A Theory of Economic Unions[*]

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April 2019

Preliminary and incomplete – not for circulation

Abstract

After decades of successful growth, economic unions and international policy coordination have recently become the focus of heightened political controversy. We argue that this is partly due to the changing nature of world trade. In the 20th century, a large share of this trade consisted of two-way trade within the same industry. In the 21st century, however, inter-industry trade has staged a comeback. We develop a novel theoretical framework to study the policies adopted by economic unions to promote market integration; their effects on inter- and intra-industry trade, productivity and income distribution; and the political forces that determine their endogenous adoption. Our model emphasizes the two-way causation between trade and trade-promoting institutions, and it helps interpret the process of European integration.

JEL Classification: F15, F55, F62, H77, D71, D78

Keywords: Economic unions, non-tariff barriers, European intergation

1 Introduction

The development of global markets increasingly relies on international institutions that provide common regulation to reduce or remove the frictions that hamper trade across national borders. The growing importance of these non-tariff barriers reflects, on the one hand, the decline of more obvious costs of international trade: progress in transportation and communication technology has steadily reduced shipping costs, while multilateral and regional trade agreements have brought tariffs down to an all-time low of 3% on average.[1] On the other hand, regulatory harmonization has grown more important with the increasing complexity of world trade. Recent decades have witnessed the growth of trade in tasks, with different stages of production located in different countries along global value chains. In the future, growth in international trade must increasingly lie in the service sector. Its importance is steadily growing, and it already accounts for almost two thirds of world output; yet it only accounts for less than a quarter of world trade, in part because many services—especially professional and financial services—are bound by distinct national regulations.[2]

The need for common policies to enable market integration and reap the gains from trade has led to the creation of international economic unions. Europe has been at the forefront of this institutional development. Establishing a common market was the core objective of the European Economic Community at its founding in 1957. Over the following six decades, what is now the European Union has grown from 6 to 28 member states, while steadily deepening economic integration and regulatory harmonization in its Single Market. Yet economic unions are far from an exclusively European phenomenon; on the contrary, they are found on every continent.[3] Moreover, recent trade agreements such as the EU–Japan Economic Partnership Agreement have increasingly emphasized regulatory cooperation, common standards and impartial enforcement procedures for the protection of

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[1] The world average of effectively applied tariff rates, weighted by the product import shares corresponding to each partner country, was 2.59% in 2017, as reported by the World Development Indicators.

[2] Over the decade to 2016, the share of services in world value added grew from 62% to 65%, as reported by the World Development Indicators. Developed countries had a similar pattern of growth (e.g., 74% to 77% for the US and 64% to 66% for the EU) and developing countries a steeper one (e.g., 43% to 52% for China). In 2016, the share of services in international trade was 23% on average, with higher figures for developed countries (e.g., 26% for the US and 29% for the EU, including intra-EU trade) and lower ones for developing countries (e.g., 16% for China).

[3] International economic unions, with varying levels of economic integration and institutional success, include the Caribbean Single Market (CARICOM), the Central American Common Market (SICA), and the Southern Common Market (Mercosur); the Central African Economic and Monetary Community (CEMAC) and the West African Economic and Monetary Union (UEMOA); the Eurasian Economic Union, the Gulf Cooperation Council, and the ASEAN Economic Community.
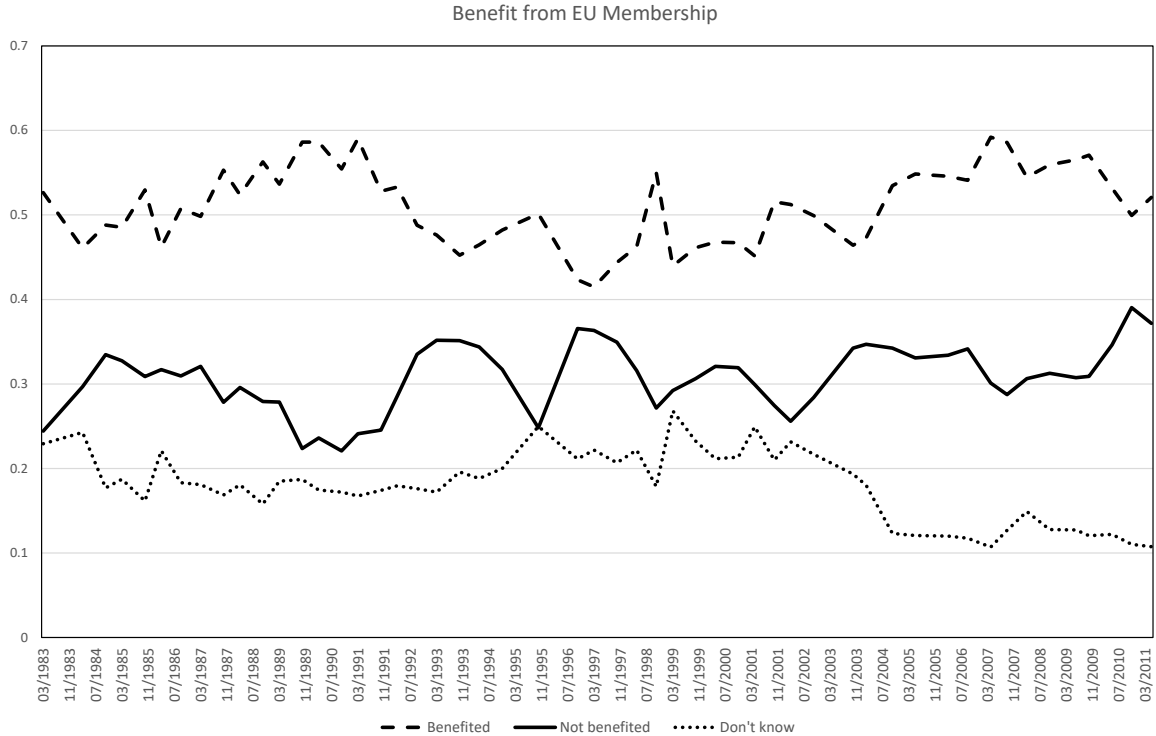
Figure 1: Perceived benefits from EU membership

Shares of responses to the question: "Taking everything into consideration, would you say that (your country) has on balance benefited or not from being a member of the European Union?" Source: Eurobarometer.

investors and intellectual-property owners.

After decades of successful growth, however, economic unions and international policy coordination have become the focus of heightened political controversy over the past few years. After the election of President Trump in 2016, the United States abandoned both the Trans-Pacific Partnership and the Transatlantic Trade and Investment Partnership. Also in 2016, the United Kingdom voted in a referendum to leave the EU. Euro-skepticism appears on the rise more broadly, and plans for the enlargement of the euro area are effectively on hold.

These setbacks do not mean that supranational institution are now facing a universal backlash, just as they did not previously enjoy universal support. Yet, they have become increasingly polarizing. Both President Trump and Brexit won narrow, unexpected and bitterly divisive victories at the polls. Eurobarometer surveys show that the share of European citizens who perceive net benefits of EU membership has remained quite steady over the decades; however, the share who perceive net costs has been gradually catching up, as the share of undecided respondents fell (Figure 1).

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Preference polarization over international economic integration is naturally linked to the changing nature of international trade. Throughout the second half of the twentieth century, a substantial share of world trade—and an even higher share of trade among developed countries in general and among EU member states in particular—consisted of two-way trade in products of the same industry. A key feature of such intra-industry trade is that it does not imply the reallocation of resources predicted by conventional models of trade driven by differences in factor intensities. Accordingly, one of the original motivations for developing new models of trade was the need to account for episodes such as the creation of the EEC, in which trade liberalization had faced little political opposition because it had led to rises in real income for all factors in all member states (Helpman and Krugman 1985).

In the twenty-first century, however, inter-industry trade has staged a comeback. Its rise is most apparent on a global scale, with the integration of China into the world trading system—which has also triggered the most political controversy. In Europe, too, enlargement of the EU to the East since 2004 has brought a noticeable increase in the share of intra-EU trade that is inter-industry. Figure 2 shows the Grubel–Lloyd (GL) index of intra-industry trade for the 15 pre-enlargement EU members with themselves, with the new member states, and with all EU members.[4] Intra-industry trade is considerably more prevalent within Western Europe than between Western and Eastern Europe. As a result, its share in total intra-EU trade drops sharply with enlargement in 2004, even though a large fraction of intra-EU trade remains between the pre-enlargement members.

To shed light on these phenomena, in this paper we develop a theoretical framework to study the effects on trade, productivity and income distribution of the policies adopted by economic unions to promote market integration; as well as the political forces that determine the endogenous adoption of union policies. Our analysis focuses on the two-way causation between trade and trade-promoting institutions, which are simultaneously determined in a political and economic equilibrium. We then apply our model, in particular, to interpret the process of European integration.

Section 2 presents the basic setup of our theory. We consider a union composed of heterogeneous member countries, each with a heterogeneous population. Countries produce differentiated varieties in a continuum of industries employing sector-specific human capital. They differ both in size and in the distribution of their factor endowment across sectors. These differences entail potential gains from both intra-industry and inter-industry trade.

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[4]Recall that the Grubel–Lloyd index is defined as one minus the ratio of net to gross trade: $1 - |X - M| / (X + M)$, where X and M denote the values of gross exports and gross imports, respectively.
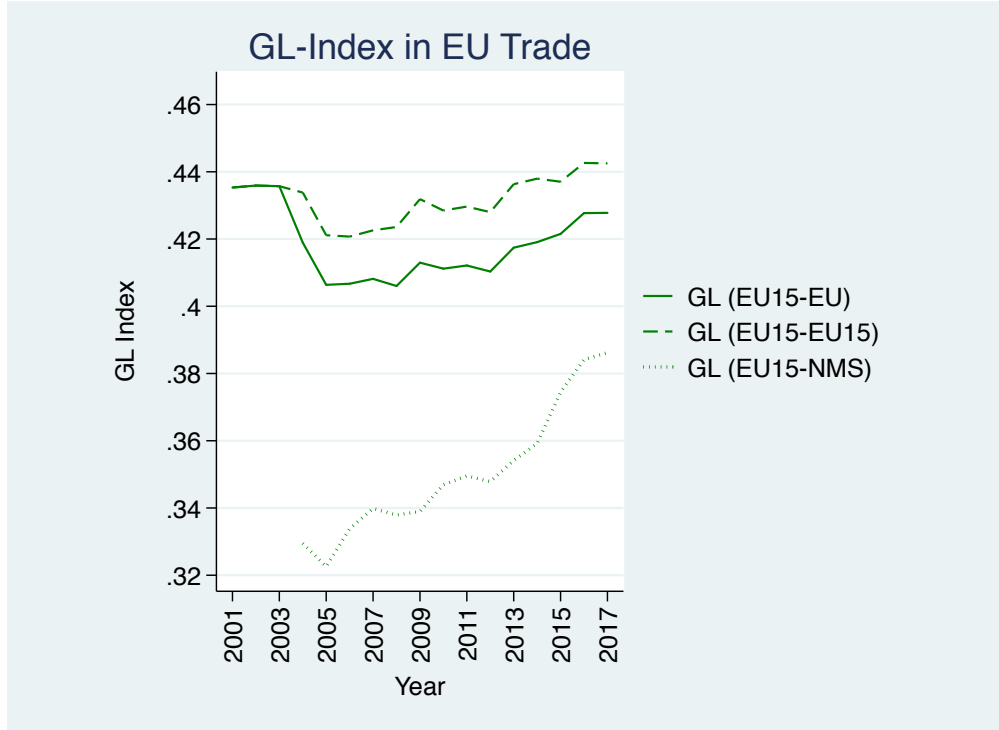
Figure 2: Grubel–Lloyd index of intra-industry trade in the EU

Trade in goods (SITC 5-digit level) of the EU-15 countries with themselves (dashed line), with new member states (dotted line) and with all EU members (solid line). Source: Eurostat.

However, trade is possible only in the presence of union policies that overcome non-tariff barriers, and implementing these policies is costly. For instance, the adoption of common regulations or standards that allow firms to sell their products in foreign markets also imposes some administrative and compliance costs. We model the resource costs of union policies as a proportional tax or productivity decline.

Our model explains how these costs and benefits of economic unions are distributed within and across countries, and how their distribution shapes individual preferences over the adoption union policies. We find that some of the effects of policy adoption are homogeneous within each country because they reflect changes in productivity that accrue entirely to consumers. This is the case both for administrative costs and for the benefits of increased variety that result from intra-industry trade. Inter-industry trade also yields consumer benefits, but in addition it has distributive consequences across workers in the same country. Exporters reap an extra gain from accessing foreign markets, while factor owners in import industries lose from the entry of foreign competitors into their home market.

In Section 3 we study the political equilibrium that leads to the adoption of trade-

promoting policies by a union whose membership is exogenously given. Key to our analysis is that the distribution of gains and losses from a given policy is uncertain ex ante. Many trade-promoting measures, such as better contract enforcement or mutual recognition agreements, affect a majority of industries, and it is impossible to predict perfectly which ones will be most affected. When all industries are equally likely to be affected, we show that policy adoption reduces to a one-dimensional problem of choosing the extent of economic integration in the union. Then all individuals have single-peaked preferences, so the median-voter theorem holds. This simple model of policy formation paints a rich and realistic picture, which yields three main sets of results.

First, if union members are identical, there is no disagreement either between or within countries. The unanimously chosen extent of integration increases with the number of union members. The intuition for this result is simply that the value of trade-promoting policies increases with the number of potential trading partners. Economic integration with a larger union is more valuable and hence, absent any disagreement, the size and the depth of the union move together.

Second, however, disagreement over union policies arises if countries differ in size. Even if trade is purely intra-industry and has no redistributive effects, the value of trade-promoting policies is higher for smaller countries. Member states with a larger home market prefer a shallower union with low administrative costs. Smaller countries prefer deeper economic integration. This result implies that break-ups of countries within the union can only make the union stronger and deeper, while unifications of member can only make it weaker and shallower. Instead, the impact of enlargement and exits becomes ambiguous. The accession of small countries tends to promote economic integration, but so does the exit of a large member. In general, a union whose member states are more heterogeneous in economic size is more contentious and more fragile.

Third, patterns of comparative advantage due to differences in relative endowments create disagreement over union policies within countries. Workers in comparative-advantage industries desire greater economic integration because they stand to benefit as exporters. Workers in comparative-disadvantage industries desire a shallower union because they stand to lose from import competition. Hence, the effect of comparative advantage on the equilibrium extent of market integration is nuanced. On the one hand, inter-industry trade increases the value of adopting union policies. On the other hand, it also generates winners and losers, and losers may block the adoption of policies even when these are in the interest of the country as a whole. In particular, we find that enlargement can steadily promote

market integration, then suddenly trigger a sharp backlash when the median voter becomes threatened by import competition.

Section 4 (*which is still very preliminary*) discusses how our theory helps interpret the history of European integration. In the twentieth century, the EU steadily grew in size up to 15 members, while constantly deepening market integration and enjoying broad political support. This pattern is consistent with our prediction that economic unions can grow when their members are not too dissimilar and their trade is mostly intra-industry. In the twenty-first century, enlargement has brought into the EU countries that are smaller, poorer and have a different mix of factor endowments. In keeping with our theory, this has led to a further increase in market integration, but also to growing political tensions and discontent among losers in larger, richer countries.

Section 5 does not conclude yet, but rather sketches some directions of further analysis that we intend to pursue over the coming weeks before concluding the paper.

Related Literature (*very preliminary*)   There is a large literature on international and regional trade agreements: Freund and Ornelas (2010) and Maggi (2014, 2016) provide excellent surveys. This literature considers international agreements as coordination and commitment devices to prevent the escalation of negative externalities generated by trade policy and to protect governments from the influence of domestic pressure groups. It has studied the design of rules for achieving these goals, and the merits of multilateral relative to regional negotiations. In contrast, we study the adoption of union-wide policies aimed at eliminating non-tariff barriers to trade and removing the undesirable "border effect" that these barriers produce. Our focus is on the heterogeneous costs and benefits of these policies. We abstract from coordination and commitment problems, which have been studied extensively.

Our paper is also related to the literature on the size of trade-promoting international unions. Several papers build on the insight from theories of federalism (Oates 1972) that unions, like centralized jurisdictions, reap the benefits of coordination and market integration, but at the cost of imposing uniform policies on members with different preferences (Bolton and Roland 1996, 1997; Alesina and Wacziarg 1999; Alesina, Spolaore and Wacziarg 2000; Casella 2001; Casella and Feinstein 2002; Alesina, Angeloni and Etro 2005; Gancia, Ponzetto and Ventura 2018). These papers have studied how the size of jurisdictions changes with exogenous changes the costs of international trade. In contrast, we study the adoption of heterogeneous trade-promoting policies in a union where disagreement across countries

may stem from differences in size, productivity and factor endowments. In this respect, our model is also related to a small set of papers studying asymmetric unions (Harstad 2006; Berglof et al. 2008, 2012). This literature has however focused on a different question, namely, whether the possibility of forming "inner clubs" is desirable and/or can sustain more cooperation in the presence of externalities.

Finally, there is a new but fast-growing literature on the recent backlash against globalization. Some papers have investigated empirically the economic factors that can explain the votes for Brexit, Trump or populist parties (Dippel, Gold and Heblich 2015; Feigenbaum and Hall 2015; Autor et al. 2017; Becker, Fetzer and Novy 2017; Colantone and Stanig 2017a,b). From a theoretical perspective, political opposition to globalization has been associated mostly to a rise in inequality (Grossman and Helpman 2019; Pastor and Veronesi 2019)). In this paper, we also consider inequality, but we shows how it interacts with other factors giving rise to a rich set of results. Interestingly, Buera, Monge-Naranjo and Primiceri (2011) warned that, in a model with uncertainty and learning, a large economic shock could trigger a reversal against market-oriented policies. All the papers in this literature study unilateral policy choices, not the disagreement over the adoption of union-wide policies, which is instead our focus.

2   A Model of Trade-Promoting Policies

Economic unions are created to eliminate non-tariff barriers to trade and remove the undesirable "border effects" that these barriers produce. For instance, trading some goods and services may require legal enforcement of contracts. Domestic courts are biased in favor of domestic importers and tend to rule against foreign exporters. Thus, trade in those goods/services becomes possible if unbiased union courts can overrule biased domestic ones. Another example of non-tariff barriers is the adoption by national regulators of technical standards that impede foreign access to the domestic market for some goods/services. Trade in those goods/services becomes possible if union regulators impose common standards for all member countries. There are many other non-tariff barriers that can be eliminated with the appropriate policy intervention. We refer to the creation of union courts, the adoption of common standards, the harmonization of economic regulation, the creation of a common currency and other similar measures as trade-promoting union policies or, in short, union policies. These policies typically require additional administrative structures or impose bureaucratic procedures that raise production costs.

This section provides a simple model of a union with heterogeneous member countries, each with a heterogeneous population. An economic union adopts policies that promote trade among its members but raise production costs. We show how the gains from market integration and the costs of policy compliance are distributed within and across countries.

2.1 ECONOMIC ENVIRONMENT

The world consists of a discrete set of countries: $\mathcal{N} = \{1, 2, ..., N\}$. The population of country $n \in \mathcal{N}$ is denoted by L_n. We normalize the world's population to one, i.e., $\sum_{n \in \mathcal{N}} L_n = 1$, so that L_n is the share of the world's population located in country n. Within each country, the population is distributed across a continuum of industries: $\mathcal{I} = [0, 1]$. Country n contains a measure $L_n(i)$ of workers that own a total measure $H_n(i)$ of labor that is specific to industry i. We refer to $H_n(i)$ as "human capital", and we choose units such that $\sum_{n \in \mathcal{N}} H_n(i) = 1$.[5] Naturally, we also have that $\int_0^1 L_n(i)\, di = L_n$. Thus, the population of this world differs in (i) the country of residence; and (ii) the industry of employment.

The representative worker of industry i in country n solves the following maximization problem:

$$W_n(i) = \int_0^1 \ln C_n(i, j)\, dj \quad \text{s.t.} \quad \int_0^1 P_n(j)\, C_n(i, j)\, dj \le \frac{Y_n(i)}{L_n(i)}, \tag{1}$$

where $P_n(j)$ is the price of good j in country n; while $C_n(i, j)$ and $Y_n(i)/L_n(i)$ are the consumption of good j and the wage or income of the representative worker of industry i in country n. Maximization allows us to derive the indirect utility function:

$$W_n(i) = \ln \frac{Y_n(i)}{L_n(i)} - \int_0^1 \ln P_n(j)\, dj. \tag{2}$$

The welfare of the representative worker of industry i in country n depends positively on (the log of) her income and negatively on (the log of) the prices of consumption goods. Since preferences are homothetic, this second term is common to all workers in country n. Thus, we can unambiguously refer to it as (the log of) the cost of living or price level of country n.

Each industry $i \in \mathcal{I}$ is organized into two stages of production. In the upstream stage, monopolistic firms use specialized workers to produce differentiated inputs. In the downstream stage, competitive firms assemble these inputs to produce final goods for consumption. Transport costs for final consumption goods are prohibitive. Transport costs for intermedi-

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[5] We assume throughout that workers within a given country-industry pair are all identical. Thus, human capital per worker is $H_n(i)/L_n(i)$.

ate inputs are negligible, and there are no tariffs. But there are non-tariff barriers that keep domestic markets closed to foreign producers.

To eliminate these barriers and integrate markets, a subset of countries $\mathcal{N}_U \subseteq \mathcal{N}$ has formed an economic union. For later reference, define the population and human capital of the union as $L_U = \sum_{n \in \mathcal{N}_U} L_n$ and $H_U(i) = \sum_{n \in \mathcal{N}_U} H_n(i)$. The union adopts trade-promoting policies that cover a set of industries $\mathcal{I}_U \subseteq \mathcal{I}$. Let $\mathbb{I}(i)$ be an indicator function such that $\mathbb{I}(i) = 1$ if $i \in \mathcal{I}_U$; and $\mathbb{I}(i) = 0$ otherwise. Then, the share of industries covered by union policies is $\mu \equiv \int_0^1 \mathbb{I}(i)\,di$. Let $\mathcal{Z}_n(i)$ be the set of input varieties produced by industry i of country n, and let $\mathcal{Z}_U(i) = \bigcup_{n \in \mathcal{N}_U} \mathcal{Z}_n(i)$. If $i \in \mathcal{I}_U$, assembly firms in member countries can use any variety in $\mathcal{Z}_U(i)$, but compliance with union policies raises their costs by a factor $e^{\kappa(i)}$, with $\kappa(i) \geq 0$. If $i \notin \mathcal{I}_U$, assembly firms in member countries do not have compliance costs but they can only use varieties in $\mathcal{Z}_n(i)$.

In the downstream production stage, competitive firms assemble input varieties, using a CES technology with elasticity of substitution $\sigma > 1$ that is symmetric across all input varieties. Maximization and competition ensure that the price of each consumption good is:

$$P_n(i) = e^{\mathbb{I}(i)\kappa(i)} \left\{ \int_{\mathcal{Z}_n(i)[1-\mathbb{I}(i)]+\mathcal{Z}_U(i)\mathbb{I}(i)} [p_n(z,i)]^{1-\sigma}\,dz \right\}^{\frac{1}{1-\sigma}}, \tag{3}$$

where $p_n(z,i)$ is the price of input variety z of industry i in country n. Equation (3) says that price equals cost as described by a symmetric CES cost function. Implementing the union policy (i.e., $\mathbb{I}(i) = 1$) raises costs by a factor $e^{\kappa(i)}$, but it allows firms to use a larger set of inputs $\mathcal{Z}_U(i)$ instead of $\mathcal{Z}_n(i)$.

In the upstream production stage, monopolistically competitive firms require $H(z,i) = \phi + \lambda Q(z,i)$ units of human capital to produce $Q(z,i)$ units of output. The CES demand system implies a zero-profit firm size $H(z,i) = \phi\sigma$ in terms of employment and $Q(z,i) = \phi(\sigma-1)/\lambda$ in terms of output. Moreover, all firms in country n set the same price for their inputs: $p_n(z,i) = p_n(i)$. Let $Z_n(i)$ be the measure of the set $\mathcal{Z}_n(i)$. Then, we have that the equilibrium number of firms of industry n in country i is:

$$Z_n(i) = \frac{1}{\phi\sigma} H_n(i); \tag{4}$$

and the aggregate income of industry i in country n is:

$$Y_n(i) = \frac{\sigma-1}{\lambda\sigma} p_n(i) H_n(i). \tag{5}$$

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Equations (4) and (5) are standard. The measure of input varieties produced by an industry is proportional to its human capital, and its income is proportional to the value of the inputs that it produces.

This completes the description of the "economic" model. The reminder of this section shows the union's equilibrium for a given or exogenous set of union policies $\mathcal{I}_U \subseteq \mathcal{I}$. In the next section, we provide the "political" model and describe equilibrium union policies. Throughout, we focus on the countries that are inside the union. The rest of the world remains in autarky. *We shall relax this assumption and consider trade with the rest of the world later.*

2.2 EQUILIBRIUM PRICES AND INCOMES

Consider first intermediate input prices:

$$
p_n(i) = \begin{cases} \dfrac{\lambda\sigma}{\sigma-1}\dfrac{Y_n}{H_n(i)} & \text{if } i \notin \mathcal{I}_U \\ \dfrac{\lambda\sigma}{\sigma-1}\dfrac{Y_U}{H_U(i)} & \text{if } i \in \mathcal{I}_U, \end{cases}
\tag{6}
$$

where Y_n and Y_U are the income of country n and the union: i.e., $Y_n \equiv \int_0^1 Y_n(i)\,di$ and $Y_U \equiv \sum_{n\in\mathcal{N}_U} Y_n$. All industries that are not covered by union policies ($i \notin \mathcal{U}$) receive the same spending, which is a uniform share of domestic income. All industries that are covered by union policies ($i \in \mathcal{U}$) also receive the same spending, which is however a uniform share of the union's income rather than the country's.

With these input prices, the prices for final consumption goods are:

$$
P_n(i) = \begin{cases} \dfrac{\phi^{\frac{1}{\sigma-1}}\lambda\sigma^{\frac{\sigma}{\sigma-1}}}{\sigma-1}\left[H_n(i)\right]^{-\frac{\sigma}{\sigma-1}}Y_n & \text{if } i \notin \mathcal{I}_U \\ \dfrac{\phi^{\frac{1}{\sigma-1}}\lambda\sigma^{\frac{\sigma}{\sigma-1}}}{\sigma-1}e^{\kappa(i)}\left[H_U(i)\right]^{-\frac{\sigma}{\sigma-1}}Y_U & \text{if } i \in \mathcal{I}_U. \end{cases}
\tag{7}
$$

Final good prices reflect input prices and, as a result, input scarcity. They also reflect the availability of inputs and the presence of compliance costs. In nontraded industries, there are few varieties and thus production is relatively inefficient. In traded industries, more varieties are available but there is the cost imposed by union policies.

We can now compute the income share of workers of industry i in country n:

$$\frac{Y_n(i)}{Y_U} = \begin{cases} \dfrac{Y_n}{Y_U} & \text{if } i \notin \mathcal{I}_U \\ \dfrac{H_n(i)}{H_U(i)} & \text{if } i \in \mathcal{I}_U. \end{cases} \tag{8}$$

Equation (8) shows that the income share of workers in industry i and country n equals the share of spending on the inputs they produce. If the industry is nontraded, this spending equals the share of domestic spending on the industry. If the industry is traded, this spending equals the share of the union's spending on the industry that goes to their inputs. We can now use Equation (8) to solve for country income shares:

$$\frac{Y_n}{Y_U} = \frac{1}{\mu} \int_0^1 \mathbb{I}(j) \frac{H_n(j)}{H_U(j)} dj. \tag{9}$$

That is, the income share of country n in the union is the average income share of its traded industries.

Finally, we can also compute trade flows:

$$X_n(i) = \mathbb{I}(i)(Y_U - Y_n)\frac{H_n(i)}{H_U(i)} \text{ and } M_n(i) = \mathbb{I}(i)Y_n\left[1 - \frac{H_n(i)}{H_U(i)}\right], \tag{10}$$

where $X_n(i)$ and $M_n(i)$ are the value of gross exports and gross imports, respectively. As a result, industry trade balances are:

$$T_n(i) \equiv X_n(i) - M_n(i) = \mathbb{I}(i)\left[\frac{H_n(i)}{H_U(i)}Y_U - Y_n\right]. \tag{11}$$

The trade balance of industry i is positive (negative) if industry i captures a share of the union market that is larger (smaller) than the domestic market. This happens only if industry i is more (less) productive than the average traded industry. We refer to industries with trade surpluses as "export" industries, and those with trade deficits as "import" industries.[6] Note that: (i) the income of nontraded industries equals the country's average; (ii) the income of exporting industries exceeds the country's average; and (iii) the income of importing industries falls short of the country's average. These observations will help us understand the results that follow.

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[6] At the country level, trade balances are zero since we assume that there are no transfers across countries.

Let us consider a given union $\mathcal{I}_U$ and determine how much welfare this union provides to its citizens. Substituting prices and incomes from Equations (7)-(8) in Equation (2), we can write the welfare of the representative worker of industry i in country n as follows:

$$W_n\left(i|\mathcal{I}_U\right) = W_n\left(i|\varnothing\right) + \Delta W_n\left(i|\mathcal{I}_U\right), \tag{12}$$

where we have made explicit that welfare is conditional on the set of union policies. Equation (12) decomposes the welfare of the worker into two terms, $W_n\left(i|\varnothing\right)$ and $\Delta W_n\left(i|\mathcal{I}_U\right)$, which correspond to the welfare without the union plus the value of the union with policy $\mathcal{I}_U$, respectively.

The welfare in the absence of union policies is:

$$W_n\left(i|\varnothing\right) = \frac{\sigma}{\sigma - 1} \int_0^1 \ln H_n\left(j\right) dj - \ln L_n\left(i\right) - \ln \frac{\phi^{\frac{1}{\sigma-1}} \lambda \sigma^{\frac{\sigma}{\sigma-1}}}{\sigma - 1}. \tag{13}$$

Equation (13) also describes the welfare of citizens of countries outside the union $(n \notin \mathcal{N}_U)$.[7] In autarky, every industry in country n receives an identical share of the country's spending and thus earns identical aggregate income, regardless of differences in the endowment of human capital across industries. As a consequence, differences in welfare across industries reflect only heterogeneity in the size of the workforce. Income per capita is inversely proportional to the number of workers who share the uniform income of each sector.

The common cost of living reflects symmetrically country n's productivity in every industry. Productivity is naturally decreasing with the two cost parameters (ϕ and λ), and increasing with the country's endowment of human capital ($H_n\left(j\right)$). Crucially, there are economies of scale in each industry, which are the stronger the lower the substitutability across different intermediates (σ). As long as differentiated inputs are imperfect substitutes ($\sigma < \infty$), a greater variety of intermediates raises productivity in the downstream stage of production, so the output of each country-industry increases more than proportionally with human capital (i.e., it increases by a factor $\sigma/\left(\sigma - 1\right) > 1$).

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[7]For any sequence of unions $\mathcal{I}_{U_k}$ that converges to $\varnothing$, the associated sequence of welfares $W_n\left(i|\mathcal{I}_{U_k}\right)$ converges to $W_n\left(i|\varnothing\right)$. However, the associated sequence of incomes Y_n/Y_U does not have a limit. This is not surprising: in the limit in which the union does not implement any policy there is no trade among union members, so there is no meaningful common numeraire to compare incomes.

The value of the union $\mathcal{I}_U$ for worker i in country n is:

$$\Delta W_n\left(i|\mathcal{I}_U\right) = \mathbb{I}\left(i\right)\left[\ln\frac{H_n\left(i\right)}{H_U\left(i\right)} - \ln\frac{Y_n}{Y_U}\right]$$

$$- \int_0^1 \mathbb{I}\left(j\right)\left[\kappa\left(j\right) + \frac{\sigma}{\sigma-1}\ln\frac{H_n\left(j\right)}{H_U\left(j\right)} - \ln\frac{Y_n}{Y_U}\right]dj, \quad (14)$$

where Y_n/Y_U is given by Equation (9). The first line shows the effect of union policies on (the log of) the worker's income in terms of nontraded goods, while the second line shows their effect on (the log of) the cost of living.

Income changes reflect the classic Stolper–Samuelson logic of factor-price equalization. If country n's has a relatively high endowment of human capital in industry i, it becomes a net exporter in the industry when it is covered by union policy. Factor income in the industry rises as it gains access to export markets in the union. If instead n's human-capital endowment in sector i is relatively scarce, policy adoption turns the country into a net importer from the union. Factor income in the industry falls as its domestic market opens to imports from more the union. Equations (14) and (9) highlight that in our setting factor abundance (or scarcity) is properly defined relative to the average across industries covered by union policy. This is an intuitive application of the principle of comparative advantage. Factor abundance in industries not covered by union policy is irrelevant because those industries remain non-traded.

Changes in the cost of living are common to all residents of country n. They result from the combination of three effects, which can be highlighted by an intuitive decomposition of the second line of Equation (14). First, there is a direct increase in the cost of living due to the costs of policy adoption, causing a loss $-\int_0^1 \mathbb{I}\left(j\right)\kappa\left(j\right)dj$.

Second, there are gains from intra-industry trade as the country is enabled to import inputs from the rest of the union and thus reaps productivity gains from access to a larger set of varieties. These gains equal $\left[1/\left(\sigma-1\right)\right]\int_0^1 \mathbb{I}\left(j\right)\ln\left[H_U\left(j\right)/H_n\left(j\right)\right]dj$, reflecting the increase in the number of varieties (which is proportional to $H_n\left(j\right)/H_U\left(j\right)$) and the extent of productivity spillovers from variety (which is captured by the differentiation across varieties $1/\left(\sigma-1\right)$).

Third, there are gains from inter-industry trade as countries are enabled to exchange abundant varieties in return from scarce ones. These gains equal $\int_0^1 \mathbb{I}\left(j\right)\{\ln\left(Y_n/Y_U\right) - \ln\left[H_n\left(j\right)/H_U\left(j\right)\right]\}dj \geq 0$. The sign of this expression follows from Jensen's inequality, since Equation (9) established that Y_n/Y_U is the average of $H_n\left(j\right)/H_U\left(j\right)$, while the (logarithmic)

utility function is concave. If factor abundance is heterogeneous across country-industries that union policy makes tradable, consumers in each member country gain more from the decline in the domestic price of the (previously expensive) goods the country starts importing than they lose from the increase in the domestic price of the (previously cheap) goods the country starts exporting.

3 Political Equilibrium in the Union

Equation (14) describes the policy preferences of all individuals. In this section, we study how those preferences are aggregated in a model of policy adoption and we analyze the political equilibrium of the model. We assume that membership of the union $\mathcal{N}_U$ is exogenously given and we focus on the endogenous choice of union policies. *Later we shall relax this assumption and consider accessions, exits and policy adoption by a subset of the union.*

A distinctive feature of economic unions is that their policy-making for market integration cannot be neatly separated along industry lines, as in the case of tariff formation. Most of the key policies underpinning a common market affect many industries: impartial enforcement of contracts and intellectual property rights, mutual recognition of marketability assessments, pro-competitive regulation and antitrust enforcement, currency union ... The cross-industry impact of union policies implies that, when countries debate whether to adopt them, their distributive consequences for different sectors are at best imperfectly known.

To simplify our analysis and highlight the sharpest analytical implications of our framework, we consider the limit case in which the sector-specific factors affected by each union policy are not predictable at all ex ante. Then, the union can propose the policies that deliver the most market integration for the lowest administrative burden. However, it cannot fine-tune its proposals to turn specific country-industries into exporters or importers. In expectation, the adoption of any union policy tends to enable countries to export the goods and services in whose production they hold an overall comparative advantage, and to import those in which they hold an overall comparative disadvantage.

As a result, as we are about to see, political conflict becomes one-dimensional. There is a single measure of the extent of economic integration, ranging from the absence of any union policy to a perfectly unified union market with complete and seamless tradability. Different agents have different preferences over the extent of economic integration, but they all agree on how any degree of economic integration should be achieved. Formally, every individual has single-peaked preferences, which implies in particular that if policy adoption is decided

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by majority rule then the degree of market integration preferred by the median voter will be achieved in equilibrium.

3.1 THE ADOPTION OF UNION POLICIES

Each industry is fully characterized by a compliance cost $\kappa(i)$ and a vector of human capital endowments in each country $H(i) \equiv (H_1(i), H_2(i), ..., H_N(i))$ belonging to the unit simplex $\Delta^{N-1} = \left\{ H_n \in \mathbb{R}_+^N : \sum_{n=1}^N H_n = 1 \right\}$. We say that industries i and j are of the same type if their human-capital vectors coincide: $H(i) = H(j)$.

We assume that (i) the distribution of compliance costs is continuous; (ii) the distribution of industry types is discrete; and (iii) the two distributions are independent. Assumptions (i) and (ii) help with exposition, but they have no real bite. The important assumption is (iii), as it will become clear soon. A first implication of independence is that there is a cumulative distribution function $F(\kappa)$ such that:

$$\Pr\{\kappa(i) \leq \kappa | H(i) = H\} = F(\kappa) \text{ for all } \kappa \in \mathbb{R}^+, H \in \Delta^{N-1} \text{ and } i \in \mathcal{I}. \tag{15}$$

In words, the probability of an industry having a given compliance cost is the same for all industry types. A second implication of independence is that:

$$\Pr\{H(i) = H | \kappa(i) \leq \kappa\} = \Pr\{H(i) = H\} \text{ for all } \kappa \in \mathbb{R}^+, H \in \Delta^{N-1} \text{ and } i \in \mathcal{I}. \tag{16}$$

In words, the probability of an industry of being of a given type is the same for all compliance costs. We shall use these two implications in what follows.

We make two assumptions about the set of feasible union policies. The first is that coverage by union policies cannot be made contingent on industry type $H(i)$.[8] For instance, assume a proposal is made to choose union policies that cover all industries with a compliance cost lower than a threshold κ. Then, the independence assumption implies that, under this proposal, covered industries are representative in the sense that the distribution of their types is the same as the distribution of types of all industries (Equation 16).

The second assumption is that, at the time of deciding union policies, the distribution of compliance costs is known but the specific realization of the compliance cost for a given industry $\kappa(i)$ is unknown. For instance, assume again that a proposal is made to choose

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[8]Formally, the set of covered industries can only be defined by a set $\mathcal{K}_U \subseteq \mathbb{R}^+$ such that $\mathcal{I}_U = \{i \in [0,1] : \kappa(i) \in \mathcal{K}_U\}$.

union policies that cover all industries with a compliance cost lower than a threshold κ. Then, the independence assumption implies that the probability of being covered is the same for all industry types (See Equation (15)).

This combination of assumptions implies that any Pareto efficient union policy is characterized by a threshold κ such that industries are covered by the policy if and only if their compliance costs are no greater than κ. Formally, the set of industries covered by any feasible and Pareto efficient policy is defined by a set $\mathcal{I}_U(\kappa) = \{i \in \mathcal{I} : \kappa(i) \leq \kappa\}$. The threshold κ is a summary statistic for the degree of economic integration in the union

3.2 Preferences over Economic Integration

We can now write the expected value of the union for the workers of industry i in country n as a function of the degree of economic integration:

$$\mathbb{E}\Delta W_n\left(i|\mathcal{I}_U(\kappa)\right) = F(\kappa)\left[\ln\frac{H_n(i)}{H_U(i)} - \frac{\sigma}{\sigma-1}\int_0^1 \ln\frac{H_n(j)}{H_U(j)}dj\right] - \int_0^\kappa kdF(k). \qquad (17)$$

This welfare function represents single-peaked preferences, whose bliss point is:

$$\kappa_n(i) = \ln\frac{H_n(i)}{H_U(i)} - \frac{\sigma}{\sigma-1}\int_0^1 \ln\frac{H_n(j)}{H_U(j)}dj. \qquad (18)$$

We will typically assume that $\kappa_n(i)$ is interior to the support of $F(\kappa)$, but preferences remain well-defined if it is not. If $F(\kappa_n(i)) = 0$, then workers desire no union policy and no economic integration. If instead $F(\kappa_n(i)) = 1$, then workers desire union policies for all industries and perfect economic integration.

The bliss point $\kappa_n(i)$ can be decomposed into four components.

1. A country-industry component: $\ln H_n(i)$. Workers are keener on economic integration the higher the human-capital endowment of their own country-industry. This makes them more likely to hold a comparative advantage and profit from becoming exporters to the union, and less likely to hold a comparative disadvantage and lose from facing imports from the union.

2. An industry-union component: $-\ln H_U(i)$. Workers are less keen on economic integration if the union as a whole is highly productive in their own industry. This mutes comparative advantage, reducing the gains from access to export markets, and exacerbates comparative disadvantage, increases the losses from exposure to import

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competition.

3. A country component: $-\int_0^1 \ln H_n(j)\, dj$. Consumers are keener on economic integration if their country offers little variety on average or a highly skewed distribution of productivity across sectors. This means that, in the absence of economic integration with the union, they face a home market with high average prices and particularly harmful price peaks in some industries.

4. A union component: $\int_0^1 \ln H_U(j)\, dj$. All consumers are keener on economic integration if the union offers many varieties on average or a rather uniform distribution of productivity across sectors. Then a common market is particularly attractive because it yields large economies of scale from intra-industry trade and a substantial smoothing of price dispersion thanks to inter-industry trade.

This decomposition will prove useful to guide cross-sectional comparisons and the analysis of comparative statics.

3.3 Intra-Industry Trade and Economic Size

To begin with, assume that there is only one industry type: $\mathcal{H}(i) = \mathcal{H}$ for all $i \in \mathcal{I}$. Then $H_n(i) = H_n$ for all i and, as a result, there is no inter-industry trade. It follows that the bliss point of country-n residents is:

$$\kappa_n(i) = -\frac{1}{\sigma - 1} \ln \frac{H_n}{H_U} \text{ for all } i \in \mathcal{I}. \tag{19}$$

There is no domestic conflict, and preferences are aligned across country lines.

All countries desire greater economic integration when the size of the union market is greater $(\partial \kappa_n(i)/\partial H_U)$ and when market size yields greater productivity spillovers $(\partial \kappa_n(i)/\partial \sigma < 0)$. However, countries with larger domestic markets derive lower benefits from economic integration and are more mindful of its costs $(\partial \kappa_n(i)/\partial H_n < 0)$.

If union policy is decided by majority rule, economic integration corresponds to the median bliss point κ_M, which depends on the size, i.e. H_M, of the country such that exactly half the union population lives in countries with size of at least H_M. Comparative statics then reflect the sum of two effects: (i) a change in the size of the union; and (ii) a change in the size of the median voter's country.

Consider first changes in the size of member countries. In this case, the implication for economic integration in the union are unambiguous. If a member country breaks up,

only the preferences of residents of that country are affected. Since their home market becomes smaller, they desire deeper economic integration for the union. As a result, the union can only become deeper. The consequences of a unification of existing member states are symmetric. Their residents want a shallower union after forming a larger national market. Thus, economic integration can only decline.

Changes in the size of the union have more ambiguous effects. Enlargement makes the union grow. Thus, citizens of old members now prefer a deeper union. But the citizens of new members now also vote. The union generally tends to become deeper, but this tendency is not absolute. Economic integration might decline if the economies of new members are sufficiently larger than the one of the old median voters' country.

To see this possibility in a simple example, suppose that countries differ in population but not in their per-capita factor endowment. Let the initial union comprise N_s small countries with population normalized to one and a single large country with population marginally below N_s. Then the initial median voter resides in a small country. If a new country with population $L_A \in (1, N_s]$ joins the union, it becomes the country of the new median voter. The union becomes deeper if and only if $L_A < 2N_s / (2N_s - 1)$.

Symmetrically, the exit of a member state makes the union shrink. Thus, citizens of remaining members now prefer a shallower union. But the citizens of old members no longer vote. Whether the union becomes shallower depends on the relative sizes of the exiting member and the country of the new median voter.

To see how the exit of a member state might promote greater integration among remaining members, suppose again that countries differ in population but not in their per-capita factor endowment. Let the initial union comprise N_s small countries with population normalized to one and two large countries with population marginally above $N_s/2$ each. Then the initial median voter resides in a large country. If one of the large countries leaves the union, the new median voter resides in a small country. The union becomes shallower if and only if $N_s < 8/3$ (i.e., $N_s \leq 2$).

These intuitions are useful, and they highlight the importance of the size of each country's economy as a predictor of its preferences over economic integration in the union. As we discuss in the next Section, the theoretical predictions of this simple model are consistent with the experience of European integration. However, the model emphasizes conflict across countries but abstract from conflict inside countries, which also seems crucial to match real-world evidence. To consider this additional dimension of political conflict, we need each country to host both winners and losers. In our context, these are exporters and workers in

import-competing industries. With only one industry type, there are no export or import-competing industries, so all residents of the same country agree on the same policy. When we add more industry types, this is no longer the case. We show this next.

3.4 INTER-INDUSTRY TRADE AND COMPARATIVE ADVANTAGE

Let us now assume a simple distribution of comparative advantage across industries. In every industry, a single country holds a comparative advantage. Therefore, the set of industries $\mathcal{I}$ be partitioned into $\{\mathcal{P}_1, \mathcal{P}_2, ..., \mathcal{P}_N\}$, where $\mathcal{P}_n$ is the set of industries in which country n has a comparative advantage. Country n's endowment is:

$$H_n(i) = \begin{cases} \frac{H_n + \Sigma}{1 + \Sigma} & \text{for} \quad i \in \mathcal{P}_n \\ \frac{H_n}{1 + \Sigma} & \text{for} \quad i \notin \mathcal{P}_n, \end{cases} \tag{20}$$

for $\Sigma \geq 0$ and $H_n \geq 0$ such that $\sum_{n=1}^{N} H_n = 1$ and $\sum_{n \in \mathcal{N}_U} H_n \equiv H_U$. Assume furthermore that the measure of $\mathcal{P}_n$ equals H_n. Across industries, country's n endowment has a distribution with binary support characterized by mean and variance:

$$\mathbb{E}[H_n(i)] = H_n \text{ and } \text{Var}[H_n(i)] = \left(\frac{\Sigma}{1 + \Sigma}\right)^2 H_n(1 - H_n). \tag{21}$$

The common parameter Σ captures dispersion in comparative advantage. In the limit as $\Sigma = 0$, every country has the same endowment H_n in all industries and we are back into the case of no inter-industry trade. In the limit as $\Sigma \to \infty$, we are in a winner-take-all world of complete specialization such that a single country is the monopolist producer of all varieties in measure H_n of industries.

This pattern of comparative advantage creates three types of industries in country n.

1. A share $1 - H_U$ of industries have balanced trade with the union, because no member state has a comparative advantage in these sectors. Their workers experience unambiguous gains from policy adoption:

$$\kappa_n^0 = \frac{1}{\sigma - 1}\left\{\ln H_U - \ln H_n + \sigma\left[H_U \ln\left(1 + \frac{\Sigma}{H_U}\right) - H_n \ln\left(1 + \frac{\Sigma}{H_n}\right)\right]\right\} > 0. \tag{22}$$

In addition to gains from intra-industry, for any $\Sigma > 0$ they experience further gains from inter-industry trade: $\partial \kappa_n^0 / \partial \Sigma > 0$. Intuitively, the cost of living falls further if variety not only increases in every industry but also becomes more homogeneous across

industries.[9]

Regardless of inter-industry trade, workers in balanced-trade industries desire a deeper union if the union is larger and the country is smaller: $\partial \kappa_n^0 / \partial H_U > 0$ for constant H_n, while $\partial \kappa_n^0 / \partial H_n < 0$ taking into account that $\partial H_U / \partial H_n = 1$.

2. A share H_n of industries are net exporters because the country has a comparative advantage in them. Workers in these sectors experience even larger gains from policy adoption:

$$\kappa_n^X = \kappa_n^0 + \ln\left(1 + \frac{\Sigma}{H_n}\right) - \ln\left(1 + \frac{\Sigma}{H_U}\right) > \kappa_n^0 > 0. \tag{23}$$

Intuitively, they experience the same decline in the cost of living as workers in balanced-trade industries, and additionally they experience an increase in their income in terms of non-tradables as endowments become more unequal across industries: $\partial \kappa_n^X / \partial \Sigma > \partial \kappa_n^0 / \partial \Sigma > 0$.

Exporters are particularly keen to integrate with a large union, since they benefit doubly from purchasing from a wider set of suppliers and from selling to a wider set of customers: $\partial \kappa_n^X / \partial H_U > \partial \kappa_n^0 / \partial H_U > 0$ for constant H_n. The mirror image of this result is that their enthusiasm is particularly dampened when their home market is already large: $\partial \kappa_n^X / \partial H_n < \partial \kappa_n^0 / \partial H_n < 0$.

3. A share $H_U - H_n$ of industries are net importers because another union member has a comparative advantage in them. Workers in these sectors experience both gains and losses from the union:

$$\kappa_n^M = \kappa_n^0 - \ln\left(1 + \frac{\Sigma}{H_U}\right). \tag{24}$$

On the one hand, their cost of living falls; on the other, so does their income in terms of non-tradables as more efficient foreign competitors enter their market. As a result, $\partial \kappa_n^M / \partial \Sigma > 0$ if and only if:

$$H_U - H_n > 1 - \frac{1}{\sigma} \text{ and } \Sigma > \frac{H_n}{\frac{\sigma}{\sigma-1}(H_U - H_n) - 1}. \tag{25}$$

If the union provides a small expansion in market size $(H_U - H_n)$ or the benefits from a larger markets are modest (σ is high and varieties are highly substitutable), then exporters monotonically like the union less as endowments become more heterogeneous.

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[9] All comparative statics are derived explicitly in the Appendix.

If the union is large enough and love of variety strong enough, however, their preferences reach an interior minimum, beyond which the rise in consumer gains dominates the decline in producer income.

Nonetheless, export workers also desire a deeper union when the union is larger: their preference is particularly keen, because not only they experience consumer benefits, but their comparative disadvantage is muted as any new entrants into the union share their it: $\partial \kappa_n^M / \partial H_U > \partial \kappa_n^0 / \partial H_U > 0$.

A larger domestic economy also mutes comparative disadvantage, which leads to ambiguity. If economies of scale are large enough, consumer gains dominate and all residents of larger countries prefer a shallower union: $\partial \kappa_n^M / \partial H_n < 0$ if σ is low enough. However, if economies of scale are modest while comparative disadvantage is very sharp, then producer losses loom so large that import-competing workers are more averse to integration in smaller countries: $\partial \kappa_n^M / \partial H_n > 0$ if σ and Σ are high enough.

As the union admits a new member m, all residents of existing union member whose industry remains of the same type unambiguously want the union to become deeper. However, a share H_m of industries switch from balanced trade to net imports, with an associated decline in the integration desired by their employees: $\kappa_n^M - \kappa_n^0 = -\ln(1 + \Sigma/H_U) < 0$. Whether the union becomes deeper or shallower as a result of enlargement then depends on whether the identify of the median voter changes.

Suppose all countries have identical average endowments: $H_n = 1/N$ for all n. Then the identity of the median voter does not depend on country size, but merely on sectoral comparative advantage. In every member state of a union of N_U countries, share $1/N$ of voters work in export industries, share $1 - N_U/N$ in balanced-trade industries and share $(N_U - 1)/N$ in import industries. Thus, so long as $N_U < 1 + N/2$ the median voter works in a balanced-trade industry and prefers:

$$\kappa_n^0 = \frac{1}{\sigma - 1} \left\{ \ln N_U + \frac{\sigma}{N} \left[N_U \ln\left(1 + \frac{\Sigma N}{N_U}\right) - \ln(1 + \Sigma N) \right] \right\}. \tag{26}$$

If $N_U > 1 + N/2$ the median voter works in an import industry and prefers:

$$\kappa_n^M = \kappa_n^0 - \ln\left(1 + \Sigma \frac{N}{N_U}\right). \tag{27}$$

Thus, the depth of the union grows smoothly in its size for $N_U < 1 + N/2$ and then for
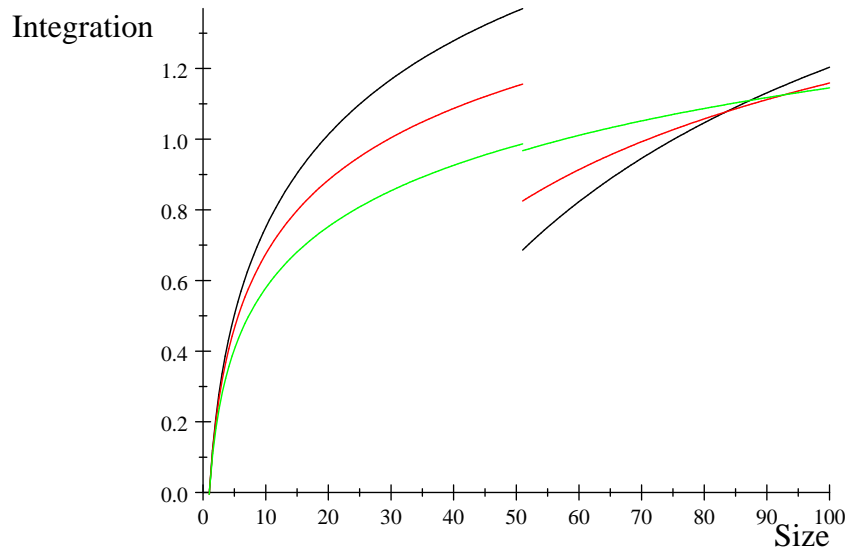
Figure 3: Economic integration as a function of union size

The graph is drawn for $\sigma = 5$, $N = 100$ and $\Sigma = .5$ (in black), $\Sigma = .2$ (in red) and $\Sigma = .01$ (in green).

$N_U > 1 + N/2$, but it jumps down discontinuously as the threshold is crossed. As the strength of comparative advantage (Σ) grows, so do both responses to enlargement: the union grows faster until the political tide turns, then it shrinks more dramatically when the median voter becomes threatened by import competition, as shown in Figure 3.

4   A Preliminary Look at European Integration

In this section, we briefly review the process of European integration, and we review sugges-tive evidence through the lens of our theoretical model.

European integration started when 6 countries—Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany—signed the Treaty of Paris in 1952 and the Treaty of Rome in 1957, creating the European Economic Community. Member countries removed custom duties and agreed on a common agricultural policy. The first enlargement happened in 1973, when Denmark, Ireland and the United Kingdom joined the union. During the 1970s, the union implemented regional policies to help the development of poorer areas and adopted laws to protect the environment. Over time, the European Parliament increased its influence and, from 1979, all citizens started to elect its members directly. In 1981, Greece joined the union. Spain and Portugal followed in 1986. In the same year, the Single European Act extended Community powers especially in the area foreign policy. In 1993, the Maastricht Treaty established the European Union and the Single Market with its "four freedoms" of movement.

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In 1995, the EU gained three more new members: Austria, Finland and Sweden. In 1999, the euro as a currency was launched. Ten new countries—Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia—joined the EU in 2004, followed by Bulgaria and Romania in 2007. In response to the eurozone debt crisis, the so-called "Banking Union" was established, transferring responsibilities for banking policy from the national level to the EU. In 2013, Croatia became the 28th member. Besides these major events, the EU was built on a complex maze of treaties and agreements, steadily widening and deepening the scope of economic integration between its members.

In 2016, for the first time, a member state—the UK—voted to leave the union. Anti-EU sentiment has also been on the rise in other countries. What could be driving this growing dissatisfaction with European integration? Clearly, one culprit is the eurozone debt crisis. However, the deterioration of the image of the EU seems to predate the crisis, and another factor seems to be "enlargement fatigue" after the accession of Eastern European countries in 2004-07.

A key feature of enlargement is that it has made the EU more heterogeneous in economic terms. Figure 4 confirms that new members are on average smaller and poorer. It shows the average total GDP of union members relative to the average GDP of the six founding members. The graph shows that, almost invariably, each enlargement included countries with an average economic size on average smaller than the initial members. Moreover, the sharpest drop in average country size happens after the enlargement in 2004.

Our theory then suggests that enlargement fatigue could be driven, at least in part, by a dissatisfaction of the larger economies with the extent of economic integration promoted by pivotal voters after the accession of much smaller economies. This argument is consistent with the simple observation that the UK has always been one of the largest economies in the EU. Yet, the relationship between economic size and discontent towards the EU can be studied more systematically.

We measure size by the logarithm of a country's aggregate GDP. The literature has shown that negative attitudes towards the EU are typically associated with economic hardship, inequality and low levels of education. Hence, we control for the interest rate on 10-year government bonds as a measure of the severity of the financial crisis; for the Gini coefficient of the net income distribution as a measure of inequality; and for the fraction of working-age population with tertiary education. Since most of these variables do not exhibit much time variation, we turn to the cross-section. The main caveat with this analysis is that, with just 28 observations, power is necessarily limited. Nevertheless, we can highlight suggestive
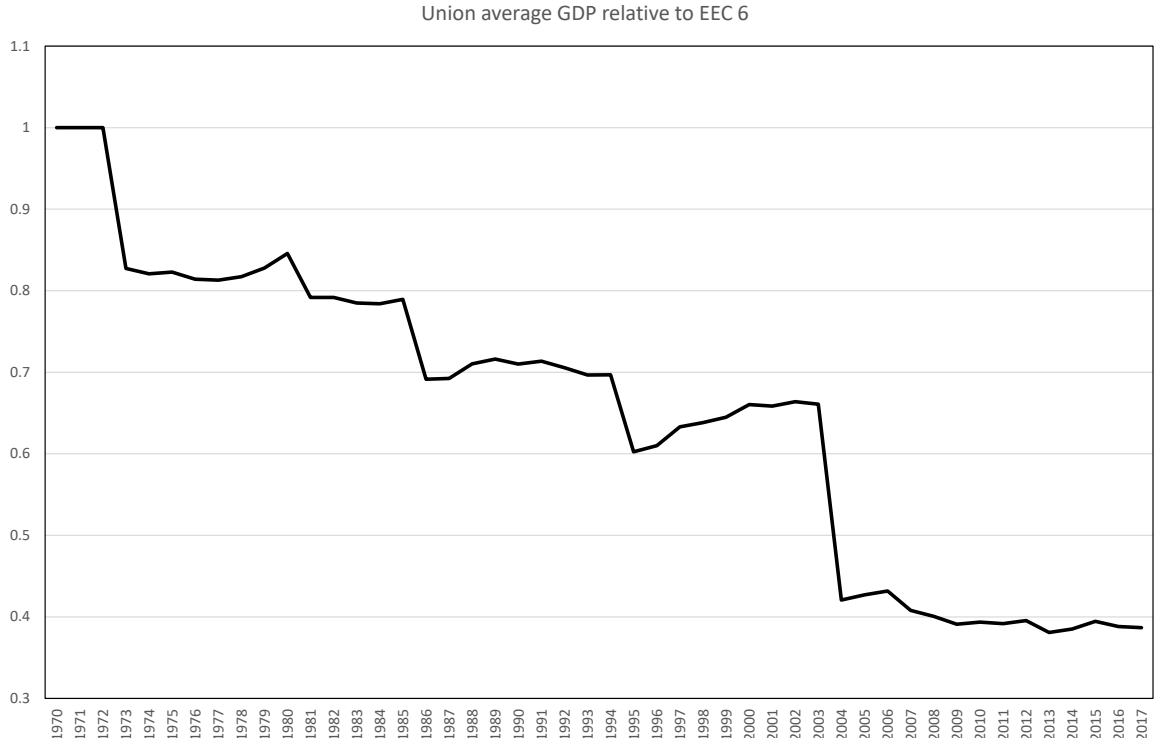
Figure 4: Average GDP of EU member states relative to the six founding countries
Source: WDI.

correlations in the data.

Table 1 presents the results of a simple OLS regression in which the dependent variable is the fraction of respondents who have a "very negative or fairly negative" image of the EU in 2017. The explanatory variables are first introduced individually, then all simultaneously. Column (1) shows that people living in larger economies have a more negative image of the EU. The coefficient is large, implying that a doubling of GDP is associated with a 2 percentage point increase of negative responses, and is statistically significant at the 5% level. Column (2) shows that the long-term interest rate also has a statistically significant correlation with a negative image of the EU. Columns (3)-(4), instead, fail to find significant associations between inequality and education and an anti-EU attitude in the cross-section countries. Columns (5) and (6) confirm the previous results once all variables are included simultaneously, with or without including a dummy for the 6 founding members of the EU. Overall, the analysis shows that the variable with the highest predictive power and statistical significance is economic size.

Figure 5 shows graphically the association between GDP and a negative image of the EU. The scatter plot highlights the presence of some obvious outliers. In particular, Greece

Table 1: Negative image of the EU: country correlates

Dependent variable: Negative Image of EU						
	(1)	(2)	(3)	(4)	(5)	(6)
lGDP	2.073**				2.076**	1.991**
	(1.038)				(0.983)	(0.857)
Interest		1.498*			1.995**	2.040**
		(0.861)			(0.891)	(0.842)
Gini			-0.292		-0.531	-0.531
			(0.377)		(0.356)	(0.349)
Education				-0.095	0.040	0.042
				(0.214)	(0.199)	(0.195)
EEC6	Yes	Yes	Yes	Yes	Yes	No
Observations	28	28	28	28	28	28
R-squared	0.140	0.110	0.026	0.010	0.323	0.322

Notes: All regressions include the intercept. EEC6 is a dummy for the 6 EEC core countries. Standard errors are in brackets. *, ** and *** denote significance at 10%, 5% and 1% respectively.

has strong anti-EU attitude despite its small economic size, while Germany has a strong pro-EU attitude despite its large size. However, these observations might be explained by other factors, such as the austerity measures imposed by the EU in Greece since the financial crisis and the central role that Germany has always played in European institutions. If these two countries were dropped from the sample, the coefficient of GDP would become significant at the 1% level.

The finding that education does not correlate strongly with a pro-EU attitude across countries is in contrast with existing evidence within countries. For instance, for the UK, Becker, Fetzer and Novy (2017), Pastor and Veronesi (2019) and others, find that voting Leave is associated with low educational attainment. A special survey by the European Commission (2016) also shows that education markedly affected the attitude of Europeans towards the EU enlargement: 51% of those who left full-time education at the age of 20 or later favored the EU enlargement, compared to 35% of those who left at age 15.

The discrepancy between these findings within and across countries findings is consistent with our model, which highlighted different sources of disagreement over union policies across and within countries. From this perspective, it is useful to look how the attitude towards the EU varies with the level of education by country. As expected, data from the Eurobarometer
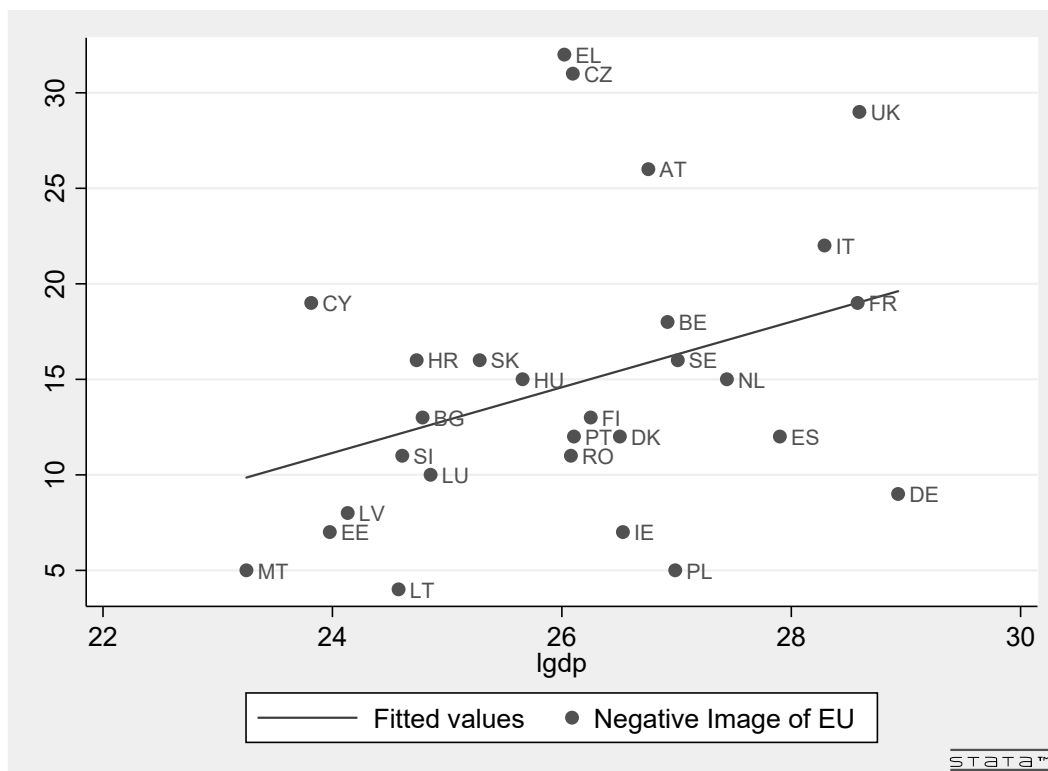
Figure 5: Negative image of the EU by economic size

Data for 2017. Source: Eurobarometer and WDI.

stratified by education groups show that the share of respondents with a "very positive or fairly positive" image of the EU in 2017 is on average much higher (48%) among individual who left education at the age of 20 or later than those who left at age 16-19 (36%) or below (29%). But do these differences between more and less educated people vary systematically with the level of income of a country? In other words, are highly educated workers more pro-EU in richer countries? The answer to this question is provided by Figure 6 which shows the share of positive views among respondents who left education at age 20+ relative to those who left school at age 16-19, against the log of GDP per capita. The scatter plot confirms that in all countries but Hungary positive views are more frequent among better educated people. Strikingly, however, this difference increases with income. In particular, the coefficient of a linear regression is 0.13, with a standard error of 0.05.[10]

What can we learn from these results? The evidence suggests that the attitude towards the EU mirrors the distribution of the gains from intra-EU trade and supports the predictions

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[10] A similar scatterplot using data on respondents with a negative view of the EU yields very similar results: respondents with lower education are more anti-EU in richer countries.
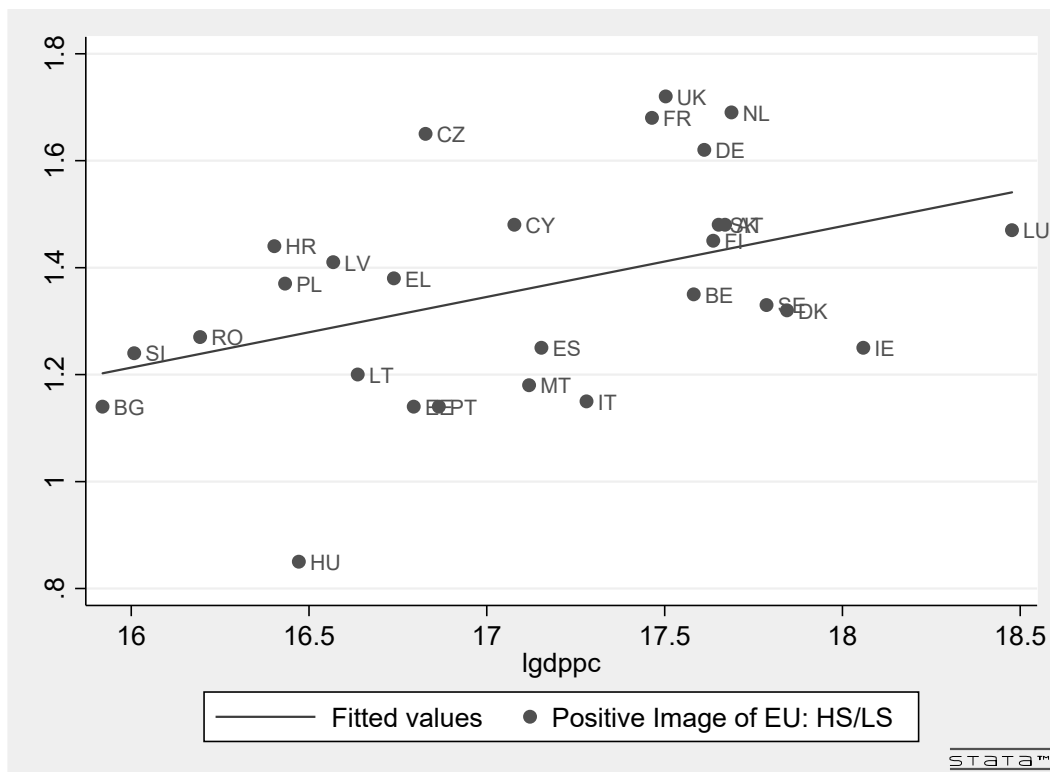
Figure 6: Economic size and support for the EU by education

Positive image of the EU in 2017 among high-skill respondents (who left education at age 20+) relative to low-skill respondents (who left education at age 16-19). Source: Eurobarometer and WDI.

of our theory. Across countries, smaller countries reap greater benefits from intra-industry trade by gaining access to the larger union market. Within countries, educated workers are more likely to benefit from trade as long as they are specialized in industries where products are more differentiated and gains from varieties are higher (e.g., Epifani and Gancia 2008). At the same time, as in models of inter-industry trade, gains are larger for workers in export industries, such as the high-skilled in rich countries, then for those in import-competing industries.

In line with this view, there is a growing empirical literature suggesting that exposure to import competition has increased the support for parties and politicians with protectionist, populist, and nationalist agendas (Dippel, Gold and Heblich 2015; Colantone and Stanig 2017a,b). Over time, disagreement and dissatisfaction about the EU can be understood, at least in part, as a reaction to the fact that, through various enlargements, member countries have grown more heterogeneous in size, productivity and relative endowments.[11]

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[11]A recent literature uses structural models to quantify the economic gains from the EU. The results are

This perspective also offers some insight on persistent support for European integration in Germany. While Germany is the largest economy in Europe, it is also an export powerhouse. Not only does it have an overall trade surplus; it also has a trade surplus in a majority of industries.[12] Our framework then suggest that the median German voter is uncommonly keen on the Single Market because it is in the uncommon position of being an exporter.

5 CONTINUATION

Obviously, this is work in progress. There are two directions in which we are working now, and we should be able to have results within weeks.

1. *The first one is theoretical. We have assumed until now that union membership is exogenous (some countries are in the union and some not) and universal (union policies affect all members or none). We want to understand better what happens if:*

   (a) *We discard the assumption that the union is exogenous, but retain the assumption that it is universal. How does our analysis change if member countries can freely enter or exit the union? Intuitively, the credible threat of exit will protect large countries from unwanted economic integration. The median voter in a small country will prefer a wider and shallower union to a deeper and narrower one. Instead, small countries concerned with import competition might be pushed out of the union. We should explore different rules to exit and enter the union. Do they make the union more efficient? Why? Or why not?*

   (b) *We discard the assumption of universal policies. How does our analysis change if member countries can cherry-pick which policies to implement and which ones not? When trade is only intra-industry, we can prove that the largest country then gains the ability to dictate its own preferred policy. Greater integration can be sustained only by linking policies into non-negotiable packages. This can help us understand some of the logic of a multi-speed Europe, which some observers advocate. Would this make the union more efficient? Why? Or why not?*

2. *The second direction is empirical. Essentially, all the predictions of our model are*

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consistent with our view. For instance, Mayer, Vicard and Zignago (2019) and Caliendo et al. (2018) find that new member states were the largest winners from the EU enlargement.

[12]A country could instead specialize in very few export sectors and still have an overall surplus. The most extreme example is Saudi Arabia, a net exporter with 76% of exports accounted for by the oil industry alone.

encapsulated in Equation (18) which we reproduce here:

$$\kappa_n(i) = \ln \frac{H_n(i)}{H_U(i)} - \frac{\sigma}{\sigma - 1} \int_0^1 \ln \frac{H_n(j)}{H_U(j)} dj. \tag{28}$$

This Equation describes the distribution of policy preferences. But notice that, using Equation (11), we can re-write this equation as follows:

$$\kappa_n(i) = \ln \frac{T_n(i) + Y_n}{Y_U} - \frac{\sigma}{\sigma - 1} \int_0^1 \ln \frac{T_n(j) + Y_n}{Y_U} dj. \tag{29}$$

Thus, we can use industry trade balances to discipline the theory. To do this, we need to recognize that empirically observed industries are not symmetric, but this is quite straightforward to do. We are now computing industry trade balances at different levels of aggregation, to determine whether they help us understand the distribution of preferences for/against the EU both across and within countries, and how this distribution has shifted over time as a result of the various enlargements. This can help us predict also what will happen to the EU after Brexit. We could also determine the potential effects of a breakup in Scotland or Catalonia.

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Recall that:

$$\kappa_n^0 = \frac{1}{\sigma - 1} \left\{ \ln H_U - \ln H_n + \sigma \left[H_U \ln \left(1 + \frac{\Sigma}{H_U} \right) - H_n \ln \left(1 + \frac{\Sigma}{H_n} \right) \right] \right\} > 0, \qquad \text{(A1)}$$

such that:

$$\frac{\partial \kappa_n^0}{\partial \Sigma} = \frac{\sigma}{\sigma - 1} \frac{\Sigma \left(H_U - H_n \right)}{\left(H_U + \Sigma \right) \left(H_n + \Sigma \right)} > 0. \qquad \text{(A2)}$$

Keeping H_n constant (i.e., increasing $\sum_{m \in \mathcal{N}_U \setminus \{n\}} H_m$):

$$\frac{\partial \kappa_n^0}{\partial H_U} = \frac{1}{\sigma - 1} \left\{ \frac{1}{H_U} + \sigma \left[\ln \left(1 + \frac{\Sigma}{H_U} \right) - \frac{\Sigma}{H_U + \Sigma} \right] \right\} > 0; \qquad \text{(A3)}$$

while taking into account that $\partial H_U / \partial H_n = 1$:

$$\frac{\partial \kappa_n^0}{\partial H_n} = -\frac{1}{\sigma - 1} \left\{ \frac{H_U - H_n}{H_U H_n} \right.$$
$$\left. + \sigma \left[\ln \left(1 + \frac{\Sigma}{H_n} \right) - \frac{\Sigma}{H_n + \Sigma} - \ln \left(1 + \frac{\Sigma}{H_U} \right) + \frac{\Sigma}{H_U + \Sigma} \right] \right\} < 0. \quad \text{(A4)}$$

Both signs follow because:

$$f(x) = \ln \left(1 + \frac{1}{x} \right) - \frac{1}{x + 1} > 0 \Rightarrow f'(x) = -\frac{1}{x(x+1)^2} < 0 \text{ and } \lim_{x \to 0} = 0. \qquad \text{(A5)}$$

Recall that:

$$\kappa_n^X = \kappa_n^0 + \ln \left(1 + \frac{\Sigma}{H_n} \right) - \ln \left(1 + \frac{\Sigma}{H_U} \right), \qquad \text{(A6)}$$

such that:

$$\frac{\partial \kappa_n^X}{\partial \Sigma} = \frac{\partial \kappa_n^0}{\partial \Sigma} + \frac{H_U - H_n}{\left(H_U + \Sigma \right) \left(H_n + \Sigma \right)} > \frac{\partial \kappa_n^0}{\partial \Sigma} > 0. \qquad \text{(A7)}$$

Keeping H_n constant (i.e., increasing $\sum_{m \in \mathcal{N}_U \setminus \{n\}} H_m$):

$$\frac{\partial \kappa_n^X}{\partial H_U} = \frac{\partial \kappa_n^0}{\partial H_U} + \frac{\Sigma}{H_U \left(H_U + \Sigma \right)} > \frac{\partial \kappa_n^0}{\partial H_U} > 0; \qquad \text{(A8)}$$

while taking into account that $\partial H_U / \partial H_n = 1$:

$$\frac{\partial \kappa_n^X}{\partial H_n} = \frac{\partial \kappa_n^0}{\partial H_n} - \Sigma \left[\frac{1}{H_n \left(H_n + \Sigma \right)} - \frac{1}{H_U \left(H_U + \Sigma \right)} \right] < \frac{\partial \kappa_n^0}{\partial H_n} < 0. \qquad \text{(A9)}$$

Recall that

$$\kappa_n^M = \kappa_n^0 - \ln\left(1 + \frac{\Sigma}{H_U}\right), \tag{A10}$$

such that:

$$\frac{\partial \kappa_n^M}{\partial \Sigma} = \frac{\partial \kappa_n^0}{\partial \Sigma} - \frac{1}{H_U + \Sigma} = \frac{1}{H_U + \Sigma}\left[\frac{\sigma}{\sigma - 1}\frac{\Sigma(H_U - H_n)}{H_n + \Sigma} - 1\right]. \tag{A11}$$

Keeping H_n constant (i.e., increasing $\sum_{m \in \mathcal{N}_U \setminus \{n\}} H_m$):

$$\frac{\partial \kappa_n^M}{\partial H_n} = \frac{\partial \kappa_n^0}{\partial H_n} + \frac{\Sigma}{H_U(H_U + \Sigma)}; \tag{A12}$$

while taking into account that $\partial H_U / \partial H_n = 1$:

$$\frac{\partial \kappa_n^M}{\partial H_U} = \frac{\partial \kappa_n^0}{\partial H_U} + \frac{\Sigma}{H_U(H_U + \Sigma)} > \frac{\partial \kappa_n^0}{\partial H_U} > 0. \tag{A13}$$