off point and the fact that the distribution of τ is uniform, we can characterize the probability of corruption $\rho_i(q)$ in country i as:

$$\rho_i(q) = \frac{\theta_i \theta_j [\bar{c}_i - c]q}{\delta}$$

Notice that $\rho_i(q)$ 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 ρ_i given a level of discretion q_i^d

$$\rho_i = \int_0^{q_i^d} \rho_i(q) g(q) dq = \frac{\theta_i \theta_j [\bar{c}_i - c]}{\delta} \int_0^{q_i^d} q g(q) dq$$

where $\int_0^{q_i^d} q g(q) dq$ can have a probability interpretation as $P(q < q_i^d) E\{q | q < q_i^d\}$; $P(q < q_i^d)$ is the probability that the size of the project is below the level of discretion q_i^d , and that there is an opportunity for corruption; $E\{q | q < q_i^d\}$ is the average size of the project conditioning on $q_i < q_i^d$. The higher the discretion threshold q_i^d , the higher the aggregate probability of corruption. A higher threshold level of discretion provides more opportunities for corruption (it is more likely that $q_i < q_i^d$). Moreover, the stake for collusion is larger since corruption can occur for larger

¹⁹We do not consider the possibility that the salary of the bureaucrat depends on the total cost of the public project, i.e. that the bureaucrat 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.

projects.. Trivially, if both countries have a common discretion threshold, the country with a higher level of social honesty \bar{c}_i will be less corrupt.

The procurement stage

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

1. If $q > q^*$, the bureaucrat must organize a second price auction. The expected cost of the project is:

$$(\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}]) q + (1_i \pm) k:$$

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 $(\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}]) q$. Additionally, the cost of organizing the auction has to be paid.

2. If $q < q^*$, the bureaucrat can choose whether to use competitive or sole source procurement leading to the following expected cost of the project:

$$(1_i \pm) \bar{c} q + \pm [\circ_i(q) \bar{c} + (1_i \circ_i(q)) (\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}])] q:$$

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 $(1_i \circ_i)$, the bureaucrat is honest and the expected price of the auction is $(\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}]) q$: With probability \circ_i , the bureaucrat 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.

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

$$\begin{aligned} t &= \int_0^{q_i^*} \pm [\circ_i(q) \bar{c} + (1_i \circ_i(q)) (\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}])] q g(q) dq \\ &+ \int_0^{q_i^*} (1_i \pm) \bar{c} q g(q) dq + \int_{q_i^*}^{\bar{q}} [(\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}]) q + (1_i \pm) k] g(q) dq \\ &= (\bar{c}_i \otimes_i \otimes_j [\bar{c}_i \underline{c}]) q_M + \int_0^{q_i^*} [1_i \pm (1_i \circ_i(q))] \otimes_i \otimes_j [\bar{c}_i \underline{c}] q g(q) dq + \int_{q_i^*}^{\bar{q}} (1_i \pm) k g(q) dq \end{aligned}$$

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^a . 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 .

$$\begin{aligned} \pi_i^D &= \int_0^{q_i^a} [\alpha_i(1 - \beta_j)] [\bar{c}_i - c] q g(q) dq + \int_0^{q_i^a} (1 - \alpha)^{\beta_i} [\bar{c}_i - c] q g(q) dq \\ &\quad + \int_{q_i^a}^{\bar{q}} \beta_i(1 - \beta_j) [\bar{c}_i - c] q g(q) dq \\ &= \beta_i(1 - \beta_j) [\bar{c}_i - c] q_M + \int_0^{q_i^a} (1 - \alpha)^{\beta_i} \beta_j [\bar{c}_i - c] q g(q) dq \end{aligned}$$

π_i^D increases with the domestic level of discretion q_i^a , since the higher q_i^a , 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.²⁰

$$\begin{aligned} \pi_i^F &= \int_0^{q_j^a} \alpha_i(1 - \beta_j) [\bar{c}_i - c] q g(q) dq + \int_{q_j^a}^{\bar{q}} \beta_i(1 - \beta_j) [\bar{c}_i - c] q g(q) dq \\ &= \beta_i(1 - \beta_j) [\bar{c}_i - c] q_M + \int_0^{q_j^a} (1 - \alpha)^{\beta_i} (1 - \beta_j) [\bar{c}_i - c] q g(q) dq \end{aligned}$$

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

The choice of discretion

The level of discretion is chosen given the expected costs of the procurement stage and the expected profit of the firms. We will now analyze the choice of q^a 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 differ in the social level of honesty α but have access to the same production technology, i.e. firms are homogeneous in the sense that $\beta_i = \beta_j = \beta$. This simplification allows us to isolate the

²⁰This result is a direct consequence of our assumption that the corrupt bureaucrat 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.

effects of different propensities for corruption on the desirability of an economic union. The case of heterogeneous firms will be analyzed in Section 4. Without loss of generality we assume that $\bar{c}_A > \bar{c}_B$.

2.1 Homogeneous firms without a union

In the absence of a union, each country votes for its own q^a 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 profits of the domestic firm, since he owns θ_M shares of the firm. Hereafter, we will write θ instead of θ_M for notational simplicity. We denote by $U_i(q_i; q_j) = \theta t_i(q_i) + \theta \tau_i^D(q_i) + \theta \tau_i^F(q_j)$ 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 influence on the level of discretion in the foreign country and therefore takes it as given. His maximization problem therefore reduces to:

$$\max_{q_i} \theta t_i + \theta \tau_i^D:$$

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

$$\theta^2 [\bar{c}_i - \underline{c}] q_i^a - \theta (1 - \theta) \theta \frac{\partial^2 [\bar{c}_i - \underline{c}] q_i^a}{\partial q_i^2} + \theta (1 - \theta) k' + (1 - \theta) k' g(q_i^a) = 0 \quad (1)$$

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

$$q^{aNC} = \frac{k}{\theta^2 [\bar{c}_i - \underline{c}] (1 - \theta)}:$$

The level q^{aNC} is easily interpreted. $\theta^2 [\bar{c}_i - \underline{c}] (1 - \theta) q^{aNC}$ 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 $q > q^{aNC}$ it is always optimal to organize the auction, while for $q < q^{aNC}$ it is optimal to use sole-source procurement when the cost of organizing the auction is high. q^{aNC}

is increasing in the cost of organizing an auction. The level q^{NC} is also increasing in the number of shares $\bar{1}$ 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 θ), 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 $\bar{\omega} < 1$. Using the implicit function theorem it can be shown that the above comparative static results are also valid for q_i^a 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 $\bar{\omega}_A > \bar{\omega}_B$, then $q_A^a > q_B^a$.

Proposition 1 tells us that corruption has a shadow cost, namely the private information of the bureaucrat is not used optimally. The bigger the level of social honesty, the bigger the opportunity cost to disregard the private information of the bureaucrat concerning the organizational cost of the auction and therefore the higher the discretion.

2.2 An economic union with homogeneous firms

If countries A and B form a union they fix a common level of discretion²¹ q_U^a , which is determined in bilateral negotiation. We consider any level of discretion q_U^a as a possible outcome of the bilateral negotiation if it is feasible according to the following definition.

Definition 1 q_U^a is a feasible outcome of the bilateral negotiation if it satisfies the following two conditions:

1. efficiency:

²¹This model fits the case of the European Union very well (see introduction).

there exists a $\lambda \in (0, 1)$ such that $q_U^* = 2 \arg \max \left\{ \lambda U_A(q_U; q_U) + (1 - \lambda) U_B(q_U; q_U) \right\}$

2. individual rationality (participation constraint):

$$U_i(q_U^*; q_U^*) \geq U_i(q_i^*; q_j^*) \quad \forall i, j \in \{A, B\}$$

Definition 1 states that the union should be efficient and that no participant should be made worse off by joining the union. These requirements are satisfied by most bargaining schemes.

Let $q_i^{**} = 2 \arg \max \{U_i(q; q)\}$ 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:

$$\max_q \left[t_i + \lambda \left(\frac{D}{P} + \frac{F}{P} \right) \right]$$

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

$$2\lambda \left[\frac{D}{P} - \frac{C}{P} \right] q_i^{**} - \lambda (1 - \lambda) \frac{2\lambda \left[\frac{D}{P} - \frac{C}{P} \right] q_i^{**}}{1 - 2\lambda \frac{1}{P}} + (1 - \lambda) \frac{(1 - \lambda) \frac{D}{P}}{1 - 2\lambda \frac{1}{P}} + (1 - \lambda) k' g(q_i^{**}) = 0 \quad (2)$$

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

$$q_i^{**NC} = \frac{k}{2\lambda \left[\frac{D}{P} - \frac{C}{P} \right] \left(1 - 2\lambda \frac{1}{P} \right)}$$

Since $\frac{2\lambda - 1}{P} < 1$, $q_i^{**NC} < q_i^{**NC}$. 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 benchmark case both countries are identical. Therefore,

Proposition 2 (i) Without corruption ($\lambda = 1$) a union will always be formed.

(ii) The common level of discretion in the union without corruption is q_i^{**NC} .

With corruption ($\lambda < 1$), 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) $q_i^{**} < q_i^{**NC}$

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

Since the median voter can affect the profits of the domestic firm abroad, he would choose a lower level of discretion to benefit from increased possibilities of trade (Part (i) Lemma 1). This ideal level of discretion is lower than the level of discretion in the absence of corruption due to the shadow cost of corruption mentioned in Proposition 1 (Part (ii) Lemma 1). The final part of Lemma 1 shows how different propensities towards corruption can cause a potential conflict 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 bureaucrats. Given this potential conflict 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^* according to Definition 1 and Lemma 1.

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

1. $q_B^{**} < q_U^* < q_A^{**}$

2. $q_U^* < q_B^* (< q_A^*)$

The first condition is implied by the requirement of efficiency in Definition 1. The second condition is due to the participation constraint of the less corrupt country. If $q_U^* > q_B^*$, the less corrupt country would not have any benefits 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 $q_U^* < q_B^*$ Corollary 1 is immediate.

Corollary 1 The aggregate probability of corruption j_i is lower in a union than without a union in both countries and $j_A < j_B$ for $\bar{\alpha}_A > \bar{\alpha}_B$.

The union promotes competition by decreasing the level of discretion of both countries' bureaucrats. 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 effect 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 benefits more than the less corrupt country. Hence for $\bar{\alpha}_A > \bar{\alpha}_B$ country B benefits more than country A.

The reduction of discretion is more costly for a country that has more confidence in its bureaucrats, since a lower level of discretion reduces the possibility of using the private information of the bureaucrat in an efficient way. Moreover, the benefits 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 $q_A^* > q_B^*$.) Since the benefits 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 $\bar{\alpha}_A > \bar{\alpha}_B$ there exists a $\bar{\alpha}_B^* < \bar{\alpha}_A$ such that $\bar{\alpha}_B < \bar{\alpha}_B^*$ no union is possible. In other words, if country B is too corrupt, country A will not agree to form a union.

Therefore we can conclude that corruption can destroy the incentives to form a union. To be more precise, it is not the existence of corruption as such but rather the difference in corruption propensities that hinders the formation of a union. This result is driven by the conflict of interest created by differences in corruption and by the fact that a union imposes a common level of discretion.²²

²²If this restriction were abandoned, a union would always be formed. Hence, our common rule assumption blocks the formation of potentially useful unions. A look at the European union suggests that both separate and common

The most important assumption leading to the above results is that we do not consider direct costs of integration in our model (although we can regard the constraint of using a common level of discretion as an indirect cost of integration). However, integration might involve some direct costs, e.g. the cost of setting up a central regulatory agency. Vagstad (2000) models this direct cost of integration as a fixed cost resulting from setting up common institutions. If we applied his idea to our model, integration would only happen if the potential gains from trade outweigh these fixed costs and the costs of ignoring the private information of the bureaucrat. However, for each fixed cost of integration there would still exist a (potentially zero) threshold $\bar{\alpha}_A$ $\bar{\alpha}_B$ on the differences in corruption propensities above which the less corrupt country will not agree to form a union.

3 Heterogeneous firms

Before concluding it is important to underline how our results change if countries also differ in another aspect, namely in the level of efficiency of their firms ($\theta_A \neq \theta_B$). We will only give the intuition for the results. The formal analysis can be found in working paper version of this article (Ganuza and Hauk, 2001).

We first discuss whether efficiency differences on their own can hinder the formation of a union. Technological differences may produce a conflict of interest related to the choice of the common procurement legislation but they do not destroy the incentives to form a union. The potential conflict of interests stems from the fact that the country with the efficiency advantage wants more openness towards trade since it has better chances of winning the international competition. But also the less efficient country is willing to reduce discretion to some extent if a union is formed because it can thereby influence the foreign profits of its domestic firm, i.e. internalize some of rules exist. While countries have discretion in some policies (for example in deciding the national taxes) there are other policies in which all the countries have to accomplish with a common rule (for example the common discretion threshold for procurement). The existence of common rules might be due to feasibility reasons: if diverse rules could be chosen every country would want a higher level of discretion for itself but a lower level of discretion for the other countries. Hence different rules may create envy or equity problems among countries. Moreover, there will be other costs associated to different rules, for example in the case of procurement different rules can distort firms' location decisions.

the negative trade externality. A union is always possible since the more efficient country prefers the less efficient country's ideal point for the union to the status quo (no union).

If countries also differ in their propensities towards corruption, differences in efficiency complicate the union formation if the country with the efficiency advantage is the more corrupt country and facilitate the union formation otherwise.²³ If the country with the efficiency advantage is the more corrupt country, the conflict of interests between the two countries is aggravated: the more corrupt country is more willing to disregard the private information of its bureaucrats and gains more from trade, hence wants a low level of joint discretion. But if the efficiency advantage belongs to the more honest country, the conflict of interests is mitigated since the country that is more reluctant to reduce discretion (the less corrupt country) benefits more from trade. 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.

4 Conclusion

Although corruption usually transcends the national level,²⁴ 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 studied the incentives of countries to form an economic union. We set up a theoretical model with several testable implications. (i) Since integration reduces corruption, our model suggests that corruption should be higher in countries where domestic firms are sheltered from foreign competition. (ii) Our model predicts that the more corrupt country benefits more from integration, hence more corrupt countries will be more in favor of integration than less corrupt

²³The formal proof of this result is only done for a particular parameterization for the cost difference, namely $\theta_A = \theta$ and $\theta_B = \frac{1}{\theta}$ with $\theta \geq 2$ ($\frac{\theta}{2}$) being a constant. As shown in the Working Paper with this parameterization the difference in efficiency between two countries does not affect their level of discretion chosen in the absence of a union. Hence, this 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.

²⁴International organizations have long recognized that corruption is a supranational problem: e.g. OECD countries recently approved the "Convention on Combating Bribery of Foreign Public Officials in International Business Transactions".

countries. (iii) Corruption can hinder the formation of a union by violating the participation constraint of the more honest countries. In other words, 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 very hard.

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 economic aspects of integration. While our model clearly follows the instrumental approach - support for integration is a function of its costs and benefits - we also consider that countries with better functioning political systems might be more reluctant to transfer sovereignty. To our knowledge this is the first 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

$$\frac{\partial q_i^*}{\partial \tau} = -i \frac{\frac{\partial^2 U}{\partial q_i \partial \tau}}{\frac{\partial^2 U}{\partial q_i^2}} > 0:$$

This concludes the proof since the case without corruption is equivalent to $\tau = 1$. ■

Proof of Proposition 2

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

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

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

■

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 $\frac{\partial q_i^{NC}}{\partial \tau_i} > 0$. ■

Proof of Lemma 2

Efficiency requires the following first order condition of q_U^a

$$\frac{\partial}{\partial q_U^a} [c_i q_U^a - (1 - \tau_i) q_i] + \frac{\partial}{\partial q_U^a} \left[\frac{\tau_i^2 [c_i q_U^a - (1 - \tau_i) q_i]}{2} \frac{\frac{3}{4} \bar{A} + (1 - \frac{3}{4}) \bar{B}}{\bar{A} - \bar{B}} + 1 \right] (1 - \tau_i) \frac{\partial q_i}{\partial q_U^a} + (1 - \tau_i) k' g(q_U) = 0 \quad (3)$$

Equation (3) is identical to equation (2) except for one term: in equation (3) $\frac{\partial}{\partial q_U^a} \left[\frac{\tau_i^2 [c_i q_U^a - (1 - \tau_i) q_i]}{2} \frac{\frac{3}{4} \bar{A} + (1 - \frac{3}{4}) \bar{B}}{\bar{A} - \bar{B}} + 1 \right]$ appears instead of $\frac{\partial}{\partial q_U^a} \left[\frac{\tau_i^2 [c_i q_U^a - (1 - \tau_i) q_i]}{2} \right]$: Hence, condition 1 follows from the following inequality

$$\frac{1}{\bar{A}} = \frac{\bar{B}}{\bar{A} - \bar{B}} < \frac{\frac{3}{4} \bar{A} + (1 - \frac{3}{4}) \bar{B}}{\bar{A} - \bar{B}} < \frac{\bar{A}}{\bar{A} - \bar{B}} = \frac{1}{\bar{B}}:$$

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

Proof of Corollary 1

Immediate given Lemma 2 ■

Proof of Proposition 3

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

$$\begin{aligned} & U_A(q_U^a; q_U^a) \geq U_A(q_B^a; q_B^a) + U_A(q_B^a; q_B^a) \geq U_A(q_A^a; q_B^a) \\ & < U_B(q_U^a; q_U^a) \geq U_B(q_B^a; q_B^a) + U_B(q_B^a; q_B^a) \geq U_B(q_B^a; q_A^a) \end{aligned} \quad (4)$$

A sufficient condition for (4) to hold is that the following two inequalities are satisfied.

$$U_A(q_B^a; q_B^a) - U_A(q_A^a; q_B^a) < U_B(q_B^a; q_B^a) - U_B(q_B^a; q_A^a) \quad (5)$$

$$U_A(q_U^a; q_U^a) - U_A(q_B^a; q_B^a) < U_B(q_U^a; q_U^a) - U_B(q_B^a; q_B^a) \quad (6)$$

(5) is immediate given $q_A^a \geq 2 \arg \max_q U_A(q; q_B) \geq 8q_B$; $U_A(q_B^a; q_B^a) - U_A(q_A^a; q_B^a) < 0$, and given that $U_B(q_B; q_A)$ is decreasing in q_A , $U_B(q_B^a; q_B^a) - U_B(q_B^a; q_A^a) > 0$

In order to show (6) we calculate $U_i(q_U^a; q_U^a) - U_i(q_B^a; q_B^a)$:

$$U_i(q_U^a; q_U^a) - U_i(q_B^a; q_B^a) = \int_{q_U^a}^{q_B^a} [1 - \pm(1 - \theta_i(q))]^{2\tau_i} \tau_i q g(q) dq - \int_{q_U^a}^{q_B^a} (1 - \pm) k g(q) dq - \int_{q_U^a}^{q_B^a} (1 - \pm)^{2\tau_i} \tau_i q g(q) dq + \int_{q_U^a}^{q_B^a} (1 - \pm)^{\tau_i} (1 - \theta_i) \tau_i q g(q) dq$$

We wish to show:

$$U_A(q_U^a; q_U^a) - U_A(q_B^a; q_B^a) - U_B(q_U^a; q_U^a) + U_B(q_B^a; q_B^a) < 0 \quad (7)$$

Using the above expression, (7) becomes:

$$\begin{aligned} & \int_{q_U^a}^{q_B^a} [1 - \pm(1 - \theta_A(q))]^{2\tau_A} \tau_A q g(q) dq - \int_{q_U^a}^{q_B^a} [1 - \pm(1 - \theta_B(q))]^{2\tau_B} \tau_B q g(q) dq \\ & = \int_{q_U^a}^{q_B^a} [\pm(\theta_A(q) - \theta_B(q))]^{2\tau_i} \tau_i q g(q) dq \\ & > 0 \text{ since } \theta_A(q) < \theta_B(q) \end{aligned}$$

This concludes the proof. ■

Proof of Proposition 4

Given $q_A^a \geq 2 \arg \max_q U_A(q; q_B) \geq 8q_B$, and $q_A^{aa} \geq 2 \arg \max_q U_A(q; q)$ we can define the following cutoff point q_B^a for the level of discretion chosen in the domestic context by country B reflecting τ_B :

$$U_A(q_A^a; q_B^a) = U_A(q_A^{aa}; q_A^{aa})$$

where $U_A(q_A^a; q_A^a)$ is the maximum expected utility that the median voter of country A can obtain by forming a union with B. Given that $U_A(q_A^a; q_B)$ is decreasing in q_B ; if $q_B^a < \bar{q}_B$, no union can be formed; the union violates country A's participation constraint. Define \bar{q}_B^a as the level of social honesty of country B that results in $q_B^a = \bar{q}_B$; where $q_B^a = 2 \arg \max_q U_B(q; q_A) - 8q_A$. We know that $\frac{\partial q_B^a}{\partial \bar{q}_B} > 0$, hence $\bar{q}_B < \bar{q}_B^a$ implies $q_B^a < \bar{q}_B$ and therefore country A's participation constraint is violated for $\bar{q}_B < \bar{q}_B^a$. ■

B Data Appendix

B.1 Corruption in the EU

Our data source for corruption is the corruption perception index (CPI) of Transparency International. CPI is based on different surveys that measure corruption within countries by gathering data about the subjective perception of corruption within the country itself (for details see Lapsdorf (1999)). The degree of corruption practised by nationals outside the country is not included in CPI. CPI is therefore the correct measure of corruption for our model since we exclude international corruption by assumption. CPI varies between 0 and 10. The higher the index, the less corrupt a country. The following table summarizes CPI for the EU countries. Luxembourg is omitted due to the lack of data.

country	1995	1996	1997
	CPI	CPI	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

Our data for the desirability of integration stems from the Standard Eurobarometer surveys. These surveys are conducted on behalf of the European Commission twice a year. The regular sample size is 1000 people aged fifteen years and over per country.²⁵ While a set of identical questions is asked in each Member State in each survey, the set of questions differ with different surveys. For Figure 1 we use 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. The table below reports the country averages. The data is taken from the Standard Eurobarometer 44, 46, and 48.

²⁵Exceptions are Germany (1000 in former East and 1000 in former West Germany) and UK (1000 in Britain and 300 in Northern Ireland).

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

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