Globalization and Political Structure*

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Abstract

The first wave of globalization (1830-1914) witnessed a decline in the number of countries from 125 to 54. Political consolidation was often achieved through war and conquest. The second wave of globalization (1950-present) has led instead to an increase in the number of countries to a record high of more than 190. Political fragmentation has been accompanied by the creation of peaceful structures of supranational governance. This paper develops a theoretical model of the interaction between globalization and political structure that accounts for these trends and their reversal. We show that political structure adapts to steadily expanding trade opportunities in a non-monotonic way. Borders hamper trade. In its early stages, the political response to globalization consists of removing borders by increasing country size. War is then an appealing way of conquering markets. In its later stages, however, the political response to globalization is to remove the cost of borders by creating international economic unions. As a result, country size declines and negotiation replaces war as a tool to ensure market access.

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1 Introduction

In 1820, the world was made up of 125 countries and long-distance trade was very modest—less than 5% of world output. Over the following century, international trade grew more than four-fold while the number of countries fell to merely 54. The interwar period witnessed a reversal of these trends: trade collapsed and the number of sovereign states rose to 76 by 1949. Until then, political and economic integration had proceeded together. But the end of World War II marked the beginning of a new era. After 1950 trade between nations has flourished to levels never seen before. But this time the process of economic integration has been accompanied by different changes in the world political structure. On the one hand, the number of countries has risen to a record high of more than 190, so that more trade is now accompanied by political fragmentation. On the other hand, there has been a proliferation and growth of international treaties and unions aimed especially at fostering economic integration, such as the World Trade Organization and the European Union.

These trends are illustrated graphically in Figure 1, which shows the historical evolution of the number of sovereign states in the world, average exports as a share of GDP and the number of members of the GATT/WTO. The data on the number of states was obtained from Butcher and Griffiths (2013).[1] Since counting the number of sovereign countries in the past poses some challenges, especially in remote and underdeveloped areas, in Figure 2 we plot an alternative measure of political concentration:[2] the average land size of "internationally recognized" countries and of thirteen major empires since 1830, from the Cross-National Time-Series Data Archive. Both figures tell a remarkably similar story. During the first wave of globalization in the nineteenth century there was a phase of political concentration in which countries and empires expanded their territories. But this trend reversed in the second wave of globalization after World War II, which saw the collapse of large empires and a steady fall in average country size, together with an expansion in trade agreements.

Figure 3 illustrates another feature of the historical redrawing of political borders, namely the incidence of violence in the process. It displays the share of territorial changes that involved military conflict computed on all territorial changes recorded over a period of ten years before and after each date, from the Correlates of War Project. The figure clearly shows that the end of World War II marks another structural break: before 1950, more than

[1] See Appendix A.1 for more details about the data.

[2] Most importantly, the commonly used "International System" (Singer and Small 1966), including countries with international recognition, grossly underestimates the number of independent political entities in the nineteenth-century developing world.

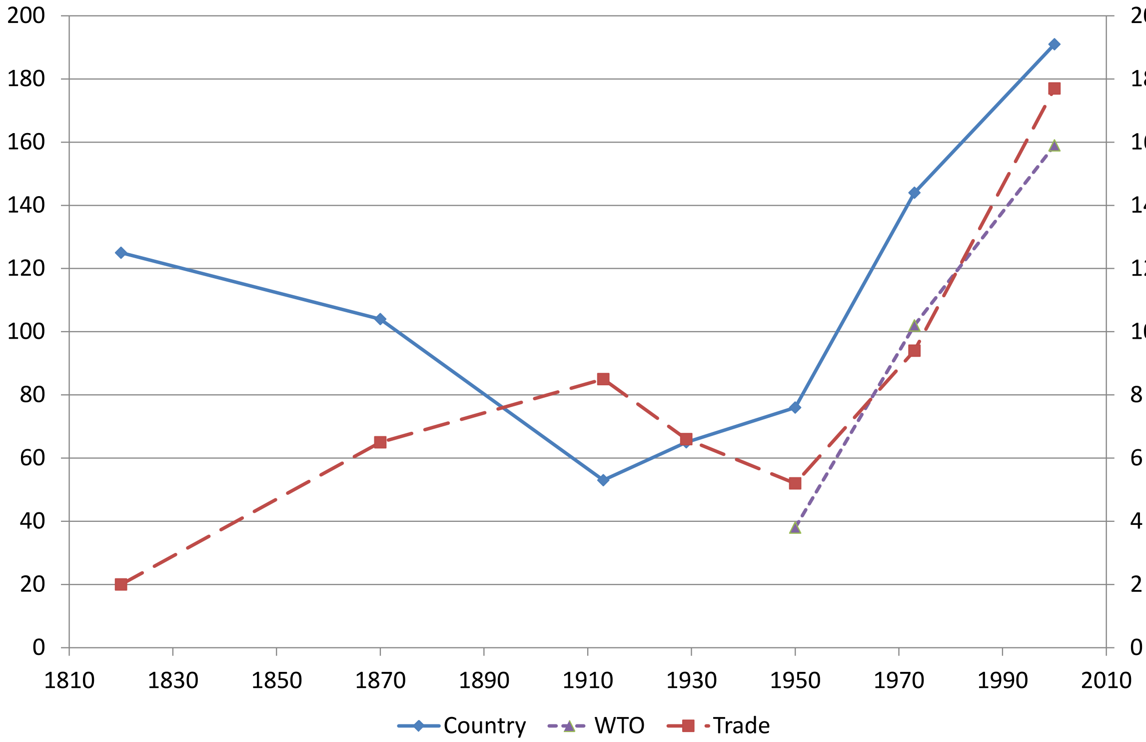

Figure 1: Trade share (right axis), the number of countries and WTO membership (left axis.) See appendix for details on data.

one third of all territorial disputes were decided by war, while after that date diplomacy prevailed in almost 90% of cases.

Why did the first wave of globalization lead to political concentration and conflict? Why did the second wave of globalization lead instead to political fragmentation, resolved in a more peaceful way? To answer these questions, this paper develops a theoretical framework to study the interaction between globalization and political structure. We define globalization as a process by which markets expand and the potential gains from trade grow. There is wide consensus that globalization started around the mid nineteenth century and that it was fueled by major technological advancements, sustained economic growth and the adoption of market-promoting policies (Fouquin and Hugot 2016; Pascali 2017). In this paper, we take the technological determinants of globalization, triggered by the stream of innovations that started after the Industrial Revolution, as an exogenous driving force. We then study how market-expanding policies react to it.

A key premise behind our work is that borders hamper trade and globalization makes borders more costly. Thus, political structure needs to adapt to expanding trade opportunities by removing borders or reducing their cost. Our theory shows that this process entails

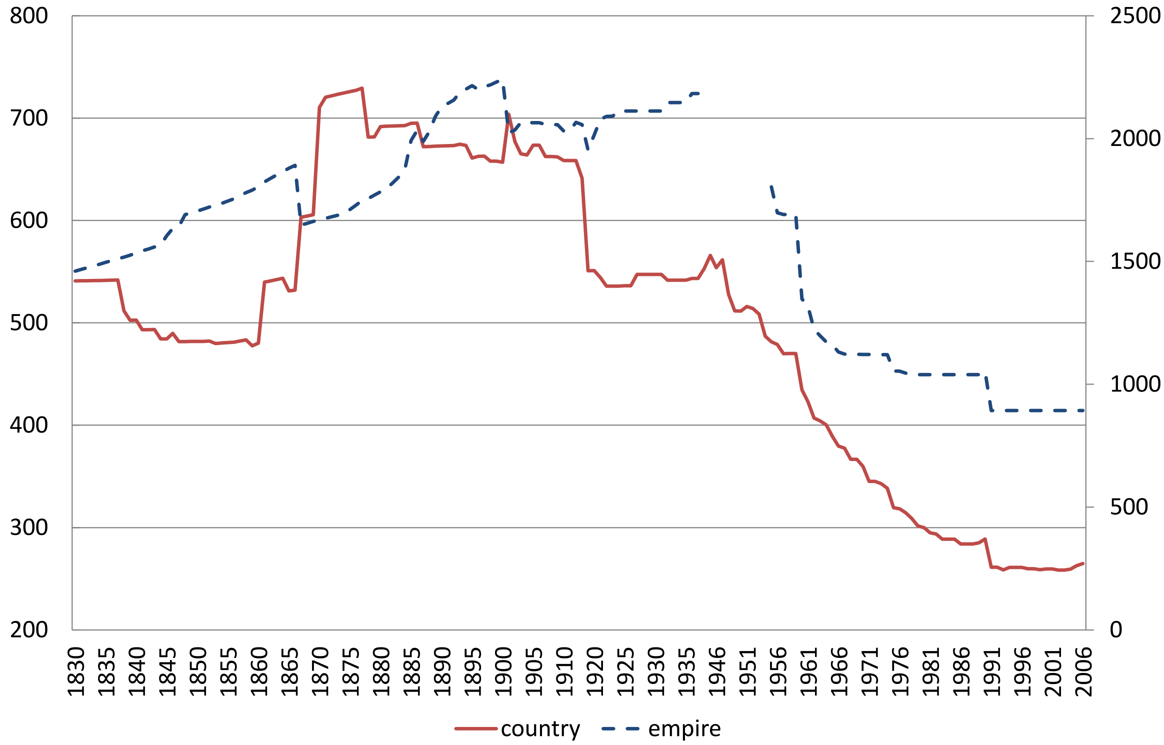

Figure 2: Size of countries (left axis) and empires (right axis). Thousand squared miles, see the appendix for details on data.

a non-monotonic evolution of country size, consistent with the evidence in Figures 1 and 2. In its early stages, the political response to globalization consists of removing borders by creating large countries. In its later stages, instead, the political response to globalization is to remove the cost of borders by creating international economic unions, and this leads to a reduction in the size of countries. We also show that while the incentive to conquer markets through aggression increases with globalization, the formation of international economic unions removes this incentive, thereby paving the way to the rule of diplomacy.

To obtain these results, we consider a symmetric world with a continuum of basic geographical units or localities, each containing people that share common preferences. Goods can be transported at a negligible cost within localities, but at a positive cost across localities. Governments perform two tasks in this world. First, they provide the economic regulation necessary for markets to work, such as contract enforcement and protection of property rights. Second, they provide their residents with public services such as education and welfare programs. We ask how governments are organized geographically to perform these tasks and, in particular, how this organization changes as the cost of transporting goods across localities declines.

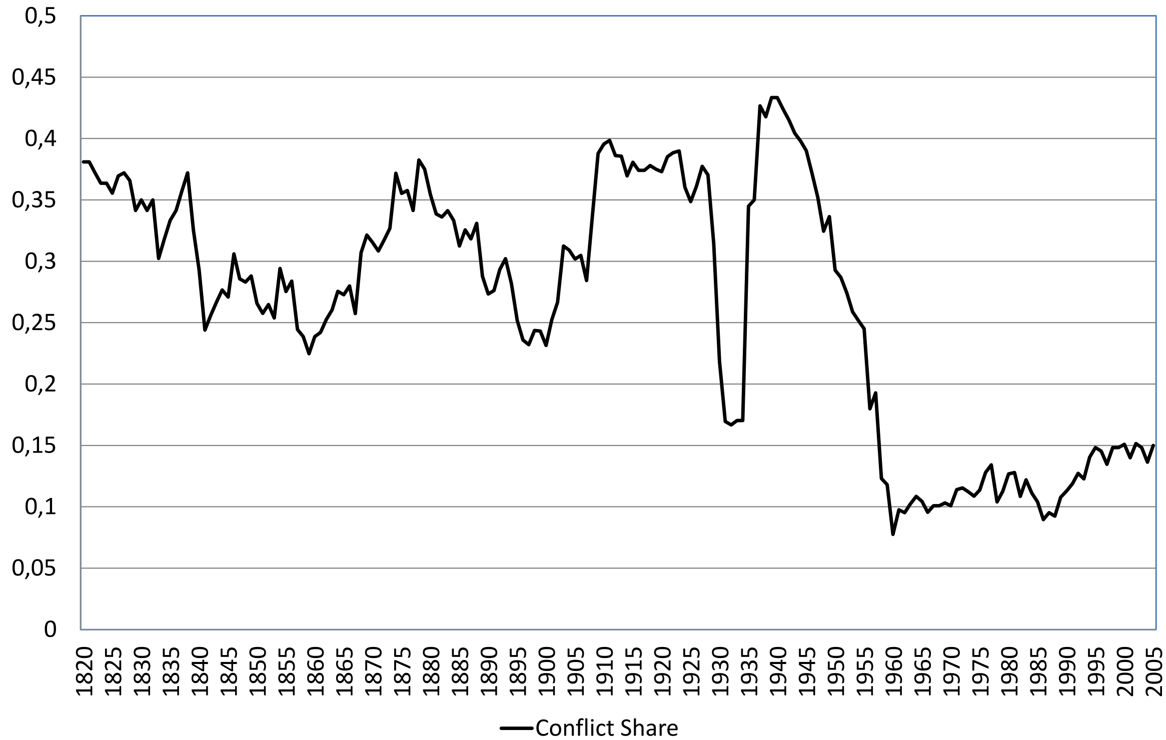

Figure 3: Share of changes of borders involving military conflict. Each point corresponds to an average over a +/-10 year window. Source: Correlates of War.

We make two standard assumptions about the effects of governments. The first is the presence of border effects. Localities that have different governments providing economic regulation can only trade a limited range of goods, while localities that share a single government can trade all goods. The second assumption is preference heterogeneity over public services. Yet, localities that share a single government providing public services are forced to receive a single undifferentiated basket.

We assume that local preferences differ with respect to public services but not economic regulation. This assumption reflects the notion that market-enabling economic regulation aims primarily at increasing efficiency. This goal is widely shared by people with different distributive preferences (Coase 1960; Posner [1973] 2014). Accordingly, government functions such as contract enforcement, monetary policy, or the policing of anti-competitive practices are often entrusted to apolitical technocrats. On the contrary, public services are a focus of political tension because people have different views on how children should be educated, on the proper size and scope of the welfare system, and so on. Such preferences vary systematically across localities because they reflect their distinctive history and culture.

If there were no costs of government, the optimal political structure for this world would be a two-level governance structure. The first level would be a continuum of country governments, one for each locality, providing each of them with its preferred basket of public services. The second level would be a world government or economic union that regulates markets and eliminates all border effects. Unfortunately, there are costs of government and this political structure is too expensive.

We make two standard assumptions about the costs of government. The first is that they are subject to economies of scale. There are some costs of setting up and running a government that are fixed or independent of the number of localities sharing this government. The second assumption is that costs of government are also subject to economies of scope. Coordinating different levels of government is costly and, as a result, the two-level governance structure is more expensive than a single-level structure in which country governments provide both public services and market regulations.

Economies of scale and scope affect the optimal political structure. Economies of scale make it more desirable to have a discrete number of country governments rather than a continuum of them. Localities are willing to accept public services that are less than ideally tailored to their preferences in order to save some costs of government. Economies of scope, if large enough, make it more desirable to have a single-level governance structure than a two-level one. Localities may also be willing to accept higher trade costs in order to save some costs of government.

Thus, the organization of the state is determined by the interplay of four forces: preference heterogeneity, the border effect, economies of scale and economies of scope.[3] We then ask how a reduction in transport costs across localities affects the organization of government. Reduced transport costs raise the gains from trade and strengthen the incentive to remove borders. This economic primitive generates a non-monotonic effect on political structure.

A key aspect of any theory of political structure is a view of how localities interact. As a preliminary step, in Section 3 we consider the case in which localities are sovereign and bargain efficiently. At early stages of globalization, the gains from trade are small and the benefit of creating an economic union does not justify the loss of economies of scope. Thus, a single-level governance structure is optimal. As globalization proceeds, localities remove borders by increasing the size of countries. The number of countries declines and the mismatch between each locality's ideal and actual provision of public services grows. Eventually,

[3]Although these forces are standard in the theoretical literature, the reader might still wonder whether our focus on them is justified empirically. We discuss the relevant empirical evidence in Section 2.2, after clarifying the role of each of these forces in our analysis.

this mismatch is large enough to justify a move to a two-level governance structure. The world political structure shifts from a few large countries to many small countries within a world economic union. The two-level structure is more expensive, but it is nonetheless desirable because it facilitates trade and improves preference-matching in the provision of public services. Our result of a shift from a single-level to a two-level architecture of government is consistent with the seemingly opposite reactions of the world political structure to the first and second waves of globalization.

This case can be interpreted as the rule of diplomacy. But diplomacy is hardly the only form of interaction in the real world. To capture this, in Section 4 we allow a set of core localities to wage war and build empires. War is costly but it allows core localities to impose their preferences on colonies. We obtain three results. First, there is an intermediate stage of globalization in which core localities choose to wage war and build empires, which eventually collapse as the world enters the third and final stage of globalization. Second, war makes countries large and rapidly growing in size with globalization, because it allows the conquerors to extract the gains from trade with the conquered while forcing them to pay most of the costs of size. Third, international unions are created to promote peace: the great powers choose to avoid the cost of war and to replace conquered colonies with free partners in an economic union. The cause of imperial collapse at a late stage of globalization is exactly the same as the cause for the rise of empires at an early stage, namely, the desire to reap gains from trade in the most cost-efficient manner.

These results are obtained in a setup that imposes a symmetric geography. In Section 5, we break the symmetry of the baseline model and assume that localities in the core are near each other, while localities in the periphery are far from the core and from each other. The main new result is that the core has a stronger incentive to form a core union, which may be subsequently enlarged to include periphery countries. This extension is useful because it helps us understand why the process of union formation tends to be gradual and often starts at the regional level. It can also explain why global empires controlling far-away colonies are replaced by peaceful regional unions of nearby countries.

The picture that arises from our stylized model is rich and suggestive, and it improves our understanding of the determinants of political structure. To show this, in Section 6 we use our analytical results to interpret a variety of specific historical experiences. In light of recent events, we also ask what lessons, if any, can be learned for the future of the European Union. We conclude in Section 7 by reviewing some of the limitations of our theory and some promising avenues for further research. In the rest of this introduction, we offer a brief review of the related literature.

Related Literature Our research is related to Alesina and Spolaore's (1997) seminal work on the equilibrium determination of the number and size of countries. Their theory of country formation hinges on the trade-off between economies of scale and preference heterogeneity.[4] Alesina, Spolaore and Wacziarg (2000, 2005) add to the theory the trade-reducing effect of international borders. They show that when borders become less of an impediment to trade, the optimal political structure reacts by creating more borders. This approach can explain the increase in the number of countries during the second wave of globalization, if globalization is taken to be a weakening of the border effect. However, these papers take the decline in the border effect as exogenously given and cannot explain why the first wave of globalization was accompanied instead by a decline in the number of countries. Moreover, they assume throughout that economies of scope are prohibitive, so that the state must always be organized in a single level of government. Thus, they do not explain the proliferation and growth of economic unions during the second wave of globalization.

We introduce two new elements that prove crucial for the analysis. First and most important, we recognize that economies of scope are limited. This innovation expands the set of political structures that may emerge in equilibrium. Our second novelty is to study a more primitive technological driver of globalization: the gradual decline of transportation costs. This change in focus enables us to show that globalization makes borders costlier rather than cheaper, and creates incentives to remove them rather than to create them. The decline in the border effect emphasized by Alesina, Spolaore and Wacziarg (2000, 2005) is in fact endogenous to the development of political structure in response to expanding trade opportunities. Not only does our theory microfound the driving force behind their model. More important, we show that the transition from single-level to multi-level governance is crucial to explain why globalization led to a decline in the number of countries during the nineteenth century, but then to its increase during the twentieth.

The observed reversal in the link between globalization and country size remained an open puzzle so far. Some papers have investigated other aspects of the interaction between economic and political integration, such as the effects of trade on preferences and income distribution. Casella (2001) and Casella and Feinstein (2002) study how preferences for public goods can endogenously become more heterogeneous as market size expands and enables greater specialization. Bolton and Roland (1997) focus on income distribution and

[4] Desmet et al. (2012) calibrate this trade-off for European countries.

find that heterogeneous countries may break up if their barriers to external trade decline. Both these forces help explain why economic integration has been accompanied by political fragmentation since World War II, but they cannot account for the opposite pattern during the previous century.

Our work is also related to the literature on trade and war. The idea that trade promotes peace was formalized by Polachek (1980). It is based on the premise that conflict harms trade and hence trade openness raises the opportunity cost of war (Alesina and Spolaore 2003; Rohner, Thoenig and Zilibotti 2013). Martin, Mayer and Thoenig (2008) show that while bilateral trade lowers the probability of conflict, multilateral trade openness decreases dependence to any given country and hence the cost of a bilateral conflict. The opposite idea that trade generates military conflict is instead expressed in neo-Marxist theories of imperialism. Trade can also make countries dependent on others and therefore vulnerable (Bonfatti and O'Rourke 2017). Our paper suggests that these seemingly antithetical views can capture two different stages of the same model. In particular, we provide a unified explanation for why territorial changes are more associated with military conflict in the first wave of globalization than in the second. Consistent with our result that economic unions remove the incentive to wage war, Martin, Mayer and Thoenig (2012) find evidence that regional trade agreements promote peaceful relations.

The effect of war on country formation has been studied by, among others, Alesina and Spolaore (2003), Gennaioli and Voth (2015) and Alesina, Reich and Riboni (2017). The key difference between our analysis and theirs is that in our framework it is globalization which leads to war and ultimately to larger countries, including through a military channel.

More broadly, our research is related to the economic analysis of federalism and of the geographic structure of government. Our model embeds the key trade-off that lies at the heart of the classic theory of fiscal federalism (Oates 1972). Centralization reaps economies of scale and benefits from policy coordination, but it imposes a uniform policy on localities with different preferences. Political-economy frictions micro-found these countervailing forces with remarkable generality (Lockwood 2002; Besley and Coate 2003; Harstad 2007; Boffa, Piolatto and Ponzetto 2016). Multiple local governments fail to coordinate efficiently even if they can bargain with one another. A single central government fails to match policies to local preferences even if it can differentiate policy across regions—in fact endogenous policy differentiation may prove more harmful than uniformity. Such models of political centralization and decentralization have been applied most often to the architecture of government at the sub-national level (Lockwood 2006; Treisman 2007). However, the same insights apply to the study of international unions (Marks and Hooghe 2004; Alesina, Angeloni and Etro 2005; Alesina, Angeloni and Schuknecht 2005; Ruta 2005).

Prior work has overwhelmingly focused on the optimal size and composition of an exogenously given number of government tiers. Surprisingly, the literature has devoted much less attention to the choice between a single-level and a multi-level governance structure, which our analysis focuses on. Alesina and Spolaore (2003) present the fundamental trade-off between economies of scope and the benefits of assigning different policy decisions to jurisdictions of different size.[5] Boffa, Piolatto and Ponzetto (2016) micro-found economies of scope in political accountability and show that a federal structure is optimal only when there is wide geographic variation in voter information. Our analysis advances this line of research by studying how the incentives for multi-level governance change over time as globalization increases.

2 The Symmetric World

In this section, we develop a stylized model of the world that contains the basic ingredients of our theory: geography, markets and preferences. The model mixes these ingredients imposing a high degree of symmetry. This allows us to derive our basic results on the effects of globalization on political structure quickly and intuitively.

The concept of locality is a key primitive in our theory. We model the world as a set of places within which there are neither geographical nor cultural distances, and we label them localities. Thus, localities consist of a group of people sharing common preferences and inhabiting a particular territory. This approach, which is common in the literature, simplifies the study of how peoples with different preferences interact and organize themselves into political entities. But it is silent about how these different preferences arose in the first place and how they evolve over time. It also abstracts from domestic conflict.

The concept of globalization is another important primitive in our theory. Geographical distances introduce trade costs across localities. In particular, we use the usual assumption of iceberg trade costs across localities. We interpret globalization as exogenous technological change that gradually removes these trade costs.

[5] Specifically, Chapter 2 discusses arbitrarily overlapping jurisdictions and Chapter 9 a system constrained to form a pyramidal hierarchy. However, most of the book focuses on the case of prohibitive economies of scope, as in Alesina and Spolaore (1997).

2.1 Basic Setup

We consider a world with a continuum of atomistic localities, $l \in [0,1]$. Each locality contains a positive measure of identical individuals. Let W_l be the welfare of the representative individual of locality l. For short, we refer to this individual as "locality l." Then, the welfare of locality l is determined as follows:

$$W_l = W_l^M + W_l^G, \tag{1}$$

where W_l^M is the utility derived from the consumption of market goods, and W_l^G is the utility derived from public services.

Governments provide public services and regulate markets, so government activity affects both welfare components. A political structure for this world consists of two partitions of the set of localities $[0,1]$ into governments: a public-service partition P with typical element $P_n \in P$; and an economic-regulation partition R with typical element $R_n \in R$. We assume a pyramidal hierarchy of governments. This means that, if the partitions P and R do not coincide, the finer partition must be a refinement of the coarser one.[6]

If $P = R$, we say that the world has a single-level governance structure, and we refer to the common elements of P and R as country governments or countries. Each of these countries provides both public services and market regulation to its constituent localities.

If $P \neq R$, we say that the world has a two-level governance structure. Since it will become clear shortly that P is always a refinement of R, we refer to the (smaller) elements of P as country governments or countries, and the (larger) elements of R as economic unions or unions. Countries provide public services to their constituent localities, while unions regulate the markets of their constituent countries.

Our goal is to construct a model of the partitions P and R, that is, a model of how localities organize themselves into countries and how countries organize themselves into unions. To do this, we need to make assumptions about preferences, technology and the costs of government and determine how welfare W_l depends on political structure (P, R).

[6] This assumption simplifies the presentation, but it is not needed until Section 5. The equilibria discussed in Sections 3 and 4 have this property even if we do not impose it.

2.1.1 *Markets and Trade*

There is a continuum of industries producing goods, $i \in [0,1]$. Let $c_l(i)$ be the consumption of goods of industry i by locality l. The utility function takes the following form:

$$W_l^M = \int_0^1 \ln c_l(i)\, di. \tag{2}$$

The choice of a symmetric logarithmic or Cobb-Douglas utility function ensures that all localities spend the same share of their income on each industry.

The production of consumption goods requires differentiated input varieties, $m \in [0,1]$. Define $c_l(m,i)$ as the amount of inputs of the variety m used by locality l in the production of goods in industry i. Then, we have that:

$$c_l(i) = \exp\left\{\int_0^1 \ln c_l(m,i)\, dm\right\}. \tag{3}$$

This production function is symmetric across and within industries. Since we use again the convenient Cobb-Douglas formulation, each locality spends the same fraction of its income on all varieties of all industries.

To introduce gains from specialization and trade, we use a simple symmetric version of the Ricardian model. Each locality is endowed with one unit of labor in each industry. This unit can produce one unit of the variety with the same index as the locality ($m = l$); or $e^{-\eta}$ units of any other variety ($m \neq l$). Since $\eta > 0$, each locality has a technological advantage in its "own" variety. The parameter η measures the extent to which technologies differ across localities and, therefore, the potential gains from specialization and trade.

There are technological barriers to trade. We assume uniform iceberg transportation costs across localities so that only a fraction $e^{-\tau} < 1$ of the goods shipped from l to $m \neq l$ arrives to destination. To focus on the most interesting case in which trade costs are not prohibitive and to ensure positive gains from trade, we assume that $\eta > \tau > 0$. Our measure of globalization is the wedge $\gamma \equiv \eta - \tau$, which captures the potential gains from trade and increases as improvements in transportation technology reduce physical trade costs τ. Globalization can thus range from $\gamma = 0$ when trade costs are prohibitive ($\tau = \eta$) to a maximum of $\gamma = \eta$ when trade costs are nil ($\tau = 0$).

Policy-induced barriers to trade or border effects arise when different governments regulate markets. In particular, we assume that exchanging goods in a fraction $\beta \in (0,1)$ of industries requires legal enforcement of contracts. In these industries, varieties cannot be traded between localities that have different governments regulating their markets, because they belong to different elements R_n and $R_{n'}$. The reason is that foreigners correctly anticipate that domestic courts will discriminate against them ex post. In the remaining set of industries, contracts are self-enforcing and hence varieties can be traded without restrictions. This formulation captures a simple and yet realistic microfoundation for the well-known finding that borders obstruct trade.[7]

A market equilibrium is a set of prices and quantities such that individuals maximize utility and markets clear. Appendix A.2 shows that there exists a unique market equilibrium. Traded industries specialize in each locality's input variety, export essentially all of their production and import the remaining input varieties. Thus, consumption in traded industries is $c_l(m,i) = e^{-\tau}$. Nontraded industries are forced to produce locally all input varieties. Thus, consumption in nontraded industries is $c_l(m,i) = e^{-\eta}$. This implies the following utility from consuming market goods:

$$W_l^M = -\eta + \gamma\left(1 - \beta + \beta \int_0^1 I_{l=m}^R dm\right), \tag{4}$$

where $I_{l=m}^R$ is an indicator variable which takes value 1 if localities l and m belong to the same R_n, and zero otherwise. Equation (4) shows the impact of border effects. A decline in transportation costs raises the gains from trade γ in every industry. However, border effects prevent a locality from reaping the gains from trade in a mass β of industries that require contract enforcement. As a consequence, the value of removing each border effect is proportional to $\beta\gamma$, where γ measures the potential gains from trade in any single industry and β the mass of industries subject to border effects. This result is intuitive and plays an important role in our analysis.

2.1.2 Governments

Public services consist of a basket of differentiated varieties, $x \in [0,1]$. The basket provided to locality l is characterized by a density function $g_l(x)$ defined over these varieties, with $g_l(x) \geq 0$ and $\int_0^1 g_l(x)\,dx = 1$. The utility derived from these public services is given by:

$$W_l^G = \int_0^1 \delta_l(x)\, u(g_l(x))\, dx - K \tag{5}$$

[7] There are other microfoundations, of course. For instance, tariffs and non-tariff barriers are also policies that discriminate against foreigners and limit the range of goods that can be traded.

where $\delta_l(x) \geq 0$, $u(g_l(x)) = -1/g_l(x)$ and K is a cost function to de defined shortly. We refer to the first and second terms of Equation (5) as the benefits and costs of public services respectively.

We now introduce three assumptions about governments. The first assumption is about preference heterogeneity. Each locality has a different ideal variety of public services. We define and order the basic varieties such that the ideal one for locality l is $x = l$. In particular, we assume that $\delta_l(x) = \delta$ if $x = l$; and $\delta_l(x) = 0$ otherwise.

The second assumption is that there are economies of scale in the provision of public services. Building and maintaining a government reduces the value or utility of public services by a total or fixed amount $\phi > 0$, and this cost is equally shared among the constituent localities.

The third and final assumption is that there are economies of scope across government functions. Membership of an economic union reduces the value or utility of public services by an amount $\kappa > 0$. This captures the costs of oversight and coordination between the country and the economic union.

These three assumptions imply the following utility from public services:

$$W_l^G = -\frac{\delta}{g_l(l)} - \frac{\phi}{\int_0^1 I_{l=m}^P dm} - \kappa I_l^U, \tag{6}$$

where $\delta > 0$; $I_{l=m}^P$ is an indicator variable that takes value 1 if if localities l and m belong to the same P_n, and zero otherwise; and I_l^U is an indicator variable that takes value 1 if locality l is a member of an economic union $R_n \neq P_n$, and zero otherwise. The first term in Equation (6) says that the value of public services for locality l depends on the amount of its ideal variety that is provided. The second term in Equation (6) says that each locality's share of the fixed cost of government declines with the size of the country. The parameter ϕ measures the magnitude of these economies of scale. The third term of Equation (6) says that being member of an economic union is costly. The parameter κ measures the magnitude of these economies of scope.

2.2 Discussion of Assumptions

To complete the model we need to make assumptions on how localities interact. We shall consider law and diplomacy in Section 3, and war and conquest in Section 4. In both cases, the world's political structure is determined by the interplay of the forces that we have already presented. Our assumptions are commonly made in the literature, but it may be useful to take a small detour and discuss them before we move on.

The starting point of our analysis is the idea that improvements in transportation technology are a major driver of globalization, which we model as a fall in trade costs between localities. This view is uncontroversial: there is overwhelming evidence that the secular rise in trade volumes was made possible by better transportation technologies. For instance, some of the major drivers of the first wave of globalization are the adoption of the steamship (Pascali 2017), the telegraph (Steinwender 2017) and the spread of railroads (Donaldson 2017). Likewise, the main drivers of the second wave of globalization include the use of containerization in ocean shipping (Levinson 2006), the development of jet aircraft engines (Hummels 2007) and more recently the ICT revolution. All these innovations promoted trade both between and within countries.

We also assume that borders obstruct trade. The large negative effect of political borders on trade volumes is well know at least since the work of McCallum (1995), who showed that, controlling for distance and income, trade between two Canadian provinces is 20 times larger than trade between a Canadian province and a U.S. state. While the exact magnitude of the border effect is still subject to debate, all existing studies coincide in finding large effects. For instance, in a recent survey of the voluminous empirical literature on gravity equations, Head and Mayer (2014) report that countries are typically found to trade 5 to 7 times more with themselves than with any other country.

There is equally strong evidence that sharing economic regulations and signing economic agreements promote trade and reduce the border effect. For instance, Head and Mayer (2014) also report that sharing a common currency or being part of a free trade area are associated on average with a doubling of the volume of trade; similarly, Helpman et al. (2008) find that having a similar legal system increases the bilateral volume of trade by more than 60 percent. Using a simple model, Anderson and van Wincoop (2004) attempt a rough decomposition of the border effect. They argue that the compounded cost of borders is equivalent to an ad valorem tax of 44 percent, which can be broken down into an 8 percent of policy related barriers (including non-tariff barriers), 7 percent language barriers, 14 percent currency barriers, 6 percent information cost barriers, and 3 percent security barriers.

Our modeling assumption that technological barriers reduce trade along the intensive margin while policy-induced barriers affect the extensive margin is also grounded in empirical evidence. There is a wide consensus that transportation costs affect significantly the intensive margin of trade; on the other hand, Helpman et al. (2008) and Dutt et al. (2013) find that free trade agreements and WTO membership predominantly affect the extensive margin.

Turning next to governments, our model follows the standard assumptions that underpin the literature on federalism and the architecture of government since Oates (1972).[8] Having separate local governments enables better preference matching, but sharing a common government enables beneficial policy coordination and reaps economies of scale. While these assumptions originated as simple observations of real-world patterns, models of political economy have provided them with rigorous micro-foundations. Majority rule makes centralization costly when localities have different preferences (Lockwood 2002; Besley and Coate 2003). Frictions in bargaining between political leaders (Harstad 2007) and in their agency relationship to their constituents (Boffa, Piolatto and Ponzetto 2016) explain both why multiple local government cannot fully coordinate their policies and why a single central government cannot fully tailor public services to local preferences. Accordingly, Strumpf and Oberholzer-Gee (2002) find empirically that U.S. states with more heterogeneous preferences are more likely to decentralize policy-making.

Our assumption of economies of scope in government is equally classic (Musgrave 1971; Dahl and Tufte 1973; Alesina and Spolaore 2003). Marks and Hooghe (2004, p. 18) "emphasize the costs of decomposing authority" as a paramount concern in the analysis of multi-level governance, especially in the international arena with its prevalence of intersecting task-specific jurisdictions. Empirical evidence shows that multiplying administrative tiers reduces their efficiency, and is particularly associated with lower labor productivity and excess government employment (Le Galès and John 1997; Andrews and Boyne 2009). This cost is particularly pronounced for special-purpose governments in charge of a single task (Berry 2009). These efficiency losses reflect both the costs of administrative duplication and economies of scope in political accountability. Boffa, Piolatto and Ponzetto (2016) show theoretically that dividing policy-making responsibilities across multiple levels of government increases overall rent extraction by government officials. Fan, Lin and Treisman (2009) report that across countries corruption increases with the number of administrative tiers: as they rise from two to six, the probability of a firm reporting that it is never expected to pay bribes falls by 32 percentage points.[9]

[8] The same forces that operate in our model at the national and supra-national level should also apply at the sub-national level. We could explore this issue further by introducing a third set of government functions that would justify a three-level governance structure. We conjecture that, in this setting, increasing globalization would explain simultaneously the creation of international unions and the trend towards greater federalism within countries.

[9] Admittedly, the evidence about the importance of economies of scope has been gathered mostly at the sub-national level. Casual observation suggests, however, that economies of scope also apply at the supra-national level. A notorious example is the European Central Bank, which is aimed at reducing the border

3 Law and Diplomacy

To determine the equilibrium political structure (P, R), we must make assumptions about how governments are chosen. A natural benchmark is that bargaining among localities is efficient and delivers Pareto efficient outcomes. In this case, the equilibrium political structure is obtained by solving the following maximization problem:

$$(P, R) = \arg\max \int_0^1 \omega_l W_l dl, \tag{7}$$

where $\{\omega_l\}_{l\in[0,1]}$ is a set of Pareto weights such that $\int_0^1 \omega_l dl = 1$. Given the symmetry of this world, it seems reasonable to focus on the case in which the bargaining process treats all localities in the same way: $\omega_l = 1$ for all $l \in [0, 1]$. Sometimes this political structure is referred to as the utilitarian welfare optimum since it maximizes average world welfare. We view it as the description of a world in which all localities have the right to choose their own political structure. This is a world ruled by law and diplomacy. We shall consider war and conquest in the next section.

An implication of the maximization problem (7) is that each country P_n provides a uniform bundle that contains equal amounts of the ideal varieties of its constituent localities.[10] That is, locality l receives the following bundle of public services:

$$g_l(x) = \begin{cases} \dfrac{1}{\int_0^1 I_{l=m}^P dm} & \text{if } I_{l=x}^P = 1 \\ 0 & \text{if } I_{l=x}^P = 0. \end{cases} \tag{8}$$

Thus, we can re-write Equation (6) as follows:

$$W_l^G = -\delta \int_0^1 I_{l=m}^P dm - \frac{\phi}{\int_0^1 I_{l=m}^P dm} - \kappa I_l^U, \tag{9}$$

Note that the value of public services for locality l declines with the size of the country. As more localities join the country, the public services provided are farther away from the ideal of each member locality. The parameter δ measures the importance of this preference mismatch.

effect by eliminating currency barriers. Its creation does not seem to have reduced the size or costs of national central banks, but instead it seems to have just added to these costs.

[10] This is welfare-maximizing for the government given that localities have convex preferences.

Combining Equations (1), (4), and (9), we obtain:

$$W_l = -\eta + \gamma \left(1 - \beta + \beta \int_0^1 I_{l=m}^R dm\right) - \delta \int_0^1 I_{l=m}^P dm - \frac{\phi}{\int_0^1 I_{l=m}^P dm} - \kappa I_l^U. \tag{10}$$

Equation (10) shows how political structure determines welfare and reveals the key trade-off that underlies our theory. A desirable political structure should facilitate trade, accommodate preference heterogeneity and take advantage of economies of scale and scope. But these goals cannot be achieved simultaneously and something must give.[11]

3.1 Equilibrium Political Structure

There are a couple of preliminary results that simplify the analysis of the maximization problem (7). The first one is that P and R contain equal-sized elements. Let S and U be the sizes of each element $P_n \in P$ and $R_n \in R$ respectively.[12] The second result is the confirmation that, indeed, P is a refinement of R. If it is ever worth paying the costs of having a two-level governance structure, this is because localities desire a lower-level government that provides public services adapted to their specific preferences, and a higher-level government that reduces border effects and facilitates trade. Thus, we can write W_l as a function of S and U as follows:

$$W_l = W^F(S, U) = -\eta + \gamma (1 - \beta + \beta U) - \delta S - \frac{\phi}{S} - \kappa I^U, \tag{11}$$

where I^U is an indicator variable that takes value 1 if $S \neq U$, and zero otherwise.

It follows from Equation (11) that the equilibrium political structure that solves the maximization problem (7) is such that either $P = R$ or $P \neq R = \{[0, 1]\}$.[13] In the first case, the world is organized in a single-level governance structure with a set of countries that

[11] Equation (10) includes all the features of Oates's (1972) classic Decentralization Theorem: in the absence of cost savings from the centralized provision of public services ($\phi = 0$) and of interjurisdictional externalities ($\beta\gamma = 0$), welfare is at least as high if each locality can choose its own public services than if any uniform bundle is imposed across all of them.

[12] Throughout, we disregard the constraint that the number of countries and unions, $1/S$ and $1/U$, must be a natural number. Aside from this constraint, all localities prefer the same optimal country size so that any equilibrium is symmetric. In Appendix A.3 we introduce this integer constraint and show that the equilibrium political strcuture remains symmetric and qualitatively analogous to the tractable approximation we use in the main text.

[13] We know that, if $P \neq R$, there is only one world economic union because the marginal cost of adding members is constant and the marginal benefit is growing with the size of the union. Thus, having many small unions is not optimal.

provide public services and regulate markets. In the second case, the world is organized in a two-level governance structure with countries providing public services and a world economic union regulating markets.

We now find the equilibrium political structure in three steps. First, we compute the welfare $W^F(S_1^*, S_1^*)$ generated by the single-level governance structure, where S_1^* is the optimal country size without a world union. This political structure takes full advantage of economies of scope, and country size trades off preference heterogeneity against both economies of scale and facilitating trade:

$$S_1^* = \sqrt{\frac{\phi}{\delta - \beta\gamma}}. \tag{12}$$

The size of countries in the absence of unions is increasing with economies of scale (ϕ) and the importance of trade ($\beta\gamma$), and it is decreasing with preference heterogeneity (δ).[14]

Second, we compute the welfare $W^F(S_2^*, 1)$ generated by a world with an economic union, where S_2^* is the optimal country size with a world union. This political structure gives up economies of scope in order to remove border effects and facilitate trade. Country size trades off preference heterogeneity and economies of scale:

$$S_2^* = \sqrt{\frac{\phi}{\delta}}. \tag{13}$$

The size of countries with a world union is increasing with economies of scale (ϕ) and it is decreasing with preference heterogeneity (δ). Country size is always smaller with a world union than without it. The reason is that the union removes one of the incentives for country size, namely, facilitating trade.

The third step is to determine the equilibrium political structure. If $W^F(S_1^*, S_1^*) > W^F(S_2^*, 1)$, the world is partitioned into countries of size S_1^*. If instead $W^F(S_1^*, S_1^*) < W^F(S_2^*, 1)$, the world is partitioned into countries of size S_2^* that belong to a world economic union. Naturally, in the knife-edge case in which $W^F(S_1^*, S_1^*) = W^F(S_2^*, 1)$, both solutions are equilibrium political structures. A little bit of algebra shows that the world union is preferred if and only if:

$$\kappa + 2\sqrt{\phi\delta} < \beta\gamma + 2\sqrt{\phi(\delta - \beta\gamma)}. \tag{14}$$

That is, the world union is preferred for high values of β, γ and δ; and low values of ϕ and

[14] Equation (12) assumes that $\delta > \phi + \beta\eta$, so that there is enough preference heterogeneity to ensure that countries are always smaller than the whole world.

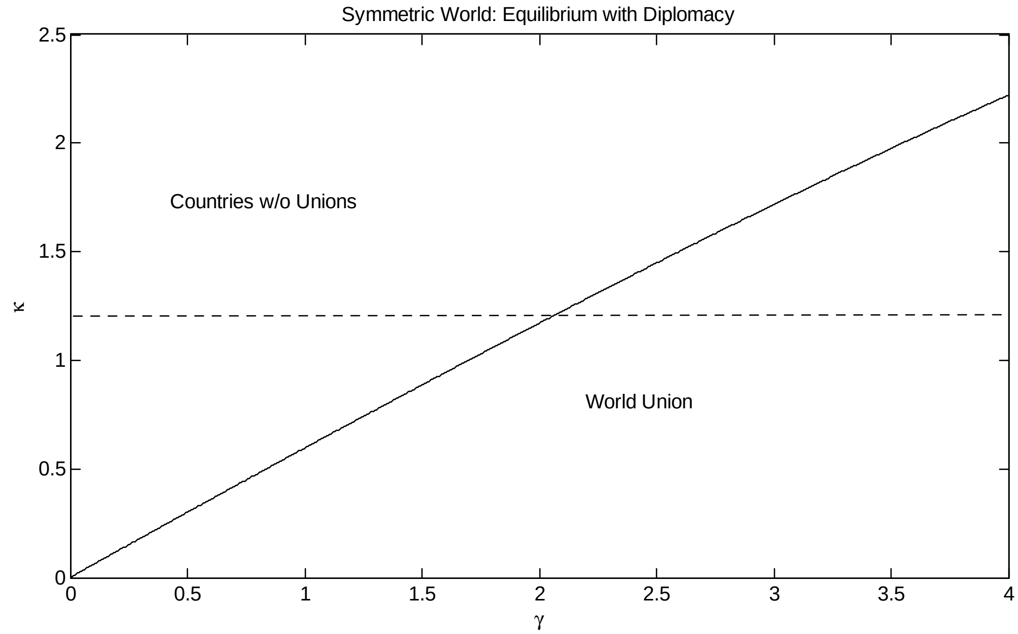

Figure 4: Globalization and Political Structure. The figure shows how equilibrium political structure depends on economies of scope (κ) and globalization (γ).

κ. A world union is more useful if the border effect and the gains from trade are large and there is substantial preference heterogeneity. A world union is less useful if economies of scale and scope are sizable.

3.2 Globalization and Political Structure

With these results at hand, we can now return to Figures 1 and 2 in the introduction and ask again: Why did the first wave of globalization reduce the number of countries but not generate economic unions? Why did the second wave of globalization increase the number of countries and lead to the creation of economic unions? To answer these questions, we interpret globalization as a process by which γ grows from 0 to η, and we study how political structure changes as this process unfolds.

Figure 4 shows how equilibrium political structure depends on the two key parameters that measure economies of scope and globalization, κ and γ. For a given κ, the world chooses a single-level political structure if γ is low. If κ is not too large, as in the dashed line, the world political structure shifts from single-level to two-level governance as globalization crosses a

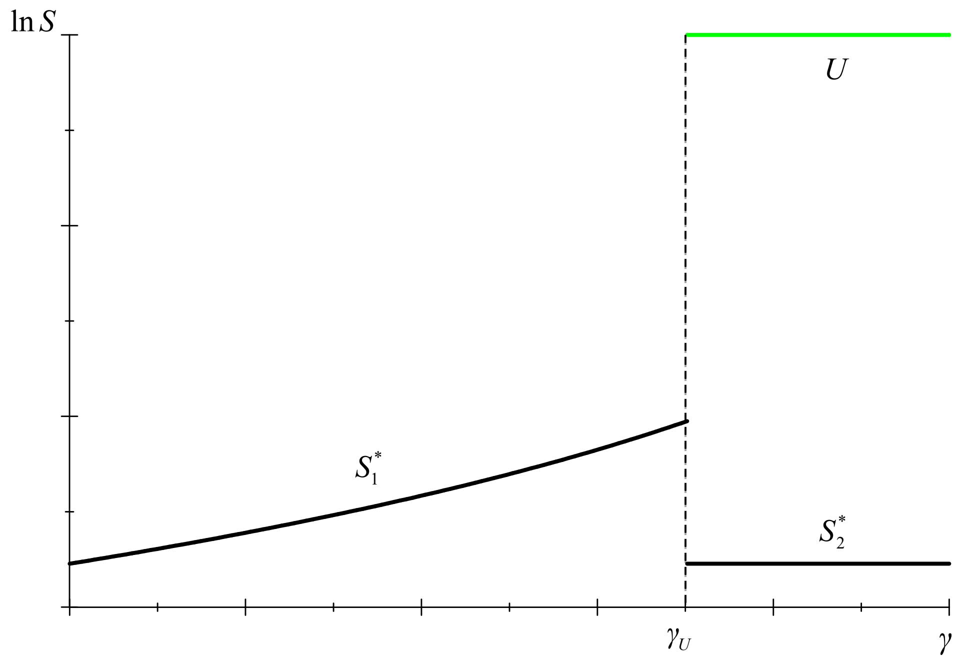

Figure 5: Globalization, Countries and Unions. The figure shows how the world political structure changes with globalization (τ). The black line is the size of each country, the green line is the world union.

threshold value γ_U defined as follows:

$$\beta\gamma_U + 2\sqrt{\phi\left(\delta - \beta\gamma_U\right)} = \kappa + 2\sqrt{\phi\delta}. \tag{15}$$

If economies of scope are nil, the smallest gain from trade leads to the formation of a world union ($\kappa = 0$ implies $\gamma_U = 0$). If economies of scope are prohibitive, the world union is never an equilibrium ($\kappa > \beta\eta + 2\sqrt{\phi\left(\delta - \beta\eta\right)} - 2\sqrt{\phi\delta}$ implies $\gamma_U > \eta$). The comparative statics of this threshold follow directly from our analysis of Equation (14). The larger the border effect (β) and preference heterogeneity (δ), the smaller γ_U. The larger economies of scale (ϕ) and scope (κ), the larger γ_U.

Figure 5 shows how political structure changes with globalization by plotting the equilibrium size of countries and unions as a function of γ. At low levels of globalization ($\gamma < \gamma_U$), it is too expensive to create a world union, and increases in γ lead to an increase in country size. The cost of reaping additional gains from trade is a growing preference mismatch.

Eventually, the preference mismatch has grown so large that it becomes cost-effective to create a world union. At high levels of globalization ($\gamma > \gamma_U$), the cost of reaping additional gains from trade is the loss of economies of scope. The creation of a world union allows countries to revert to a smaller size and reduce the preference mismatch. Further increases in γ have no effect on political structure.

It is instructive to compare our result to the finding by Alesina, Spolaore and Wacziarg (2000) that globalization always reduces country size. Their analysis differs from ours in two crucial ways. First, they assume prohibitive economies of scope so that the world always has single-level governance. Second, they model globalization as an exogenous reduction in the border effect. Thus, globalization always reduces country size, and their model cannot explain why globalization led to smaller countries in the twentieth century but not in the nineteenth century. We show, however, that an exogenous decline in transportation costs increases the border effect in the nineteenth century, and then leads to the endogenous removal of border effects in the twentieth century. This is how we explain the reversal in the link between globalization and country size.[15]

4 War and Conquest

The previous section considered a world in which every locality can choose its own government freely. Then, the equilibrium political structure is the outcome of efficient bargaining among equals. This constitutes a useful theoretical benchmark and an ideal state of affairs. But it hardly reflects historical experience. Alongside diplomacy, war and conquest (or the threat of it) have played a crucial role in shaping real-world political structure. Thus, we want to know whether the possibility of war and conquest affects the relationship between globalization and political structure. And if it does, we also want to know how and why this happens.

Suppose now that the world is divided into core and periphery. The core contains a measure π of localities with a superior military technology that can be used to conquer other localities and form empires. The periphery contains the remaining localities that do not have this military technology. We assign low indices to core localities: $C = [0, \pi]$. We keep all assumptions regarding preferences, technology and the costs of government. Thus, the

[15] Could it be technological progress? Alesina, Spolaore and Wacziarg (2000) show that technological progress increases the gains from trade and the incentives to create large countries. Once again, the difficulty lies in the reversal of the link between technological progress and country size. Their model cannot explain why technological progress led to larger countries in the nineteenth century but not in the twentieth century.

model of the previous section applies as $\pi \to 0$.

Empires are an alternative form of government that provides public services and regulates the markets of all its member localities. The latter are divided into the metropolis and the colonies. The metropolis contains core localities that unite to conquer periphery localities that then become colonies. Empires provide in identical amounts the ideal public services of localities in their metropolises. If locality l belongs to a metropolis, it receives the following bundle of public services:

$$g_l(x) = \begin{cases} \dfrac{1}{\int_0^1 I_{l=m}^M dm} & \text{if } I_{l=m}^M = 1 \\ 0 & \text{if } I_{l=m}^M = 0, \end{cases} \tag{16}$$

where $I_{l=m}^M$ is an indicator variable that takes value 1 if localities l and m belong to the same metropolis and zero otherwise. Note that empires provide none of the ideal public services of their colonies.

To build an empire of size E, core localities build a metropolis, and then wage war to conquer the colonies. A colonial war is successful if and only if the size of the metropolis M is large enough relative to that of the colonies:

$$M \geq \mu E. \tag{17}$$

The parameter $\mu \in (0,1)$ defines the smallest size of a successful metropolis. This assumption captures the well-known argument that country size is important for military success, and thus one of the reasons countries grow large is to prepare for war. To simplify matters, we assume throughout that $\pi < \mu$. This means that the combined size of all empires is always smaller than the world, and empires do not need to fight each other for colonies.

From the perspective of the metropolis, the upside of building an empire is that it facilitates trade and generates economies of scale with minimal preference mismatch. The downside is that waging war and holding the empire together reduces the utility that the metropolis derives from public services by an amount $\omega > 0$. This cost captures the diversion of government resources from providing public services in the metropolis to waging colonial wars. Thus, the welfare of a member of the metropolis is given by:

$$W_l = -\eta + \gamma \left(1 - \beta + \beta \int_0^1 I_{l=m}^E dm\right) - \delta \int_0^1 I_{l=m}^M dm - \frac{\phi}{\int_0^1 I_{l=m}^E dm} - \omega, \tag{18}$$

where $I^E_{l=m}$ is an indicator variable that takes value 1 if localities l and m belong to the same empire and zero otherwise.

From the perspective of the conquered colonies, instead, the gains from trade are dwarfed by the costs of an imperial government that generates an unbounded preference mismatch. This division of the surplus captures in our model the extractive nature of imperialism: the metropolis enjoys the gains from trade, while the conquered localities suffer under an exploitative colonial administration.

4.1 Equilibrium Political Structure

In an asymmetric world that features war and imperial conquest, equilibrium political structure need no longer be globally efficient, because core localities can impose their will on other localities through aggression. However, we still assume that political structure is jointly efficient for the core. That is, we allow core localities to cooperate with each other on the creation of their respective empires.[16] Formally, equilibrium political structure is now determined in two stages:

1. Core localities choose cooperatively whether to wage war and build empires. Localities in the periphery might become their colonies or remain free.

2. Localities that do not belong to an empire choose their political structure through efficient bargaining, as in our baseline model.

The world's equilibrium political structure now consists of a set of empires that have a combined size $1-F$; plus two partitions (P, R) of the free world which itself has a combined size F. We solve for this equilibrium political structure in two steps. First, we determine the political structure of the free world (P, R) for a given size F. Second, we determine the number and size of empires and therefore the size of the free world F.

One interpretation of the model in the previous section is that the set of core localities with superior military technology is very small: i.e. $\pi \to 0$. Another interpretation is that the military technology is not good enough, i.e., ω and μ are large. As we shall see shortly, in both cases the whole world is free and diplomacy rules.

[16] Historically, great powers have in fact cooperated and agreed on explicit partitions of the world, from the Treaty of Tordesillas in 1494 to the Berlin Conference in 1884.

4.1.1 The Free World

The analysis of the free world is essentially the same as in the previous section. The only difference is that now the combined size of the free world is F rather than 1. Efficient bargaining ensures that free localities choose the optimal political structure. Equation (11) still applies and, as a result, there are two cases to consider: $S = U$ and $S < U = F$. The optimal country sizes in these cases are still given by Equations (12) and (13), respectively.[17]

The union of the free world is preferred now if and only if:

$$\kappa + 2\sqrt{\phi\delta} \leq \beta F\gamma + 2\sqrt{\phi\left(\delta - \beta\gamma\right)}. \tag{19}$$

Condition (19) generalizes Condition (14) for the case of a free world of size F. The main difference is that empires reduce the size of the free world, and this reduces the welfare associated with an economic union of free localities. This union still costs κ to each member. But it is now less efficient at removing border effects, βF instead of β.

4.1.2 Empires

Core localities must first decide whether to wage war to build an empire or to forego war and enter the free world. We start the analysis with two observations. The first is that the equilibrium political structure features symmetric empires. Let E be the size of each of them. The second observation is that constraint (17) is always binding. From the perspective of the metropolis, there is no reason not to add additional colonies. This lowers the cost of government and facilitates trade without creating any preference mismatch (for the metropolis) in the provision of public services.

These two observations imply that the welfare of a core locality that builds an empire is given by:

$$W_l = W^E\left(E\right) = -\eta + \gamma\left(1 - \beta + \beta E\right) - \delta\mu E - \frac{\phi}{E} - \omega. \tag{20}$$

Note that this welfare does not depend on what other core localities do. This follows from our assumption that $\pi < \mu$, which ensures that core localities can find their desired measure of colonies without having to fight each other. The size of the empire trades off preference

[17] We now assume that $\delta > \phi F^{-2} + \beta\eta$ to ensure that countries are always smaller than the free world.

heterogeneity against both economies of scale and facilitating trade:

$$E^{*}=\sqrt{\frac{\phi}{\delta\mu-\beta\gamma}}, \tag{21}$$

where E^{*} is the optimal empire size (for the the core localities).[18]

Comparing Equation (21) to Equations (12) and (13), it is immediate to see that empires are larger than peaceful countries. The reason is that the metropolis does not internalize the cost of the preference mismatch imposed on the colonies: hence, $\delta\mu$ appears instead of δ in the denominator. The equilibrium size of empires is increasing with economies of scale (ϕ) and the importance of trade ($\beta\gamma$), and it is decreasing with preference heterogeneity (δ). These comparative statics are the same as for countries. Also, we now have the additional result that the smaller the size of the metropolis relative to that of the colonies (μ), the larger the empire.

When are empires formed? If core localities wage war and build empires, their welfare is $W^{E}\left(E^{*}\right)$. If core localities instead agree to refrain from waging war and choose to form countries and unions by efficient bargaining, their welfare is $\max\left\{W^{F}\left(S_{1}^{*},S_{1}^{*}\right),W^{F}\left(S_{2}^{*},1\right)\right\}$. If $W^{E}\left(E^{*}\right)<\max\left\{W^{F}\left(S_{1}^{*},S_{1}^{*}\right),W^{F}\left(S_{2}^{*},1\right)\right\}$, there are no empires, diplomacy rules and the size of the free world is $F=1$. If instead $W^{E}\left(E^{*}\right)>\max\left\{W^{F}\left(S_{1}^{*},S_{1}^{*}\right),W^{F}\left(S_{2}^{*},1\right)\right\}$, there are $\pi/\left(\mu E^{*}\right)$ empires of size E^{*}, and the size of the free world is reduced to $F=1-\pi/\mu$.[19] Some algebra shows that empires are built if:

$$\omega+\beta\gamma+2\sqrt{\phi\left(\delta\mu-\beta\gamma\right)}\leq\min\left\{\beta\gamma+2\sqrt{\phi\left(\delta-\beta\gamma\right)},\kappa+2\sqrt{\phi\delta}\right\}. \tag{22}$$

Not surprisingly, empires are built in equilibrium if the military technology is good enough, i.e., the cost of waging war (ω) is low and the metropolis (μ) small relative to the empire.

To sum up, the introduction of war and conquest substantially enriches the set of possible equilibrium structures. Condition (22) determines whether empires are built or not, and

[18]Equation (21) assumes that $\delta\mu>\phi+\beta\eta$, so that there is enough preference heterogeneity to ensure that the empire is smaller than the whole world.

[19]We see here the role played by the assumption that core localities cooperate. If core localities choose empires noncooperatively, there might be equilibria in which empires are formed when $\max\left\{W^{F}\left(S_{1}^{*},S_{1}^{*}\right),W^{F}\left(S_{2}^{*},1\right)\right\}>W^{E}\left(E^{*}\right)>\max\left\{W^{F}\left(S_{1}^{*},S_{1}^{*}\right),W^{F}\left(S_{2}^{*},1-\pi/\mu\right)\right\}$. If core localities expect other core localities to build empires, their best response is to build an empire themselves. And, once this happens, there is no incentive to deviate. This equilibrium is a coordination failure since it lowers the welfare of all the localities in the world. One can also construct equilibria with mixed strategies in which some core localities build empires and others do not. We ignore theses complications to simplify our analysis.

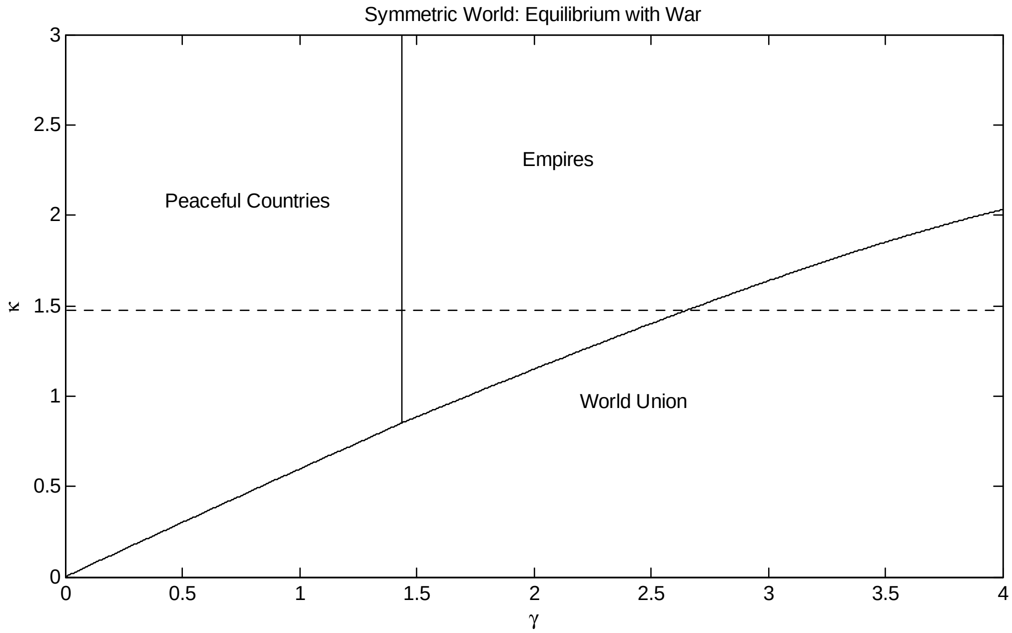

Figure 6: Globalization and Political Structure. The figure shows how equilibrium political structure depends on economies of scope (κ) and globalization (γ).

thus the size of the free world. Then, Condition (19) determines whether the free world is organized in a single-level governance structure or a two-level one.

4.2 Globalization and Political Structure

Let us now return to the question of how globalization affects political structure that motivates our analysis. To do this, we consider again a sequence of equilibria indexed by γ, and explore how political structure changes as γ grows from 0 to η. Recall that, in the baseline model of the previous section, there is a threshold value γ_U such that the world political structure will consist of a single-level governance at early stages of globalization ($\gamma < \gamma_U$), and then shifts to the two-level governance at later stages ($\gamma > \gamma_U$). How does the introduction of war and conquest affect this result?

Figure 6 shows again how equilibrium political structure depends on the two key parameters that measure economies of scope and globalization, i.e. κ and γ. Unlike Figure 4, we assume now that the cost of war is low enough so that empire-building is an equilibrium for some parameter values. The first new result is that there is an age of empires if and only if the following condition holds:

$$\omega < 2\sqrt{\phi}\left(\sqrt{\delta - \beta\gamma_U} - \sqrt{\delta\mu - \beta\gamma_U}\right). \tag{23}$$

Otherwise, empires are never built and the effects of globalization are those of the previous model. The second result is that, if there is an age of empires, it must start when the world has a single-level governance structure. The third result is that, if the age of empires comes to an end, it must give way to a world with a two-level governance structure.

The dashed line in Figure 6 corresponds to a case in which initially the whole world is free and there is no economic union. As globalization reaches a first threshold value $\gamma_L > 0$, empires are formed. Eventually, as globalization reaches a a second threshold value $\gamma_H < \eta$, empires are abandoned and a world economic union is formed. This evolution is not generic, though. A necessary and sufficient condition for $\gamma_L > 0$ is that:

$$\omega + 2\sqrt{\phi\delta\mu} > 2\sqrt{\phi\delta}. \tag{24}$$

This condition implies that core localities do not wish to conquer colonies merely to compel them to defray the fixed cost of government. The motivation for imperial expansion lies instead in the desire to gain access to colonial markets without having to compromise the preferences of the metropolis over public services. As a consequence, core localities choose to forego warfare in autarky, when market access is worthless.

Also, a necessary and sufficient condition for $\gamma_H < \eta$ is that:

$$\omega + 2\sqrt{\phi\left(\delta\mu - \beta\eta\right)} > \kappa - \beta\eta + 2\sqrt{\phi\delta}. \tag{25}$$

This condition implies that even though empires limit the preference mismatch in the metropolis, there is a level of globalization at which this mismatch has grown large enough to justify a move to the two-level governance structure. Paradoxically, the cause of imperial collapse at a late stage of globalization is exactly the same as the cause for the rise of empires at an early stage, namely, the desire to remove border effects and reap the gains from trade. It is just that, at some point, it becomes more cost-efficient to replace conquered colonies with free partners in an economic union.[20]

[20] To simplify the analysis, we have ruled out by assumption the possibility that empires form economic unions. Yet, under mild assumptions, this can be obtained as a result. For example, suppose that core localities can impose their preferred political structure, including economic unions, onto the rest of the world. Then, under the condition $\omega > 2\sqrt{\phi\delta}(1 - \sqrt{\mu})$, it is easy to show that core localities would strictly

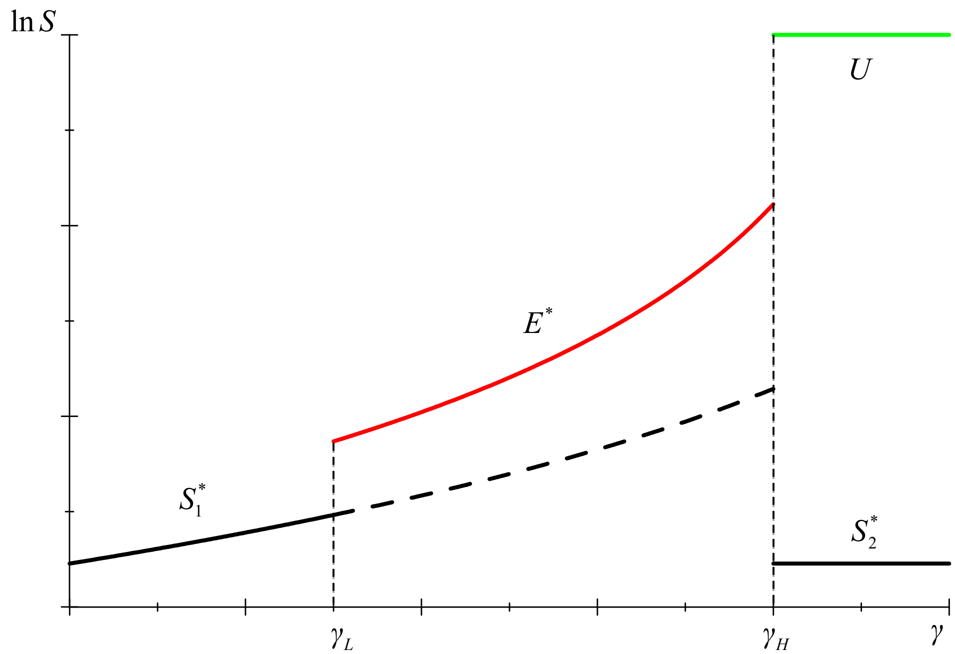

Figure 7: Countries, Empires and Unions. The figure shows how the world political structure changes with globalization (γ). The black line is the size of peaceful countries, the red line is the size of empires, the green line is the world union.

Figure 7 depicts this three-stage evolution of the world political structure by plotting the equilibrium size of empires, free countries, and unions. At low levels of globalization ($\gamma < \gamma_L$), the world contains only free countries. There are no empires or unions. As globalization proceeds, the size of countries grows and so does the preference mismatch. When globalization crosses the first threshold ($\gamma_L < \gamma < \gamma_H$), the preference mismatch has grown too large and core localities prefer to build empires. War allows the metropolises to impose their ideal public services on their colonies. Thus, empires facilitate trade and generate economies of scale at the cost of an unbounded preference mismatch in the colonies. Empires are larger than countries and keep growing as globalization proceeds. Eventually, globalization crosses the second threshold ($\gamma > \gamma_H$). At this point, preference mismatch has grown too large even within empires. Empires collapse and countries revert to a smaller size.

prefer diplomacy than war both in autarky and when the world union is in place. Hence, economic unions will be peaceful.

A world union is created. After this, there are no further changes in political structure.[21]

The analysis in this section has shown that war and conquest do not overturn our main result that globalization generates a shift in the world political structure from a single-level governance structure to a two-level one. On the contrary, considering war and conquest alongside diplomacy strengthens and enriches our theory of the link between globalization and political structure. It explains why the creation and expansion of empires causes conflict and aggression during the first wave of globalization. It also explains why the formation of economic unions during the second wave of globalization promotes peace.

5 Geography

The world so far lies in an abstract space in which all localities are equidistant. In reality, geography is much more complex. The world is made of continents and regions, and more proximate areas tend to be more integrated, both economically and politically. Geography has historically played an important role in determining political structure, and it seems reasonable to ask how it affects our results so far.

We assume now that, in addition to sharing a superior military technology, core localities are also near each other in a geographical sense. Periphery localities are instead far away from the core and from each other. Besides the added realism, this simple extension helps us rationalize why the shift from the single-level to the two-level governance structure tends to be gradual and may start at the regional level.

Iceberg transportation costs for core-periphery and periphery-periphery trade remain τ, as before. Thus, the gains from this type of trade are still γ. But we assume now that iceberg transportation costs for core-core trade are $\tau - \rho$, with $\rho > 0$. This implies that the gains from this type of trade are now $\gamma + \rho$. The rest of assumptions are those of the previous section. Thus, the previous model applies as $\rho \to 0$.

The main implication of this generalization of our model is that the utility derived from the consumption of market goods now depends on whether the locality is located in the core or the periphery:

$$W_l^M = -\eta + \gamma \left(1 - \beta + \beta \int_0^1 I_{l=m}^R dm\right) + \rho I_{l \in C} \left[(1-\beta)\pi + \beta \int_0^\pi I_{l=m}^R dm\right], \qquad (26)$$

[21] Figure 7 depicts the case in which, during the age of empires, the free world always adopts a single-level governance structure and the shift to the two-level governance structure coincides with the collapse of empires. This need not be the case. If the size of the free world is large enough, an economic union of free countries co-exists with empires.

where $I_{l \in C}$ is an indicator variable that equals 1 if $l \in C$ and zero otherwise. Notice that border effects are larger for core-core trade, $\beta(\gamma + \rho)$, than for either core-periphery or periphery-periphery trade, $\beta\gamma$. It follows immediately that, other things equal, core localities prefer sharing economic regulation with other core localities. Periphery localities, instead, are indifferent about which localities they share regulation with, and care only about their total number.

5.1 Equilibrium Political Structure

As in the previous section, the equilibrium political structure is determined in two stages. First, we find the political structure for the free world for a given F. Second, we determine the number and size of empires. Appendix A.4 goes through these steps in detail. In the main text, we simply describe our new results.

The first one is that the partitions P and R need no longer contain equal-sized elements. Since core localities prefer to join other core localities there are two distinct types of elements of P: core countries (formed by core localities) with size S_C, and periphery countries (formed by periphery localities) with size S_P. If $P \neq R$, there are, at most, two distinct types of elements of R: core unions (formed by core countries) with size U_C, and periphery unions (formed by periphery countries) with size U_P.

The second, and most important, new result is that now the free world has three possible equilibrium political structures. The first is a single-level governance structure with only countries: $U_C = S_C$ and $U_P = S_P$. In this case, core countries are larger. The reason, of course, is that they have larger gains from trade. The second political structure is a two-level governance with a world economic union. In this case, the size of all countries is still given by Equation (13). There is now a third possible political structure with an economic union that includes only the core: $U_C = \pi$ and $U_P = S_P$.[22] Thus, the world may adopt a mixed political structure with two-level governance in the core and single-level governance in the periphery. In this case, core countries are smaller than periphery countries. The reason, which is familiar by now, is that the core union removes one incentive to increase country size, which is to facilitate trade.

[22] Up to this point, the assumption of a pyramidal hierarchy of governments has eased the exposition, allowing us to refer to countries and unions from the outset, but it has not been binding. Here, however, this assumption has bite. Once a core union exists, core localities would prefer to form countries with periphery localities, since this would facilitate additional trade. The assumption rules out this possibility. This does not seem too outlandish, though, as it can be interpreted as another form of economies of scope.

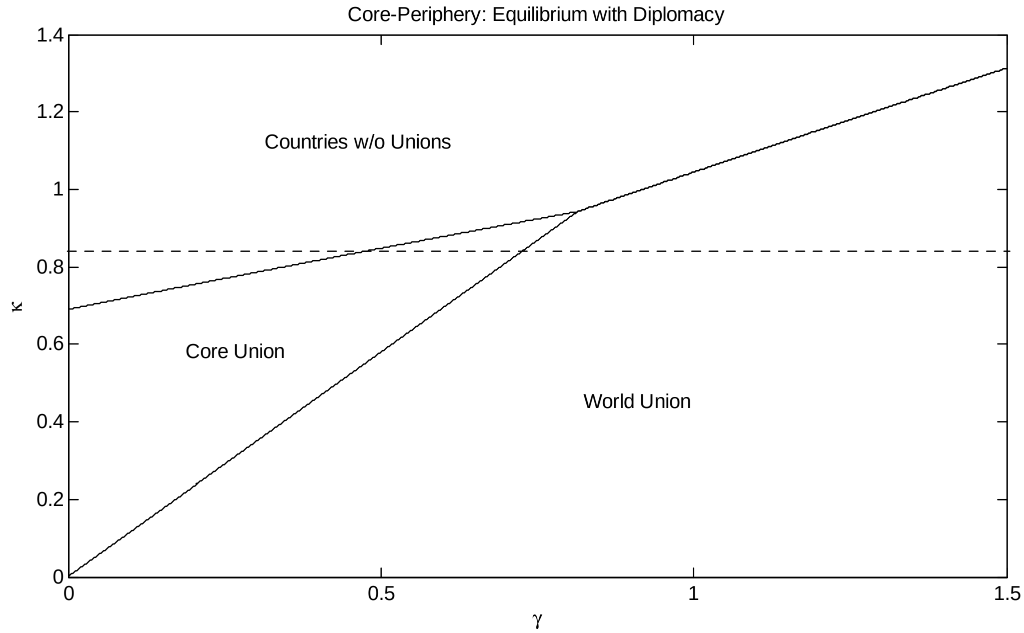

Figure 8: Globalization and Political Structure. The figure shows how equilibrium political structure depends on economies of scope (κ) and globalization (γ).

5.2 Globalization and Political Structure

We now go back to the question of how globalization affects political structure, and we consider again a sequence of equilibria indexed by γ. We begin with a scenario in which waging war has prohibitive costs, so diplomacy always prevails and the world adopts the welfare-maximizing political structure.

Figure 8 shows how this optimal political structure depends on the two key parameters κ and γ. As in Section 3, if economies of scope are high and globalization is modest the optimal political structure is single-level governance; as globalization advances, the optimal political structure shifts to two-level governance with a world union. The main novelty here is that, if κ is low enough relative to π and ρ, there is an intermediate stage in which there is a core union.

The dashed line in Figure 8 depicts such a three-stage evolution of the world political structure. At low levels of globalization ($\gamma < \gamma_C$), the world contains only countries. As globalization proceeds, the size of countries grows and so does the preference mismatch. When globalization crosses a first threshold, the preference mismatch has grown too large for core localities and it justifies giving up economies of scope. The preference mismatch in periphery localities is still small and it does not justify the loss of economies of scope.

Thus, a core union becomes the cost-effective choice. Intuitively, its optimality requires that sufficiently small economies of scale, a sufficiently large core, and high enough gains from core-core trade.[23] Eventually, globalization crosses a second threshold. At this point, preference mismatch has grown too large even in the periphery. The core union is enlarged to include periphery countries and becomes a world union. After this, there are no further changes in political structure.

As in Section 4, this peaceful evolution of political structure can be interrupted by a period of imperialist aggression if the cost of war is low enough. Figure 9 displays the equilibrium political structure in this general case. The dashed line corresponds to a scenario in which globalization triggers a four-fold evolution. The first stage is peaceful single-level governance. The second is the creation of colonial empires through which the core conquers and rules distant localities in the periphery. As globalization proceeds further, empires become overstretched and collapse, and a peaceful union replaces them. The novelty is that, in the third stage, this is a core union only. Bellicose global empires are initially replaced by a peaceful regional union. Only as globalization progresses further is the fourth and final stage reached in which the whole world forms an economic union.

It is not difficult to see that this core-periphery model could be extended in fruitful ways. One possibility would be to assume that there are two, three or N peripheries that are located progressively farther away. In this case, there would be a union that starts at the core and grows outwardly with globalization. When the first periphery joins the union, the size of its countries declines. When the second periphery joins the union, the size of its countries also declines. And so on. The union gradually advances outwardly, and it keeps breaking up countries. The end point would be the same as before, but we would now have more gradualism.

Another extension is to assume that the world has two core-periphery structures, which we can think of as continents or regions. As globalization proceeds, within each region there is a union that advances gradually, breaking up countries. Across regions, however, there is no union. Eventually, globalization has gone so far that a world union becomes cost-effective, and the two regional unions merge. Once again, the world reaches the same end point, but now we have both gradualism and regionalism.

[23] Formally, as we prove in Appendix A.4, the three lines in the graph shift up as π and ρ increase. They also shift up as β increases, raising the economic benefit of common regulation for the core; and as δ increases and ϕ decreases, raising the benefits and lowering the costs of small countries within the core union.

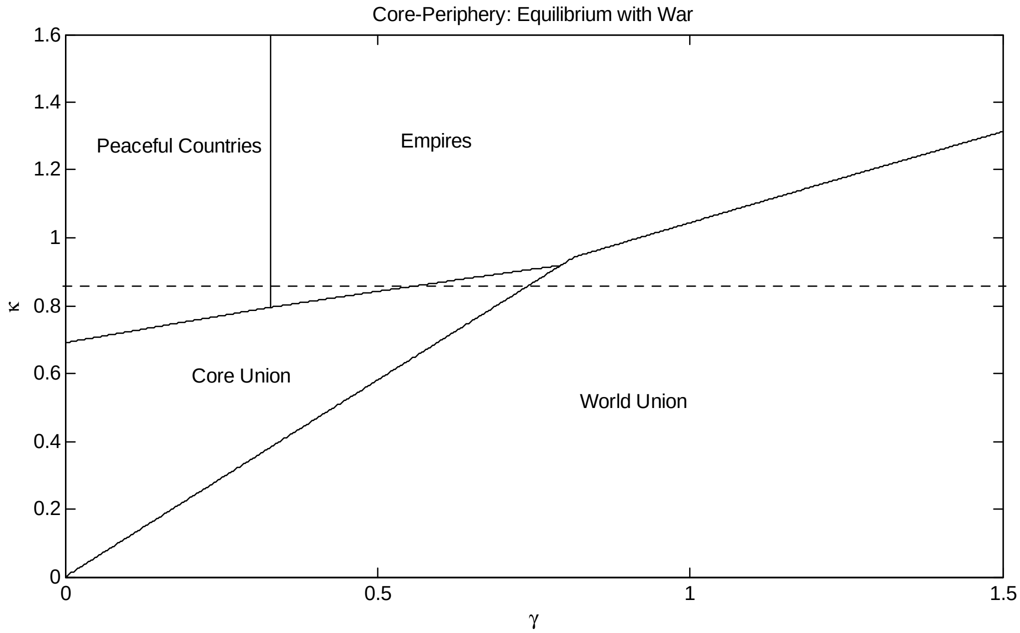

Figure 9: Globalization and Political Structure. The figure shows how equilibrium political structure depends on economies of scope (κ) and globalization (γ).

6 An Interpretation of Historical Experience

We conclude by using our analytical results to attempt a suggestive narrative of the political evolution of modern Europe (and the world).

European History Since the late Middle Ages, European sovereign states on average grew in size until the end of the nineteenth century, when this trend was dramatically reversed. For example, Kitamura and Lagerlöf (2016) show that borders declined monotonically from 1500 to 1900, and then started to increase. Medieval Europe was fragmented into hundreds of small states at a time when trade was costly, insecure and limited to few commodities. The early modern period saw important changes in both the economic and the political organization of the continent. With the Commercial Revolution, trade began to flourish and the feudal system started to be replaced by a smaller number of countries of growing size. While in 1600 there were 112 sovereign states in Europe and the Near East, at the beginning of 1800 the number had fallen to 79.

The Industrial Revolution gave trade an even more prominent role and triggered major changes in socioeconomic conditions that ultimately made the rise of the nation state possible. Trade expansion was enabled by the introduction of canals, improved roads and

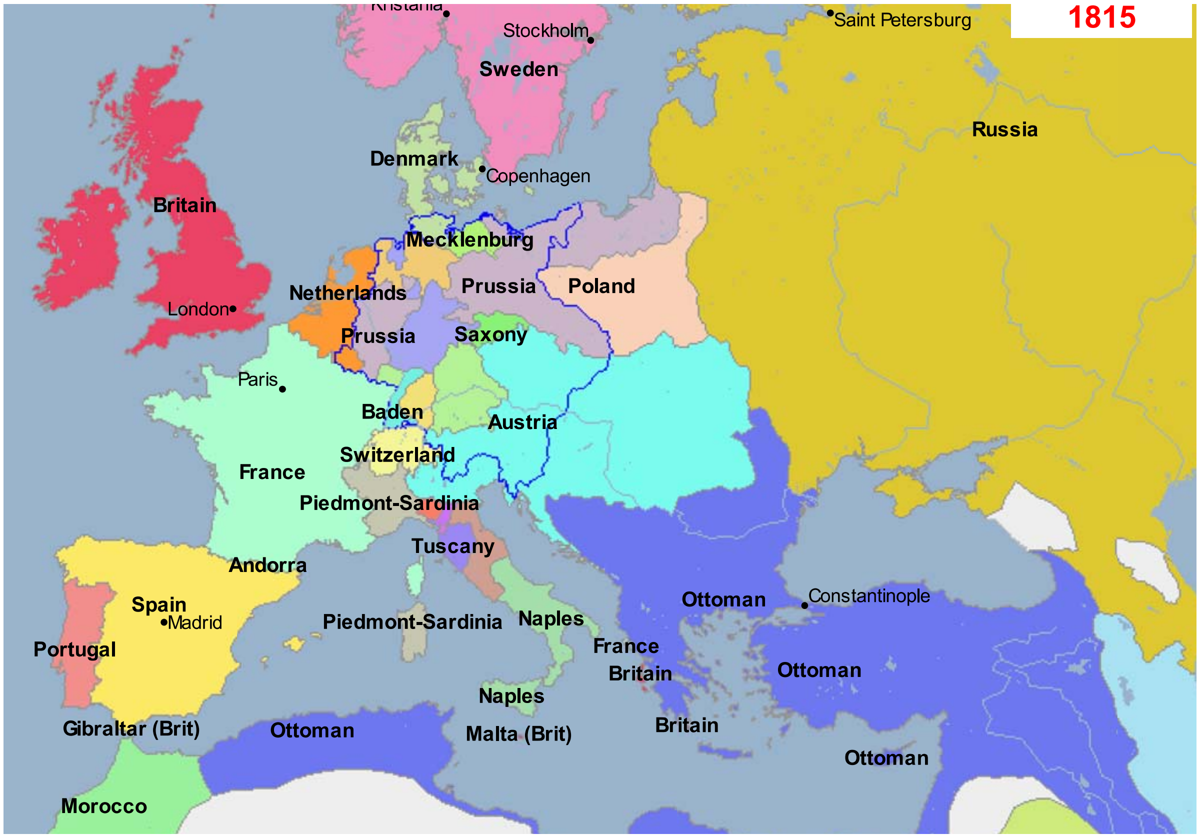

Figure 10: Europe after the Congress of Vienna (1815)

railways. At the same time, the high degree of political fragmentation at the time of the Congress of Vienna (1815) was followed by the unification of Germany and Italy (1871) and the further consolidation of other nation states. The economic rationale of building large internal markets was especially evident in the case of German unification, which started with the formation of a customs union (*Zollverein*). This process of political centralization culminated at the beginning of the twentieth century, when Europe was dominated by just 28 independent states.

Yet, the twentieth century marks a turning point. It saw the rise of international organizations both at the global level, such as the League of Nations, and at the regional level, such as the European Community. One of the key objectives of many of these supra-national organizations was precisely to promote free markets. Simultaneously, Europe entered a stage of political fragmentation, with the number of independent states growing to 58 in 2000. This pattern of an initial decline and subsequent increase in the number of countries is not confined to Europe only. For instance, the number of African countries fell from 36 in 1816 to 4 in 1914, to rise again to 51 in 2000. Similarly, in South-East Asia, these numbers changed

Figure 11: Europe before World War I (1914)

from 37 to 4 and then 20 in the years 1816, 1914 and 2000, respectively.[24] However, to better interpret the political evolutions in these regions, it is important to bring conflict into the picture.

The Rise and Fall of Colonial Empires Our model of war and conquest is broadly consistent with the rise and fall of colonial empires. In our theory, empires are built to extract trade surplus from the colonies and disappear when the union is formed to foster free markets. According to historians and in line with this view, one of the key driving forces behind colonial expansion was the desire to secure trade and access to scarce resources in an era of revived commerce, but when mercantilist practices where common. In fact, for much of the second millennium, states deployed force to create markets (Findlay and O'Rourke, 2007). Due to the scarcity of land and the desire to avoid powerful rivals, European great powers expanded by conquering territories overseas. The role of colonial powers in enforcing trade within the empire but not outside was very clear in the case of maritime commerce.

[24]The number of countries is taken from Butcher and Griffiths (2013).

On the one hand, large naval forces were built to control and protect trading routes; on the other hand, privateers were often authorized to capture merchant ships belonging to enemy nations. Despite some notable setbacks, colonialism continued to grow prior to World War I and finally collapsed after World War II.

The sharp decline of empires started after the creation of international agreements aimed at promoting economic cooperation. This is no coincidence. In the words of Spruyt (2005) and Rosecrance (1986), empires dissolved, often peacefully, because the gains through commerce displaced gains through territorial acquisition.[25] There is also evidence that international organizations played a direct role in the process of decolonization. For example, in 1960 the UN General Assembly voted the Declaration on the Granting of Independence to Colonial Countries and Peoples. Interestingly, our model of regional unions is consistent with the very different patterns of geographic expansions of empires and unions. As long as war is the dominant means of territorial expansion, the European Great Powers try to avoid conflict with each others by conquering far-away colonies and building global empires. Yet, once trade is enforced by peaceful international unions, countries seek economic integration with proximate partners, with whom the gains from trade are higher. The switch from global empires to regional economic unions is also consistent with the increased regionalization of world trade patterns observed in the data (e.g., Fouquin and Hugot 2016).

Focusing on size, our model shares with Alesina and Spolaore (2003) the prediction that empires should be larger than democratic countries, a result which is confirmed by a quick look at Figure 2. Moreover, the model suggest that countries may form and grow for the desire to increase military might and build an empire or embark into colonial adventures. This is indeed one of the recognized reasons behind the unification of Germany. Interestingly, our theory also suggests that great powers switch to the union at higher levels of globalization than consensual countries.[26] Consistently, Figure 2 shows that size started to fall earlier on for countries than for empires.

The United States Our model can also be used to interpret the founding and growth of the United States. Improvements in transportation technology and the desire to create a large internal market were important factors in its westward expansion. The abundance of land made it possible to create one of the largest countries in the world, without the

[25] Bonfatti (2012) also attributes the fall of empires to the growing importance of trade between industrial countries relative to trade with colonies.

[26] Formally, the emergence of empires unambiguously retards the creation of the world union. Moreover, unions of free countries may emerge earlier, with empires joining later on.

Figure 12: Europe Today (2014)

need to seek far away colonies. Despite its size, the United States avoided the phase of collapse and political fragmentation by choosing an institutional system with multiple levels of government. In this light, the experience of the United States follows the main pattern predicted by our theory: the creation and expansion of the federal government, which can be interpreted as a regional union, coincided with the fragmentation and loss of political power of individual states.

After the Declaration of Independence, the borders of the original thirteen states extended up to the Mississippi river, while the remaining land was occupied by French and Spanish colonies (later on part of Mexico) and by many tribes of native Americans living essentially in autarky. As the federal government acquired land and built roads westward, its territory was gradually fragmented into the fifty states. This process followed a common pattern. First, new land was annexed as large "territories;" subsequently this land was broken into new states. Federal expansion was followed not just by the creation of new states, but also by the break-up of existing ones. For example, Georgia, Massachusetts, North Carolina and Virginia all lost land to form new states. So did the former Republic of Texas (an independent country until 1846), which encompassed large parts of current Oklahoma, Kansas, Colorado, Wyoming and New Mexico. This pattern is consistent with our core-periphery model, in which the outward expansion of the core union breaks up countries in the periphery.

Trade and the Size of Countries in Ancient History Our theory has been motivated by modern and contemporary political and economic events because our model of trade and globalization seems especially suited to study the period after the Industrial Revolution. Yet, some of its key implications seem consistent with ancient history as well. For instance, several historians stress the importance of trade and market size for the expansion of countries. According to Pirenne (1925, 1939), the Roman civilization was heavily dependent upon Mediterranean trade and it collapsed when trade ended with the Arab conquest.[27] In his view, the cutting of major trade routes forced individual regions into self-sufficiency and this contributed to the consequent decline and fragmentation of Western civilization into the Middle Ages.

The Past and Future of the European Union Finally, we conclude this sections with some considerations on the past and future of the European Union. In light of recent events, this is a question that our theory cannot neglect. The main result of the core-periphery model is that international unions start from countries that have closer economic ties and expands outward as globalization increases the value of trade with more remote locations as well. This prediction is consistent with the history of the EU, which started in 1957 when Belgium, France, Italy, Luxembourg, the Netherlands and West Germany signed the Treaty of Rome establishing the European Economic Community as a customs union. The EEC gradually expanded to include nearby countries: Denmark, Ireland and the United Kingdom in 1973, Greece in 1981, Portugal and Spain in 1986. In 1992, the Maastricht Treaty converted the EEC into the EU and, in 1995, Austria, Finland, and Sweden joined. In 2002, the Euro was launched and since then the EU has grown to include 28 member states in 2013. Over this period, the union has grown in size and scope.

In June 2016, however, the United Kingdom voted in a referendum to leave the union and there is a concern that other countries might follow in the future. While rising nationalism certainly played a pivotal role, it is nevertheless instructive to look at these events from the lens of our model. Three lessons can be learned. First, the value of union membership is

[27] Similary, Friedman (1977) argues that trade increases the value of land and hence promotes territorial expansion.

proportional to the economic ties between countries. These are stronger for countries located in the core of continental Europe. For instance, while almost 80% of Belgium's total exports are delivered to other EU partners, the same figure is around 50% for the United Kingdom. Second, our model provides a rationale for trade-promoting unions. As more power is shifted to the union in other areas such as migration, tension may arise, especially in countries with a strong national identity. These two observations may explain why some UK politicians have advanced the idea of replacing the EU market with a Commonwealth free-trade zone. Third, the model suggests that the value of joining the union is proportional to its size. As a country exits, the economic foundations of the union become more fragile.

7 Conclusion

In this paper we have studied how the forces of globalization contribute to shape the world's political structure. Our theory has shown that the expansion of trade opportunities can help explain two salient puzzling phenomena in recent history. First, the rise and subsequent fall in the size of countries observed during the nineteenth and twentieth century. Second, the seemingly contradictory trends towards more political integration across countries and more political fragmentation within countries in the second half of the twentieth century. Our theory also accounts for the rise and fall of colonial empires, and it is broadly consistent with a variety of historical episodes. Yet, there are several important factors that we have deliberately left aside. We now briefly mention three that seem particularly promising for future research.

First, we have modeled economic unions as agreements aimed at facilitating trade. Although this approach is both simple and realistic, it does not do full justice to another important role of unions, namely, to solve cross-border externalities associated with domestic government activity (Alesina, Angeloni and Etro 2005). Since globalization is likely to exacerbate such policy externalities (Epifani and Gancia 2009; Broner and Ventura 2011), it increases the value of forming unions. However, in this case international agreements must be properly designed to eliminate any incentive for individual countries to free ride. More generally, in the presence of such externalities, studying the desirability of different rules or mechanisms to determine changes in political structure seems an important open question.

Second, we have focused on economic globalization as an expansion of trade opportunities. Yet, globalization is a more complex process that may also affect preferences. If cultural globalization lowers the preference for heterogeneity, it will also reduce the cost of removing borders.[28] Such cultural change may reinforce political integration, but it may also lower the value of economic unions. The equilibrium political structure may then be the result of a race between economic and cultural globalization. In a similar vein, preferences may be affected by political choices. For example, historically governments have often taken actions aimed at homogenizing their populations (Alesina and Reich 2015; Alesina, Reich and Riboni 2017).

Finally, our concept of locality abstracts from internal heterogeneity both in preferences and economic attributes. Yet, historical experience suggests that internal conflict has played a role in many processes of country formation and break-up (Bolton and Roland 1996, 1997). It would be interesting to see how globalization also affects political structure through its effect on domestic heterogeneity and conflict.

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A Appendix

A.1 Data Sources

The trade share reported in Figure 1 is merchandise exports as percent of GDP in 1990 prices, from Maddison (1995, 2001). Maddison provides trade data for selected countries in the years 1820, 1870, 1913, 1929, 1950, 1973 and 1998. To avoid compositional effects, we report the value of merchandise export as a share of GDP for the set of countries with data for all the years (Austria, Belgium, France, Italy, Spain, Switzerland, the United Kingdom and the United States). The trade share computed using the data for all available countries in every year is very similar to the one displayed in Figure 1.

The number of countries is reported for the same years. Data on the number of countries in the twentieth century is not very controversial. For the nineteenth century, however, some leading conventions grossly underestimate the number of countries. For example, the "International System," developed by Singer and Small (1966) and adopted in the Correlates of War project or in the Cross-National Time-Series Data Archive, only includes countries with international recognition. In particular, prior to 1920, the criteria to be recognized as an independent country were to have population greater than 500,000 and to have had diplomatic missions at or above the rank of chargé d'affaires with Britain and France. Clearly, this definition is too strict for our purposes, which require the identification of even relatively small political units living in economic and political autarky. We follow Butcher and Griffiths (2013), who recognize the problem and offer alternative criteria to identify the number of countries between 1816 and 2011.

The number of WTO members is from the WTO website.

The size of countries and empires displayed in Figure 2 is from the Cross-National Time-Series Data Archive (CNTS). It provides data on contiguous territorial area in thousand square miles for all countries existing in a given year according to the International State System. In a few instances, missing data have been imputed cross-checking major territorial changes from other sources (China and Persia before 1860). Area of empire is provided for a consistent sample of 13 countries: Austria (formerly Austria-Hungary), Belgium, France, Germany (formerly Prussia), Italy (formerly Sardinia), Japan, Netherlands, Portugal, Russia, Spain, Turkey (formerly the Ottoman Empire), United Kingdom, and United States. For these countries, empire area includes "overseas" territories (i.e., colonies). Data for the two modern wartime periods, 1914-1918 and 1940-1945 (1938-1954 for Empires) are missing.

European political maps were drawn using the online software GeaCron (http://www.

geacron.com). This software provides a geo-temporal database that can be used to draw geopolitical maps of any region in the world, in any given historical time period. The number of independent states in Europe and Near East reported in Section 6 is taken from Euratlas-Nüssli (http://www.euratlas.com).

A.2 Computing Equilibrium Consumption

Locality l maximizes the objective function

$$W_l^M = \int_0^1 \int_0^1 \ln c_l(m,i)\, dmdi \tag{A1}$$

subject to the following budget constraint:

$$\int_0^1 \int_0^1 p_l(m,i)\left[c_l(m,i) - q_l(m,i)\right] dmdi \leq 0, \tag{A2}$$

where $q_l(m,i)$ and $p_l(m,i)$ are the production and price of input m of industry i in locality l. The productions $q_l(m,i)$ must be consistent with available technology as described in the text. Since individuals are atomistic, they take prices as given in their maximization problems.

We claim now that equilibrium prices are given as follows:

$$p_l(m,i) = \begin{cases} 1 & \text{if } l = m \\ e^{\eta} & \text{if } i \in [0,\beta] \text{ and } I_{l=m}^R = 0 \\ e^{\tau} & \text{if } i \in (\beta,1] \text{ or } I_{l=m}^R = 1 \text{ but } l \neq m. \end{cases} \tag{A3}$$

To prove this claim, normalize world income to unity ($Y = 1$). Note first that each locality has unit density of expenditure on each input in each industry. We next examine production. Consider first industries that require contract enforcement, $i \in [0,\beta]$. Locality l employs unit density of labor to produce each non-traded input m for which $I_{l=m}^R = 0$. Thus, output of each non-traded input has density $e^{-\eta}$, so the value of output has unit density given price e^{η}. The remaining mass $\int_0^1 I_{l=m}^R dm$ of industry-i labor is employed to produce an identical mass of output. Unit density of it is sold domestically at a unit price. The remainder is shipped in identical amounts to other localities with $I_{l=m}^R = 1$, each of which receives a density $e^{-\tau}$ of imports, hence import value of unit density given price e^{τ}. In industries that do not require contract enforcement, $i \in (\beta, 1]$, the whole unit mass of industry-i labor is employed to produce the locality's own input variety, which is sold in identical amounts to all other localities in the world. Thus, the value of sales in each locality of each input in each industry has unit density, just like expenditure. This proves our claim.[29]

With these prices at hand, we can compute the equilibrium productions and consumptions described in the text.

A.3 Dealing with Integer Constraints

A world without unions consists of $N^* \in \mathbb{N}$ countries. Country n consists of measure $S_n > 0$ of localities, such that $\sum_{n=1}^{N^*} S_n = 1$ and utilitarian social welfare is $W = \sum_{n=1}^{N^*} S_n W^F(S_n, S_n)$.

The welfare function

$$W^F(S_n, S_n) = -\eta + \gamma(1 - \beta + \beta S_n) - \delta S_n - \frac{\phi}{S_n} \tag{A4}$$

is concave in S_n and increasing at $S_n = 0$. Whenever $\delta > \phi + \beta\gamma$ it has a unique maximum at $S_n = S_1^*$.

Pareto efficiency then requires that either $S_n \leq S_1^*$ for all $n = 1, 2, ..., N$ or $S_n \geq S_1^*$ for all n. Otherwise some localities could leave a country with excessive size $S_n > S_1^*$ and join another with insufficient size $S_n < S_1^*$, raising the welfare of every locality in both countries.

Utilitarian welfare maximization requires all countries to have the same size. If there are two countries m and n such that $S_m > S_n > S_1^*$, then transferring the marginal locality from m to n not only raises its welfare, but it also raises the welfare of S_m localities by more than it lowers the welfare of $S_n < S_m$ localities. Likewise if $S_m < S_n < S_1^*$.

Therefore, once integer constraints are taken into account, the utilitarian welfare optimum without unions is a partition of the world into a number

$$N_1^* = \arg\max_{N \in \mathbb{N}} \left\{ -\eta + \gamma\left(1 - \beta + \frac{\beta}{N}\right) - \frac{\delta}{N} - \phi N \right\} \tag{A5}$$

of identical countries. The objective function W has strictly decreasing differences in (N, γ) because for any $\gamma_H > \gamma_L$ and and $N_H > N_L$,

$$W(N_H, \gamma_H) - W(N_H, \gamma_L) = \beta\frac{\gamma_H - \gamma_L}{N_H} < W(N_L, \gamma_H) - W(N_L, \gamma_L) = \beta\frac{\gamma_H - \gamma_L}{N_L}. \tag{A6}$$

[29] It is straightforward to show that this equilibrium is unique. First, rule out variation in the prices of traded inputs since this would generate excess demand (supply) of cheap (expensive) varieties. Second, rule out that the relative prices of traded and nontraded varieties be above (below) τ/η since this would lead to an excess demand (supply) of nontraded inputs.

Thus, the welfare-maximizing number of countries N_1^* is decreasing in γ in the sense of monotone comparative statics. It is likewise decreasing in β, and increasing in δ and ϕ.

By the same reasoning, the utilitarian welfare optimum with unions is a world union composed of a number

$$N_2^* = \arg\max_{N \in \mathbb{N}} \left\{ -\frac{\delta}{N} - \phi N \right\} \tag{A7}$$

of identical countries.

A.4 Equilibrium Conditions for the General Model

The general model used in this paper is discussed in Section 5 when we assume that $\pi \geq 0$ and $\rho \geq 0$. The model of war and conquest of Section 4 applies in the limit as $\rho \to 0$, while the model of diplomacy in Section 3 applies in the limit as $\pi \to 0$ and $\rho \to 0$. In this Appendix, we discuss the different possible equilibria of the general model.

A.4.1 Law and Diplomacy

Assume first that the core decides to forego warfare and join the free world, so $F = 1$. Then we can define the welfare of core localities as:

$$W^C(S_C, U_C) = -\eta + (\gamma + \rho\pi)(1-\beta) + (\gamma U_C + \rho \min\{U_C, \pi\})\beta - \delta S_C - \frac{\phi}{S_C} - \kappa I_C^U \tag{A8}$$

and the welfare of periphery localities as:

$$W^P(S_P, U_P) = -\eta + \gamma(1 - \beta + \beta U_P) - \delta S_P - \frac{\phi}{S_P} - \kappa I_P^U, \tag{A9}$$

where I_C^U and I_P^U are indicator functions that take value 1 if $S_C = U_C$ and $S_P = U_P$, respectively, and zero otherwise. Utilitarian social welfare for the entire world equals:

$$W(S_C, S_P, U_C, U_P) = \pi W^C(S_C, U_C) + (1-\pi) W^P(S_P, U_P). \tag{A10}$$

There are three possible equilibrium political structures. The first is a single-level governance structure with countries of optimal sizes

$$S_{1C}^* = \sqrt{\frac{\phi}{\delta - \beta(\gamma + \rho)}} \text{ and } S_{1P}^* = \sqrt{\frac{\phi}{\delta - \beta\gamma}}, \tag{A11}$$

and without any economic unions.[30] Utilitarian world welfare under this first structure is:

$$\begin{aligned} W^1 &\equiv W\left(S_{1C}^*, S_{1P}^*, S_{1C}^*, S_{1P}^*\right) \\ &= -\eta + \left(\gamma + \rho\pi^2\right)(1-\beta) - 2\left\{\pi\sqrt{\phi\left[\delta - \beta\left(\gamma+\rho\right)\right]} + (1-\pi)\sqrt{\phi\left(\delta - \beta\gamma\right)}\right\}. \end{aligned} \tag{A12}$$

The second potential equilibrium is a two-level governance structure with countries of optimal size

$$S_{2C}^* = S_{2P}^* = \sqrt{\frac{\phi}{\delta}} \tag{A13}$$

and with a world economic union: $U_C = U_P = 1$. Utilitarian world welfare under this second structure is:

$$W^2 \equiv W\left(S_{2C}^*, S_{2P}^*, 1, 1\right) = -\eta + \left(\gamma + \rho\pi^2\right) - 2\sqrt{\phi\delta} - \kappa. \tag{A14}$$

The third potential equilibrium features a two-level governance structure for the core with countries of size $S_{3C}^* = S_{2C}^*$ and a core economic union $U_C = \pi$, but a single-level governance structure for the periphery with countries of size $S_{3P}^* = S_{1P}^*$ and no union ($U_P = S_{3P}^*$). Utilitarian world welfare under this third structure is:

$$\begin{aligned} W^2 &\equiv W\left(S_{2C}^*, S_{2P}^*, 1, 1\right) \\ &= -\eta + \left(\gamma + \rho\pi^2\right)(1-\beta) + (\gamma+\rho)\,\pi^2\beta - 2\left[\pi\sqrt{\phi\delta} + (1-\pi)\sqrt{\phi\left(\delta - \beta\gamma\right)}\right] - \pi\kappa. \end{aligned} \tag{A15}$$

The equilibrium political structure under diplomacy is the one that delivers the highest welfare:

$$\arg\max W \ni \begin{cases} \left(S_{1C}^*, S_{1P}^*, S_{1C}^*, S_{1P}^*\right) & \text{if } W^1 \geq \max\left\{W^2, W^3\right\} \\ \left(S_{2C}^*, S_{2P}^*, 1, 1\right) & \text{if } W^2 \geq \max\left\{W^1, W^3\right\} \\ \left(S_{3C}^*, S_{3P}^*, \pi, S_{3P}^*\right) & \text{if } W^3 \geq \max\left\{W^1, W^2\right\}. \end{cases} \tag{A16}$$

The core union yields higher welfare than single-level governance ($W^3 > W^1$) if:

$$\kappa < \bar{\kappa}_1(\gamma) \equiv \beta(\gamma+\rho)\,\pi - 2\sqrt{\phi}\left[\sqrt{\delta} - \sqrt{\delta - \beta\left(\gamma+\rho\right)}\right], \tag{A17}$$

for an increasing and concave threshold ($\partial\bar{\kappa}_1/\partial\gamma > 0 > \partial^2\bar{\kappa}_1/\partial\gamma^2$) such that $\partial\bar{\kappa}_1/\partial\beta > 0$, $\partial\bar{\kappa}_1/\partial\delta > 0$, $\partial\bar{\kappa}_1/\partial\phi < 0$, $\partial\bar{\kappa}_1/\partial\pi > 0$ and $\partial\bar{\kappa}_1/\partial\rho > 0$.

[30] Equation (A11) assumes that $\delta > \phi\pi^{-2} + \beta(\eta+\rho)$, so that there is enough preference heterogeneity to ensure that the optimal core country size is always smaller than the entire core.

The core union yields higher welfare than the world union ($W^3 > W^2$) if:

$$\kappa > \bar{\kappa}_2(\gamma) \equiv \beta\gamma(1+\pi) - 2\sqrt{\phi}\left(\sqrt{\delta} - \sqrt{\delta - \beta\gamma}\right), \tag{A18}$$

for an increasing and concave threshold ($\partial\bar{\kappa}_2/\partial\gamma > 0 > \partial^2\bar{\kappa}_2/\partial\gamma^2$) such that $\partial\bar{\kappa}_2/\partial\beta > 0$, $\partial\bar{\kappa}_2/\partial\delta > 0$, $\partial\bar{\kappa}_2/\partial\phi < 0$, $\partial\bar{\kappa}_1/\partial\pi > 0$ and $\partial\bar{\kappa}_2/\partial\rho = 0$.

Single-level governance yields higher welfare than the world union ($W^1 > W^2$) if:

$$\kappa > \pi\bar{\kappa}_1 + (1-\pi)\bar{\kappa}_2. \tag{A19}$$

The two functions $\bar{\kappa}_1(\gamma)$ and $\bar{\kappa}_2(\gamma)$ have a single crossing because

$$\bar{\kappa}_1(0) > \bar{\kappa}_2(0) = 0 \text{ and } \frac{\partial\bar{\kappa}_2}{\partial\gamma} > \frac{\partial\bar{\kappa}_1}{\partial\gamma}. \tag{A20}$$

In other words, the core union can follow but not precede single-level governance and precede but not follow the world union because

$$\frac{\partial}{\partial\gamma}\left(W^2 - W^3\right) = \beta\left[1 - \pi^2 - (1-\pi)S^*_{3P}\right] > 0 \tag{A21}$$

and

$$\frac{\partial}{\partial\gamma}\left(W^3 - W^1\right) = \beta\pi\left(\pi - S^*_{1C}\right) > 0. \tag{A22}$$

A.4.2 War and Conquest

If there are empires, the analysis is as essentially as it was in Section 4 for $\rho = 0$. The welfare of core localities that form an imperial metropolis is given by:

$$W_l = W^E(E) = -\eta + (\gamma + \rho\pi)(1-\beta) + (\gamma + \rho\mu)\beta E - \delta\mu E - \frac{\phi}{E} - \omega. \tag{A23}$$

The optimal size of empires is larger because so are gains from trade within the metropolis:

$$E^* = \sqrt{\frac{\phi}{\delta\mu - \beta(\gamma + \rho\mu)}}. \tag{A24}$$

Thus, if core localities build empires their welfare is given by:

$$W^E(E^*) = -\eta + (\gamma + \rho\pi)(1-\beta) - 2\sqrt{\phi\left[\delta\mu - \beta(\gamma + \rho\mu)\right]} - \omega. \tag{A25}$$

The free world contains a measure $F < 1 - \pi$ of localities in the periphery. In this case, all the analysis in Section 4 applies and, in particular, Condition (19) still determines whether the free world has a single or two-level governance structure.

When are empires formed? In the absence of empires, the welfare of core localities in the welfare-maximizing political structure is given by:

$$W_C^F = \begin{cases} W^C\left(S_{1C}^*, S_{1C}^*\right) & \text{if} \quad W^1 > \max\left\{W^2, W^3\right\} \\ W^C\left(S_2^*, \pi\right) & \text{if} \quad W^2 > \max\left\{W^1, W^3\right\} \\ W^C\left(S_2^*, 1\right) & \text{if} \quad W^3 \geq \max\left\{W^1, W^2\right\}. \end{cases} \tag{A26}$$

If $W^E\left(E^*\right) < W_C^F$, there are no empires, diplomacy prevails and the size of the free world is $F = 1$. If instead $W^E\left(E^*\right) \geq W_C^F$, there are $\pi/\mu E^*$ empires of size E^*, and the size of the free world is reduced to $F = 1 - \pi/\mu$.

Core localities prefer empires to peaceful countries ($W^E\left(E^*\right) > W^C\left(S_{1C}^*, S_{1C}^*\right)$) if:

$$\gamma > \bar{\gamma}_E \text{ such that } 2\sqrt{\phi}\left[\sqrt{\delta - \beta\left(\bar{\gamma}_E + \rho\right)} - \sqrt{\delta\mu - \beta\left(\bar{\gamma}_E + \rho\mu\right)}\right] = \omega, \tag{A27}$$

with $\partial\bar{\gamma}_E/\partial\beta < 0$, $\partial\bar{\gamma}_E/\partial\phi < 0$, $\partial\bar{\gamma}_E/\partial\mu > 0$, $\partial\bar{\gamma}_E/\partial\omega > 0$ and $\partial\bar{\gamma}_E/\partial\pi = 0$.

Core localities prefer empires to the peaceful core union ($W^E\left(E^*\right) > W^C\left(S_2^*, \pi\right)$) if:

$$\kappa > \bar{\kappa}_{E\pi}\left(\gamma\right) \equiv \omega + \beta\left(\gamma + \rho\right)\pi - 2\sqrt{\phi}\left[\sqrt{\delta} - \sqrt{\delta\mu - \beta\left(\gamma + \rho\mu\right)}\right], \tag{A28}$$

for a concave threshold ($\partial^2\bar{\kappa}_{E\pi}/\partial\gamma^2 < 0$) with

$$\bar{\kappa}_{E\pi}\left(\bar{\gamma}_E\right) = \bar{\kappa}_1\left(\bar{\gamma}_E\right) \text{ and } \frac{\partial\bar{\kappa}_{E\pi}}{\partial\gamma} < \frac{\partial\bar{\kappa}_1}{\partial\gamma}, \tag{A29}$$

and such that $\partial\bar{\kappa}_{E\pi}/\partial\phi < 0$, $\partial\bar{\kappa}_{E\pi}/\partial\mu > 0$, $\partial\bar{\kappa}_{E\pi}/\partial\omega = 1$, $\partial\bar{\kappa}_{E\pi}/\partial\pi > 0$ and $\partial\bar{\kappa}_{E\pi}/\partial\rho > 0$.

Core localities prefer empires to the peaceful world union ($W^E\left(E^*\right) > W^C\left(S_2^*, 1\right)$) if:

$$\kappa > \bar{\kappa}_{E1}\left(\gamma\right) \equiv \omega + \beta\left(\gamma + \rho\pi\right) - 2\sqrt{\phi}\left[\sqrt{\delta} - \sqrt{\delta\mu - \beta\left(\gamma + \rho\mu\right)}\right], \tag{A30}$$

for an increasing and concave threshold ($\partial\bar{\kappa}_{E1}/\partial\gamma > 0 > \partial^2\bar{\kappa}_{E1}/\partial\gamma^2$) with

$$\bar{\kappa}_{E1}\left(\gamma\right) > \bar{\kappa}_{E\pi}\left(\gamma\right) \text{ and } \frac{\partial\bar{\kappa}_{E\pi}}{\partial\gamma} < \frac{\partial\bar{\kappa}_{E1}}{\partial\gamma} < \pi\frac{\partial\bar{\kappa}_1}{\partial\gamma} + (1 - \pi)\frac{\partial\bar{\kappa}_2}{\partial\gamma}, \tag{A31}$$

and such that $\partial\bar{\kappa}_{E1}/\partial\phi < 0$, $\partial\bar{\kappa}_{E1}/\partial\mu > 0$, $\partial\bar{\kappa}_{E1}/\partial\omega = 1$, $\partial\bar{\kappa}_{E1}/\partial\pi > 0$ and $\partial\bar{\kappa}_{E1}/\partial\rho > 0$.