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The close relationship between politics and enterprises made the *revolving door* wide open and reinforced business influence on political decisions. This paper analyses the relationship between firm entry institutions and import competition inside the EU. Though there is a clear tendency for entry and startup costs to decrease over time and particularly in space, I challenge the view that greater openness to trade automatically leads to improved firm entry institutions. My model enables calculating business entry impediments whereas the lobbying game produces structural estimates of the counterfactual levels of trade, prices and earnings had no business obstacles existed. Conditions for active entry barriers are laid down in terms of trade margins, asymmetries in technology and trade costs. Importantly, the model demonstrates that startling differences in firm regulation can be explained resorting to relative gains and losses accruing in a fully trading network as is the EU. More generally, understanding factors which affect imports is crucial for any model seeking to uncover *ex ante* welfare effects of trade.

Keywords: firm entry institutions, firm heterogeneity, foreign competition, trade margins

JEL Classification: C31, E02, F12, F14, F15, F55

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1. Introduction

Peter Mandelson, former European Trade Commissioner, states that ‘Europe’s leaders share a fundamental conviction that they can only act effectively by acting together - and that they need strong, efficient-working, common institutions to do so. <...> It is the rules of the single market which give us the foundation to *export our rules and standards* around the world – an increasingly important part of my job as trade commissioner,’ (Mandelson, 2007). However, it remains unclear if the EU is successful in exporting its institutions both outside and within the member states. There are several attempts, though,[1] whose efficacy raises a number of concerns. Moreover, the recent scandal over the U.S. surveillance by the National Security Agency has put the political content at the core of debate and manifested in threats over bilateral trade agreement. This again raises the need to explore trade institutions in relation to political decision making. Therefore, this paper explores the change in firm entry institutions - defined in relation to international trade - inside the European Union. I challenge the view that greater openness to trade automatically leads to improved firm entry institutions (“foreign competition” or “disciplining effect” of trade). Indeed, the relationship between trade and institutional environment has deep scholarly foundations.[2] On the one hand, trade promotes higher competition, induces specialisation in sectors that demand good institutions and promotes economic efficiency (the foreign competition effect). On the other hand, trade might contribute to concentration of political power in the hands of groups that are interested in setting up, or perpetuating, bad institutions (the political power effect). Therefore, there are conflicting forces and tensions acting on institutions due to international trade. To explore the conditions under which one or the other channel dominates, I build a multi-country heterogeneous firm trade model with lobbying opportunities and concentrate on the EU with common *acquis communautaire* but startling differences in business regulation.

To shed more light on strategic interactions, I analyse a relationship between entry barriers to operate in the foreign country and import competition inside the EU. Time and money to start a business, including bureaucratic or corruption-related cost, the state of financial and insurance markets that stipulate differences in borrowing vary substantially among countries.[3] However, the strategic dimension is not less important: incumbent firms might prefer higher entry costs due to the deterrence of the lowest-productivity firms, thereby reducing competition and increasing profits for the high-productivity producers. Trade shifts power towards most productive firms which happen to be trading firms. One of the mechanisms to impose entry barriers is lobbying on the entry and continuing operations conditions. The extent of lobbying, however, is constrained by the domestic institutions, and the entry regulation in all the trading partners. Recently, there were attempts to incorporate some of the mentioned factors into the trade models, usually limited to a closed

[1]For example, the Trade Barriers Regulation (TBR) has given European businesses a tool for tackling trade barriers in export markets, see http://ec.europa.eu/trade/tackling-unfair-trade/trade-barriers/index_en.htm. European Commission explicitly declares its willingness to reduce the administrative burden that bears upon enterprises and the reduction of the start-up fees to the minimum possible (European Commission, 2007).

[2]For example, Polanyi (1957, c.1944) was convinced that long-distance trade engendered modern markets. Ogilvie (2011) reveals how medieval trade in Europe incurred a complex interaction over trade privileges to keep good contacts with the ruler. Indeed, Do and Levchenko (2009) theoretically emphasise that political interactions with traders and their outcomes tend to be very nuanced.

[3]Indeed, these factor underlie the fixed costs which are driving the results in heterogeneous firm models, they are commonly treated as ‘black boxes’. See recent contributions by Smeets, Creusen, Lejour, and Kox (2010); Smeets and Creusen (2011) where fixed costs are empirically investigated. It is found that poor institutional quality, such as the quality of regulation or the extent of corruption, can form an important impediment for a firm’s export decision. Therefore, trade liberalisation should be dealt with more generally, moving from the traditional approach of purely reducing iceberg-type trade costs.

economy (Rebeyrol and Vauday, 2009), two-country setup with the exogenous organisation into lobbies (Abel-Koch, 2010) or the exogenous fixed costs of producing for the export market (Do and Levchenko, 2009). The latter two papers are closest to my agenda.

Therefore, my contribution to the literature is threefold. First, I outline three stylised facts about European firm regulation and intra-regional competition. Second, I produce a model that explains the stylised facts which cover the intricate relationship between import competition, firm entry regulation and aggregate earnings in the EU. Finally, a model is used to map unobservables to observables for calculating counterfactual levels of trade, prices and earnings had no business obstacles existed. I also specify exact conditions for entry barriers to be realised at all. More generally, the EU, facing its substantial future challenges, is given a perspective on how further integration is shaped by excessive firm entry regulations and its welfare implications. One of the main insights concerns the relative gains and losses caused by firm barriers. Intuitively, having a fully trading network, where extensive margin is immaterial, the relative gains, accruing to policy markers can be substantial whereas welfare losses are quite small. This offers new view over entry barriers with the intensive rather than extensive margin at the centre of the argument. The competitive pressure from trade partners, though acting, is therefore limited. This helps explaining why the EU with the common legal environment comprises of countries with almost no firm entry regulation (e.g., Denmark) and the ones with most excessive regulation worldwide (e.g., Greece or Malta).

The paper proceeds as follows. I will first overview the literature on trade and institutions in Section 2. In Section 3, I provide empirical facts on the patterns of trade and institutions in Europe. The structure of my model is covered in Section 4. Endogeneity of entry costs is addressed in Section 5. I deal with both country-level and EU-wide measures of import competition in Section 6 with a few suggestive numerical results in Section 7. Section 8 provides several concluding remarks and further research directions.

2. Literature Review

There is a vast literature on the so-called 'new trade theory'. One of the major impetuses was a dynamic industry model with heterogeneous firms presented by Melitz (2003). The model embeds firm productivity heterogeneity within Krugman's model of trade under monopolistic competition and increasing returns and draws from Hopenhayn (1992a,b) to explain the endogenous selection of heterogeneous firms in an industry. One of the main ingredients in the Melitz-type analysis is the fixed costs for different types of business activities (domestic production versus additional production for export markets).

The presence of trade costs closely relates to the integration of countries. Melitz and Ottaviano (2008) provide a partial-equilibrium, monopolistically competitive model of trade with heterogeneous firms and endogenous differences in the 'toughness' of competition across countries. Aggregate productivity and average mark-ups are found to respond to both the size of a market and the extent of its integration through trade (larger, more integrated markets exhibit higher productivity and lower mark-ups). Integration hinges on trade barriers which have attracted much economists' attention as they impede trade flows and have a strong impact on countries' overall economic performance. One of the recent contributions that analyses trade costs is due to Anderson and van Wincoop (2004). Authors observe that trade costs are richly linked to economic policy and have large welfare implications. Poor institutions and poor infrastructure penalise trade differentially across countries. Macroeconomic implications and the role of trade costs, broadly understood, are also emphasised by Obstfeld and Rogoff (2000).

A recent empirical study analysed integration focusing on the differences in the European Union.

Corcos, Del Gatto, Mion, and Ottaviano (2012) extended Melitz and Ottaviano (2008) model to allow for international differences among EU countries in terms of factor prices and entry costs. The model is estimated on the EU data and simulated in the counterfactual scenarios. Even in a relatively integrated economy as the EU, dismantling residual trade barriers would deliver sizeable welfare gains stemming from lower production costs, smaller markups, lower prices, larger firm scale and richer product variety. However, their model does not address issues of endogenous trade policies and institutions. In the related papers, Novy (2007) finds clear evidence that over the past few decades economic integration has progressed most on a regional level, as trade costs dropped more quickly between nearby trading partners than between distant ones. Jacks, Meissner, and Novy (2008) also evidence a decrease in trade costs, however, with a considerable heterogeneity across countries.

As emphasised by Melitz (2003), managers making export related decisions are much more concerned with export costs that are fixed in nature rather than high per unit costs. Roberts and Tybout (1997) develop a dynamic model of the export decision by a profit-maximising firm and test for the presence and magnitude of sunk costs, using a sample of Colombian plants. They find that sunk costs are large and are a significant source of export persistence. Bernard and Jensen (2004) employ a rich set of plant variables to shed light on the role of plant characteristics in the export decision. Estimates of entry costs are significant and important for U.S. plants. Djankov, Porta, de Silanes, and Shleifer (2002) collected data on the regulation of entry of start-up firms in 85 countries. They give evidence that, even aside from the costs associated with corruption and bureaucratic delay, business entry is extremely expensive. Stricter regulation of entry is found to be associated with sharply higher levels of corruption, and a greater relative size of the unofficial economy. Market entry costs play an important role in the decision to enter foreign markets, also make the export supply function in the current period dependent upon the number and type of exporters in past periods. This feature, together with the implication that a firm's beliefs about future market conditions will affect its decision to pay the sunk costs for entering the export market, are emphasised by Das, Roberts, and Tybout (2007). The authors estimate a reduced-form expression in exogenous plant and market characteristic to test for the presence of sunk costs in the export supply function. Sunk costs are found to be significant, as well as prior export experience.

These findings point to a relatively sparse research on what drives a change in fixed and sunk trade costs and their relationship with the institutional environment. The already mentioned paper by Do and Levchenko (2009) analyses an interplay between openness and institutions. The institutional quality has been determined in a political economy equilibrium within a modified median-voter framework, and then outcomes in autarky and trade have been compared. All firms are politically organised and larger firms have an exogenous higher political power. The fixed cost of production is then interpreted as the inverse of institutional quality.

Two related papers are due to Rebeyrol and Vauday (2009) and Abel-Koch (2010). They both deal with the mechanism of trade policy determination. The former paper deals with a closed-economy, and emphasises a discrepancy between the level of lobbies' contributions and their political power, i.e., their weight in the determination of policies. Rebeyrol and Vauday (2009) note that lobbies have different interests by definition since each lobby asks for protection of its specific sector and the level of effective protection only comes from the relative strength of the lobbies. Hence, nothing ensures that large positive contributions would generate a large effective protection. Abel-Koch (2010) concentrates on border and behind-the-border measures, and the lobbying game that gives rise to the equilibrium values of the two. The author analyses trade barriers in the modified framework of Grossman and Helpman, paying attention to a two-country setting with endogenous trade policies but exogenous lobby formation mechanism. The empirical aspects and interactions between national governments are left for the future research.

An empirical approach on trade policies in a heterogeneous firm model was also recently offered by Bombardini (2008). She shows that, in the presence of a fixed cost of channeling political contributions, it is efficient for a lobby to be formed by the largest firms in a sector. Industrial sectors where the distribution of firm size is more dispersed are more likely to have a larger fraction of the sector output produced by firms large enough to incur the fixed cost to participate in the lobby. Then, accounting for individual firm behaviour and differences in participation shares across sectors helps to explain a larger fraction of the variation of protection across sectors.

Moreover, there is a vast literature on the relationship between trade protection and import penetration. As is evidenced by Maggi and Rodriguez-Clare (2000), the standard prediction is such that protection tends to be higher in sectors with lower import penetration. Authors challenge this finding in a short-run political economy model focusing on political influence by domestic producers, also exporters and importers. Define $1/IPR_j \equiv S_j/\left(D_j - S_j\right) = S_j/IM_j$ where IPR_j is a measure of the import penetration ratio, S_j is the supply, D_j is the demand of goods, and IM_j is the value of imports. In the case when the government attaches a similar weight to the group of importers and to the group of producers, the level of protection increases with import penetration, both in sectors that are protected with tariffs and in sectors that are protected with quantitative restrictions. Authors also address the cross-sectional relationship between trade protection and import penetration. It has been shown that the rate of trade protection increases (strictly) with import penetration when demand and supply curves have constant elasticity and producers and importers are both organised and ownership is very concentrated in both activities. Moreover, IPR has recently been emphasised by Arkolakis, Costinot, and Rodriguez-Clare (2012) which demonstrate that in almost any one-sector trade model, *ex post* trade welfare hinges on two aggregate statistics, namely IPR and trade elasticity. Therefore, import penetration ratio is crucial for any model seeking to uncover welfare effects of trade.

Therefore, firm entry costs are believed to have significant impact on economies. However, relatively little is known about the institutions that give rise to the level of openness-related costs. To shed more light, I analyse the data on import competition and entry (business startup costs) next.

3. Empirical Facts and Motivation

The geographical focus of this paper is the European Union (EU). There have been three waves of expansion of the EU in the last two decades: in 1995, 2004 and 2007.[4] The dependence of the European countries on the EU relative to the rest of the World has been expected to increase. This has been the case for the majority but not all EU member states. Three facts constitute a motivation for the theoretical model: there is a considerable convergence (decrease) of startup costs in all the EU countries (an increase in integration); there is a negative relationship between startup costs and import competition at the EU level (but not necessarily at the country level); countries with larger firm entry costs tend to have substantially lower incomes, adjusted for purchasing power.

3.1. Theoretical Importance

I will overview openness for imports, an indicator that carries welfare implications and is essential for economic development. It provides consumers with choice, better value for money and better quality goods and services. Imports also provide inputs to the industry and incentivises domestic

[4]The most recent expansion to Croatia on 1 July, 2013 is not covered here.

firms to remain competitive. According to the theory of comparative advantage, international trade leads to a more efficient use of a country's resources through the import of goods and services that otherwise are too costly to produce within the economy. The openness for imports is quantified by the means of import penetration rate. Most political economy models with the organised groups for political action predict that trade protection should be higher in sectors where import penetration is low, a prediction that finds little support in the existing empirical works (see Maggi and Rodriguez-Clare (2000) and the references therein). This motivates the research on a broader measure of institutional impediments in relation to the import penetration ratio.

The import penetration rate (IPR) shows to what degree domestic demand (the difference between gross domestic product (GDP) and net exports) is satisfied by imports.[5] In other words, it measures to what extent domestic economy is exposed to import markets and foreign competition. The measure is affected, among other things, by the political economy considerations, such as the rules, legal system, and enforcement issues. However, they are interrelated to the spatial position and political situation that favours or discourages trade and further integration with the rest of the EU. I focus on the political influence on the firms entrance into foreign markets.

Even more importantly, following recent contribution by Arkolakis, Costinot, and Rodriguez-Clare (2012), the estimator of the static gains from trade depends on the value of two aggregate statistics, one of which is equal to one minus the import penetration ratio, i.e., the share of expenditure on domestic goods. Hence, IPR is crucial in any work on gains from trade. I suggest to explore the IPR's changes with respect to institutional environment. The observational equivalence of gains from trade are conditional on IPR which, in turn, can be largely affected by modelling strategy. Lastly, the theoretical importance of fixed costs is always embedded in its effect on the properties of profit function of an active firm in the economy. Cases of super- and sub-modularity[6] are important to generalise our results to more diverse economic environments (see Costinot (2009) for a broader application in international trade). A higher entry impediment makes some firms lose whereas others might gain, a property which drives perpetuation of a more regulated business environment.[7] I leave these extensions for future research and stick to parametrised setting focusing my attention on empirical evidence.

3.2. Trade and Institutions

It has been found that the entry costs and IPR are strongly and significantly negatively correlated for the aggregate EU data. It means that the better conditions for the firms to start business in the country, the more the country tends to import on average. This result does not seem to be surprising: more competition and better institutional environment lead to higher openness and increased product variety. These effects might also be reinforcing each other, thus creating endogeneity problems. The simple linear correlation is visualised in the Figure 3.1.

Fact 1. *(Temporal Correlation) Figure 3.1 demonstrates a very strong (statistically significant)*

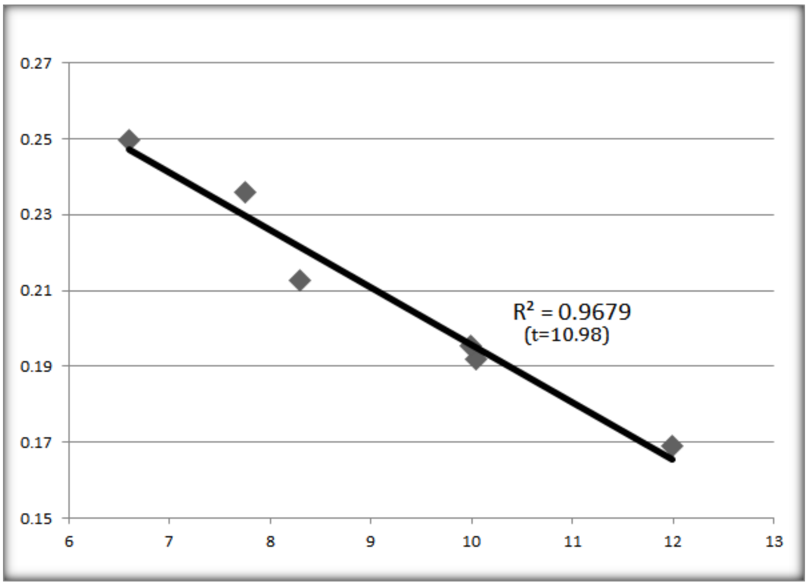
[5] If the rate is calculated at the sectoral level, it is termed the 'self-sufficiency ratio'.

[6] Recall that a function $\pi(\alpha, \varphi)$ is super-modular in α and φ if and only if $\Delta_\varphi \pi(\alpha_1, \varphi) \geq \Delta_\varphi \pi(\alpha_2, \varphi)$ when $\alpha_1 \geq \alpha_2$, where $\Delta_\varphi \pi(\alpha, \varphi) \equiv \pi(\alpha, \varphi_1) - \pi(\alpha, \varphi_2)$ and $\varphi_1 \geq \varphi_2$. Under differentiability, $\partial\pi(\alpha_1, \varphi)/\partial\varphi \geq \partial\pi(\alpha_2, \varphi)/\partial\varphi$ when $\varphi_1 \to \varphi_2$. More explicitly, $\pi(\alpha_2, \varphi_2) - \pi(\alpha_1, \varphi_2) \geq \pi(\alpha_2, \varphi_1) - \pi(\alpha_1, \varphi_1)$, which tells that if lower barriers benefit producers, then more efficient firms gain more (larger profit difference). If, however, larger barriers yield higher profits, then profit differences are negative and more efficient firms lose less than firms with higher marginal costs. Sub-modularity reverses the story.

[7] This analysis enables a simple extension of Mrázová and Neary (2012): $\pi(\alpha, \varphi)$ is super- (sub-)modular in α and φ if and only if endogenous lobbying costs are log-convex (concave). As demonstrated by Mrázová and Neary (2012), fixed costs are necessary for selection effects (for CES case - they also correctly 'predict' direction).

negative association between business startup costs and country's openness, measured by the IPR, at the aggregate EU level. However, considered separately, the EU member states differ remarkably in the association between the IPR and the costs related to entering a market and starting a business.

Figure 3.1: Negative temporal association between the IPR and startup costs at the aggregate EU level in 2003-2008



Yet there are quite a few countries for which the association is opposite to what is expected. In Figure 3.2 we plot such countries and note that Ireland and especially Russia, one of the main Union's trade partners, demonstrate a positive correlation between the IPR and startup costs. This finding requires a deeper investigation of the dynamics of the costs and their absolute and relative sizes at the country level.

Figure 3.2: Positive temporal association between startup costs and IPR

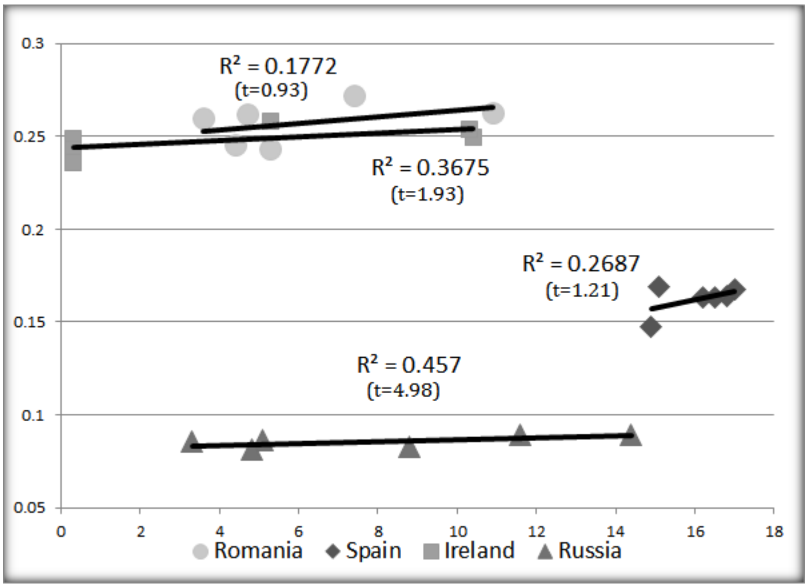


Table 1: Regression results for the IPR

Variable	GEE PA	FE	RE (Swamy-Arora)	Mean Group
Startup Costs	-.003*** (-.003***)	-.003*** (-.003***)	-.003*** (-.003***)	-.024** (-.016***)
Intercept	.288*** (.294***)	.288*** (.294***)	.288*** (.294***)	.326*** (.322)***

Note: GEE PA refers to Generalised Estimating Equation (Population Averaged), FE is Fixed Effects, RE is Random Effects, and the Mean Group follows Pesaran and Smith (1995). $N = 166$ for the sample 2003 - 2008 (in brackets: $N = 282$ for the sample 2003 - 2012). *, **, *** denote significance at 10%, 5% and 1% respectively.

I provide some glimpse on the patterns of institutional change over time. The absolute majority of the EU countries and its partners[8] are classified to the groups of the largest business startup costs, that range from 10% of Gross National Income (GNI) and above. The data on the startup costs is standardised defining typical characteristics of a company in all surveys, such as size, ownership, location, legal status, and type of activities undertaken, and the costs are normalised as a percentage of GNI per capita (World Bank, 2008).[9] A unique data collection via standardised surveys ensures comparability not only of country-specific regulatory effects on business activities across a wide range of countries but also over time.[10] This information is graphically summarised in Figure 3.4 where data (startup costs in per cent over GNI) in 2003 and 2009 were used.[11] Some spatial patterns emerge: Nordic countries with the UK have the lowest costs, then Benelux countries, and finally the Southern Europe. Countries that did not belong to the EU in 2003 were heavily dispersed: from the last bin with Poland and Hungary to the first one with Lithuania. The benchmark country is Denmark with almost no distortions for new businesses.

Fact 2. *All countries in the EU tended to decrease the startup costs for new businesses from 2003 to 2009.*

Indeed, the changes over time are quite dramatic. Overall, the pooled sample demonstrates a negative temporal association in samples for 2003 to 2009, and 2003 to 2012 (see Figure 3.3 and regression results in Table 1). I report full sample as the results hardly change if only the EU subset (without main trade partners) is considered. The concentration of the countries in 2013 moved to the first bin (0 - 5 per cent over GNI) where countries with the lowest costs are allocated. Only a few states remained in the very last bin with considerable but insufficient reduction in costs to upgrade the position (Greece and Italy). Again, Southern European countries have the highest

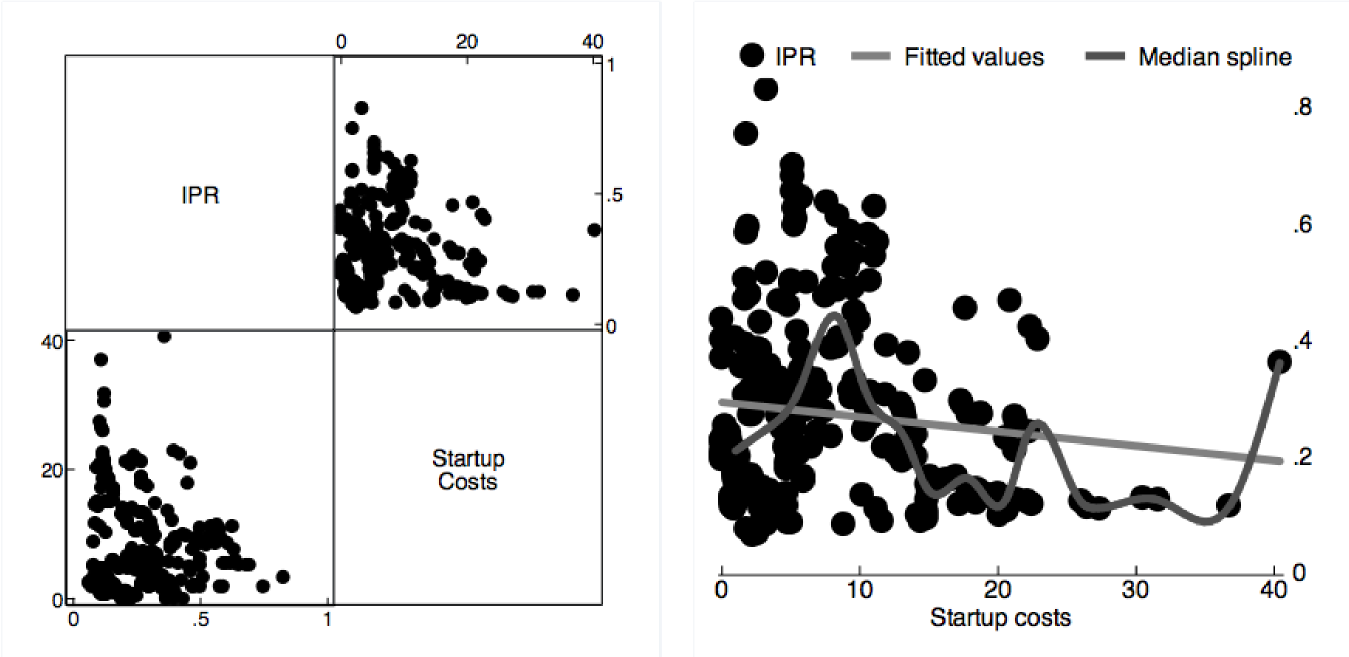
[8] I will consider three largest trade partners in Europe, namely Russia (9.7%), Switzerland (6.2%) and Norway (4.7%) that together make up over one fifth of the total extra EU-27 trade. Source: European Commission, http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/statistics/.

[9] Though I will be working with fixed rather than sunk costs in the theoretical model, the measure of startup costs is the best alternative to compare costs related to firm operations in different countries. I will discuss the necessary assumptions to connect the two concepts of costs.

[10] A potential caveat with statistics is the growth in GNI which can reduce the ratio. However, I am looking at a relatively homogeneous group of countries. If there was a common factor driving the growth in income, one can still compare the relative positions of startup costs which remained highly dispersed. Lastly, an increase in income outpaces any change in regulation which is also an indicator of an improved institutional setting.

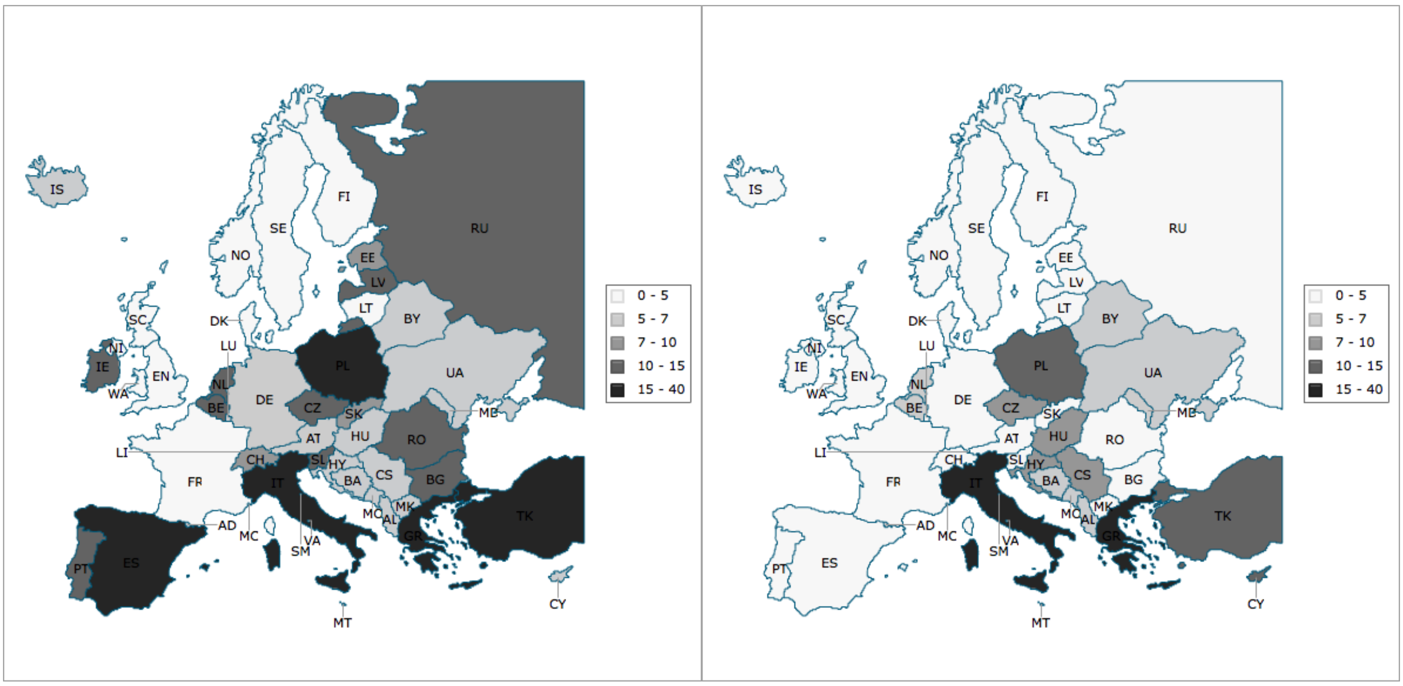
[11] The earliest information for Luxembourg is available for 2006 and for Cyprus for 2008. Therefore, I excluded them from the analysis. Malta does not provide any piece of information and cannot be used for comparison.

Figure 3.3: Negative association between *IPR* and startup costs in a pooled sample, 2003-2012



costs, Central European countries in the middle and Northern countries at the top. *No country moved down the bins.*

Figure 3.4: The Grouping of the EU and Partner Countries According to Startup Costs in 2003 and 2013



Source: World Bank, Doing Business

It is known that the body of EU legislation, *acquis communautaire*, must be adopted, implemented and enforced before countries can join the EU. It may seem all this provides enough foundations for the convergence of the fixed startup and entry costs. However, this is not the case as there is substantial resistance to improving market entry conditions. In a recent study by the World Bank,[12] the variability amongst the EU countries, ranked according to the ease of doing business and starting a business, is considerable. Rankings range from 5 (Denmark) to 78 (Greece), and from 10 (Ireland) to 150 (Malta), according the said criteria, respectively.

Interestingly, the already mentioned countries that are most and least conducive to start a business in the EU are described by a positive correlation between the startup costs and IPR. Though small sample challenges reliability, the t-tests reveal that statistically significant positive correlation is incidental to a number of countries, see Figure 3.2 which demonstrates a temporal dependence for 2003-2009. In an extended sample, positive association remains significant to Russia (slope 0.001, $p = 0.06$), even increases in Romanian case (slope 0.02, $p = 0.01$), and becomes somewhat marginal for Ireland (slope 0.001, $p = 0.15$) and Spain (slope 0.002, $p = 0.12$). Small countries as Cyprus (slope 0.002, $p = 0.82$) and Luxembourg (slope 0.004, $p = 0.81$), and all European trade partners[13] also demonstrate the positive association, however, with less statistically reliable results. Though there are many factors describing aforementioned countries, Ireland is known for its high-quality domestic firms with linkages to the internationalised sector, high productivity, and a strong interventionist tradition in Irish industrial policy, McCann (2009). Meanwhile Russia is still described by a weak institutional environment with a widespread corruption and bribery.[14] Finally, the negative link is established between firm startup costs and average annual gross earnings standardised for purchasing power. As is shown in Figure 3.5, a negative association prevailed both at individual country level and for a pooled sample.[15] The results from the pooled regression are collected in Table 2.

Fact 3. *The larger the firm startup costs are, the smaller the gross labour earnings (PPP) are for the pool of the EU countries. Cross-sectional reaction to changes in regulatory environment is remarkably heterogeneous.*

As is obvious from Figure 3.5, there is a wide heterogeneity as to how countries react to changes in firm entry costs and labour earnings. One of the conjectures is that reaction (notice differences in slopes) is driven by the labour market flexibility which is determined by the underlying institutions.[16]

Indeed, as demonstrated by Boysen-Hogrefe, Groll, Lechthaler, and Merkl (2010), the responses to global economic shocks at the labour market are largely driven by the differences in the labour market institutional measures. Figure 3.6 depicts how labour market regulations correlate with startup costs (first graph). The second graph illustrates the correlation between labour earnings and an extracted variation in startups due to labour market flexibility. Yet, it loses the significance and I cannot conclude that labour market is responsible for significance in correlation between startup costs and earnings.

To formalise, I also conduct several pooled regressions. Table 2 shows that, as suspected from graphical analysis, startup costs negatively correlate with labour earnings, both lower startup costs

[12] Economies are benchmarked to June 2012, see http://www.doingbusiness.org/rankings.

[13] Norway (slope 0.001, $p = 0.85$) and Turkey (slope 0.0006, $p = 0.09$).

[14] See, for instance, Transparency International's 2008 Bribe Payers Index (BPI) where Russia is the very last among the surveyed countries. The highest likelihood of firms to engage in bribing abroad reveals both practices at home and foreign markets. The recent Corruption Perceptions Index (2012) ranks Russia 133 among 176 countries and territories in the sample. See http://cpi.transparency.org/cpi2012/results/.

[15] I have also checked for clustered standard errors for the pooled sample. Despite the clustering, the results are getting even more statistically significant as clustering reduces the error quite significantly.

[16] I use data on labour market flexibility from the Fraser Institute's Economic Freedom of the World database due to Gwartney, Lawson, and Hall (2012). The index may vary between 0 and 10 with higher values indicating a less regulated economy.

Figure 3.5: Negative Association Between Startup Costs and Labour earnings in the Pooled and Separate-country Samples

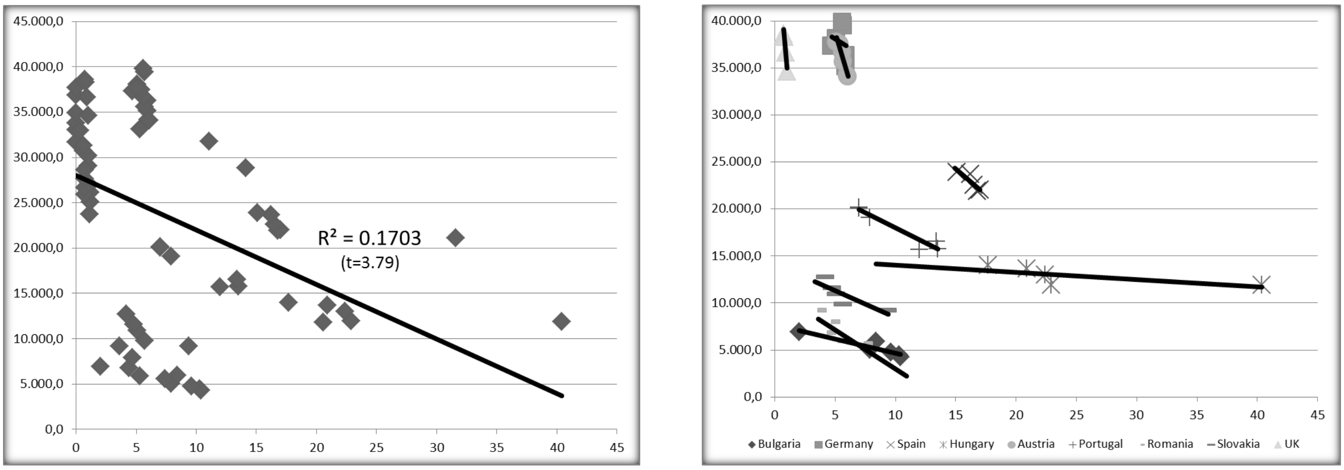
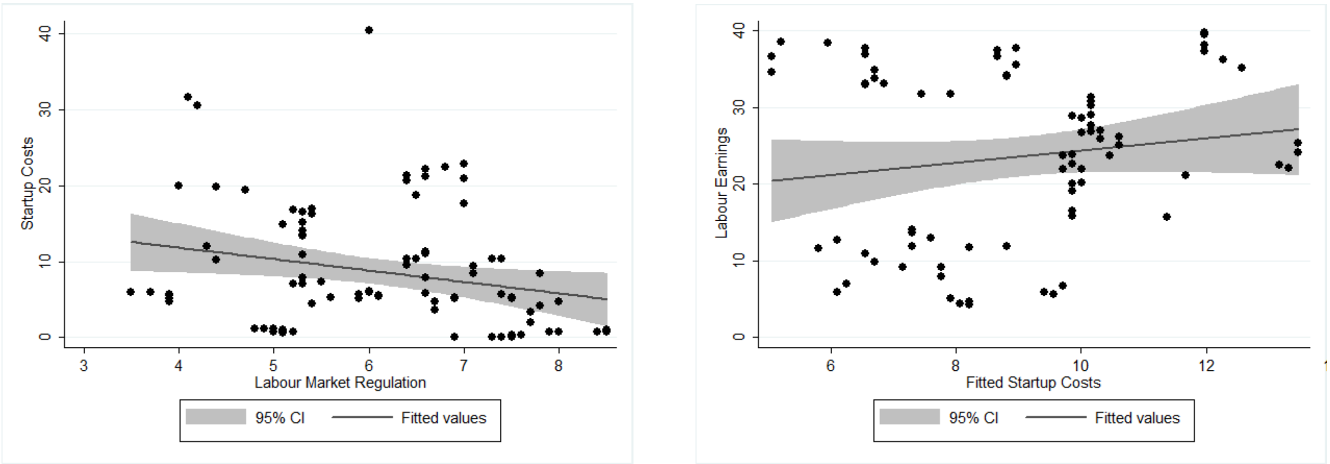


Figure 3.6: Entry Costs, Labour Earnings, and Labour Market Regulation



and more flexible labour markets tend to be associated with higher earnings, and labour market regulation affects startup costs but not earnings.

Table 2: Pooled Regression of Labour Earnings and Startup Costs

Variable	Earnings	Earnings	Earnings	Startup Costs
Startup Costs	-0.60*** (0.12)	-0.65*** (0.12)	-	-
Labour Market Regulation	-	-2.06** (0.95)	-1.19 (0.91)	-1.50** (0.71)
Intercept	28.02*** (1.59)	40.76*** (5.38)	30.58*** (4.95)	17.84*** (4.63)

Note: $N = 72$ (for the first two equations), $N = 77$ and $N = 97$ for the last equations, respectively, for years 2003-2008. Average annual gross earnings by occupation in PPP. Robust clustered standard errors in parentheses. *, **, *** denote significance at 10%, 5% and 1% respectively.

Source: World Bank, Fraser Institute.

To sum up, the firm entry costs have been decreasing over the last years, both inside the EU and in its major European trade partners. However, there is still a staggering heterogeneity of the regulation of entry and business startups costs inside the Union. Advanced member-states might resist to improving business environment as their firms are relatively more productive than those of newer member states, trading links are firmly established (so that the extensive margin is not as important) and stability in country's government allows a beneficial collaboration with the organised groups. The rationale for the above-the-normal levels of the entry costs inside the EU together with the theoretical conditions for the empirically observed positive correlation between the entry costs and import penetration ratio are laid down next.

4. Exogenous Firm Entry Institutions

I follow Melitz (2003) and Do and Levchenko (2009) to build an extended, multi-country model. This is essential to introduce spatial effects among neighbours that proved to be significant drivers in determining trade and institutional environment. Then, I introduce endogenous institutional quality measures in a simple game-theoretic framework. Following empirical motivation, I show that (i) IPR and startup costs are negatively related in a closed system (EU-wide) but may be indeterminate for the country-level case; (ii) spatial competition is inducing the reduction of startup costs; (iii) worse institutions relate to lower labour income which is in line with the empirical evidence provided in Figure 3.5.

I establish a theoretical IPR for each country and connect them into a global closed system - as will be clear, aggregate effect is free of complications (imports are equal to exports) and the only remaining is the overall revenue effect for which an unambiguous result is establishable. Spatial patterns require a multi-country setup which I combine with the lobbying game. I consider a composition of a lobby where firm heterogeneity is crucial. Indeed, to generate entry barriers, one must allow for firm selection and asymmetric trade costs.

4.1. Environment

The economic environment features a single factor - labour, with country endowments L_j for all countries $j = 1, \ldots, I$. Labour is used to produce both homogeneous and differentiated goods.

A homogeneous good z is produced with a linear technology that requires one unit of labour to produce one unit of output. Since there is no money, a numéraire must be adopted, which is a homogeneous good. Note that homogeneous good is produced by a competitive firm that makes zero economic profits. This implies that price is equal to the marginal costs, namely wage $w = 1$, which is the case so long as the numéraire good is produced in every country and freely traded (see Helpman, Melitz, and Yeaple (2004) which adopt this simplification). Moreover, there are firms that engage in monopolistic competition and produce horizontally-differentiated varieties, with a fixed production cost and a marginal cost φ which corresponds to the inverse of their productivity. In other words, the higher is φ, the higher is the marginal cost, and the less productive is the firm. I discuss choices available to consumers and firms in more detail.

4.1.1. Consumers

Preferences are modelled by considering the set of varieties consumed and the homogeneous good z. Consider a European economy comprising of i, $j = 1, \ldots, I$ countries, then consumer's utility function in country j is

$$U_j = \sum_{i \neq j} \left[\int_{\omega \in \Omega_j} q_{ij} (\omega)^{\rho} \, d\omega \right]^{\frac{\beta}{\rho}} z_{ij}^{(1-\beta)}, \; 0 < \rho < 1, \, 0 < \beta < 1, \tag{4.1}$$

where $q_{ij}(\omega)$ is the quantity consumed of good ω originating from country i in country j, and Ω_j denotes the set of varieties available in country j. The formulation implies that an elasticity of substitution between any pair of differentiated goods is $\varepsilon = 1/(1-\rho)$.[17] The demand for differentiated good from all trade partners $i = 1, \ldots, I$ is given by[18]

$$q_j(\omega) = \frac{\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} \, d\omega} p_j^{-\varepsilon} \text{ for all } \omega \in \Omega_j, \tag{4.2}$$

where E_j is the expenditure level in country j, M_j is made of firms that are active domestically, $m_j G(\varphi_c)$, where $G(\varphi_c)$ denotes a probability to be active in the market with a fixed measure of all potential firms m_j and those that trade with j, $\sum_{i \neq j} m_i G(\varphi_c^{\star})$, expressed as a share of m_i. Hence, $M_j = m_j G(\varphi_c) + \sum_{i \neq j} m_i G(\varphi_c^{\star})$ is increasing in domestic producers and importers. The price of the differentiated good is denoted by p_j and the ideal price index is given by $P_j = \left[\int_0^{M_j} p_j(\omega)^{1-\varepsilon} \, d\omega \right]^{\frac{1}{1-\varepsilon}}$. As more varieties become available, the ideal price index decreases.[19] The total demand for homo-

[17] As noted by Dixit and Norman (1980) in their classical contribution, if $\rho < 0$, the elasticity of substitution is less than unity. But given the Cobb-Douglas specification, the elasticity between differentiated goods and the homogeneous good is unity, so $\rho < 0$ implies that the differentiated goods and the homogeneous good are closer substitutes than are the differentiated goods among themselves. Therefore, the requirement $0 < \rho < 1$. Then, the requirement $0 < \beta < 1$ is needed for the utility function to be concave. To be precise, the elasticity of the inverse demand function is $\varepsilon^{-1} = \frac{q_{jk}}{p_{jk}} \frac{\partial p_{jk}}{\partial q_{jk}} = (\rho - 1) - \left[\frac{q_{jk}}{Q_{jk}} \right]^{\rho}$, yet the last term is disregarded as the quantity of any particular firm is negligible compared to a total economy's quantity. In a perfect case scenario, one models differently sized firms, some of which are not of measure zero. But this introduces a number of technical challenges to be addressed in the future.

[18] See (A.1) for derivations. Note that a Cobb-Douglas utility function implies that the consumer allocates a constant share of income to each good. Unlike Rebeyrol and Vauday (2009), however, I also discuss how expenditure level is determined in equilibrium.

[19] Under Pareto distribution,

$$P = \left[\frac{1}{1-G(\varphi_c)} \int_{\varphi_c}^{\infty} \left(\frac{w}{\kappa \varphi} \right)^{\frac{\rho}{\rho-1}} M \frac{k}{\varphi} \left(\frac{\varphi_{min}}{\varphi} \right)^{k} d\varphi \right]^{\frac{\rho-1}{\rho}} = \Gamma M^{\frac{\rho-1}{\rho}} \frac{1}{\rho \varphi_c} = M^{\frac{\rho-1}{\rho}} p(\tilde{\varphi}),$$

geneous good in country j is given by

$$z_j = (1-\beta)\, E_j. \tag{4.3}$$

Inserting demand function into the utility function (4.1), and recalling that $\rho = (\varepsilon - 1)/\varepsilon$,

$$\begin{aligned} U_j &= \sum_i \left[\int_{\omega\in\Omega_j} \frac{\beta^{\frac{\varepsilon-1}{\varepsilon}} E_j^{\frac{\varepsilon-1}{\varepsilon}}}{P_{ij}^{(1-\varepsilon)\frac{\varepsilon-1}{\varepsilon}}} p_{ij}^{1-\varepsilon} d\omega \right]^{\frac{\varepsilon\beta}{\varepsilon-1}} z_{ij}^{1-\beta} \\ &= \left(\beta \frac{E_j}{P_j}\right)^{\beta} \left((1-\beta)\, E_j\right)^{1-\beta}, \end{aligned} \tag{4.4}$$

where, recalling an equivalence between firms and goods, price index becomes $P_j = \left[\int_{\omega\in\Omega_j} p_j^{1-\varepsilon} d\omega\right]^{\frac{1}{1-\varepsilon}} = \left[\int_0^{M_j} p_j^{1-\varepsilon} d\omega\right]^{\frac{1}{1-\varepsilon}}$. This establishes the fact that price index measures true cost of living, and its increase decreases utility, $P_j^{\beta} U_j = \beta^{\beta} (1-\beta)^{1-\beta} E_j$. As noted above, a decrease in price index is related to a measure of domestic and importing firms, which are, in turn, affected by entry barriers.

4.1.2. Firms

Firms are heterogeneous with respect to productivity which is assumed to be distributed according to Pareto distribution.[20] Pareto(b, k) has a cdf $G = (\varphi/b)^k$, where k is the shape parameter while b embodies the largest possible value that φ can attain. The latter is frequently referred to as the measure of technology. Exporters also face 'iceberg' transportation costs $\tau_{ij} > 1$,[21] well-known in economic geography when shipping one unit of any variety requires to dispatch more than one unit.

Firms enter domestic market by paying fixed cost $\alpha_j f_e$ and foreign market by paying fixed cost $(\alpha_i f_x)$ per one market. The main variable of interest is α which reduces a high-dimensional problem of institutional rules affecting entry into a single scalar that multiplicatively boosts the observed entry costs in each economy (so that $\alpha \geq 1$, where 1 denotes a case with no artificial or 'unnatural'

---

where $\Gamma = \left[\frac{k(\rho-1)}{k(\rho-1)+\rho}\right]^{\frac{\rho-1}{\rho}}$, φ_c is the threshold efficiency level for the domestic producer and $\tilde{\varphi}$ is the aggregate productivity as it completely summarises the information in the distribution of productivity levels. In the open economy,

$$P = M_t^{\frac{\rho-1}{\rho}} \Gamma \frac{w}{\rho} \left[\frac{1}{M_t}\left[M\varphi_c^{\frac{-\rho}{\rho-1}} + \sum_n M_n \tau_{ni}^{-\frac{\rho}{\rho-1}} \left(\varphi_{ni}^{im}\right)^{\frac{-\rho}{\rho-1}}\right]\right]^{\frac{\rho-1}{\rho}} = M_t^{\frac{\rho-1}{\rho}} p\left(\tilde{\varphi}_t\right),$$

where, following Melitz (2003), M_t is a total measure of firms operating in a market (domestic producers plus importers), $\tilde{\varphi}^{-1} = \left[\frac{k(\rho-1)}{k(\rho-1)+\rho}\right]^{\frac{\rho-1}{\rho}} \varphi_c^{-1}$ is the weighted average of the all domestic firm productivity levels while the aggregate productivity is $\tilde{\varphi}_t = \left[\frac{1}{M_t}\left[M\varphi_c^{\frac{-\rho}{\rho-1}} + \sum_n M_n \tau_{ni}^{-\frac{\rho}{\rho-1}} \left(\varphi_{ni}^{im}\right)^{\frac{-\rho}{\rho-1}}\right]\right]^{\frac{\rho-1}{\rho}}$.

[20] It is now a common practice to use this distributional assumption - see Chaney (2008) which applied this simplification to Melitz (2003). Generally, as evidenced by Aoyama, Fujiwara, and Ikeda (2010), a number of phenomena obey the power-law distribution, including income, total capital, net profit and sales. Axtell (2001) also finds that Pareto reasonably approximates the observed distribution of firm sizes in the USA for data from multiple years and for various definitions of firm size. Ikeda and Souma (2009) study labour productivity at the microscopic level in terms of distributions based on individual firm financial data for Japan and the United States. A power-law distribution for firms and sector productivity was observed in both countries' data.

[21] Though not modelled explicitly, these could include distance, border effect, exchange rate volatility, among others. See Novy (2007) for the analysis on the iceberg trade costs.

barriers).[22] They are measured in labour units. Notice that initial sunk costs $\alpha_j f > 0$ have to be paid by each exporting firm for every country it exports to after learning its productivity level. Yet, one-time sunk costs can alternatively be modelled as per-period fixed costs incurred by every exporting firm, that is $\alpha_j f = \alpha_j f_e \left(1 + (1-\delta) + (1-\delta)^2 + \ldots\right) = \alpha_j f_e \left(1/\left(1-(1-\delta)\right)\right) = \alpha_j f_e \left(1/\delta\right)$, where δ denotes a probability of a "death" shock, occurring every period. Therefore, per-period costs have to be paid with ever-decreasing probability in future periods. This relationship is summarised in the following claim.

Claim 1 (Relationship between costs). In case the free entry condition is imposed, the expected value V from entry equals the fixed entry cost: $\alpha_j f = \int_{\varphi_d}^{\infty} V(\varphi)\, dF(\varphi) = \frac{f_e}{\delta} \int_{\varphi_d}^{\infty} \left[\left(\frac{\varphi}{\varphi_d}\right)^{\frac{\kappa}{1-\kappa}} - 1\right] dF(\varphi)$. This leads to a relationship $\alpha_j f = \alpha_j f_e/\delta$.

Hence, fixed and sunk costs are not conceptually separated. Firms observe their productivity φ from distribution $g(\varphi)$ with cdf $G(\varphi)$. Since I am dealing with the multi-country setting, firms from country j that serve their domestic market will fall within $(\varphi_c^\star, \varphi_c]$ and those that export to some country i will be described by φ from the interval $(0, \varphi_c^\star]$. Once productivity is observed, firms decide whether to produce or exit. Productivity is fixed thereafter.[23] Each firm produces a single product variety requiring $\varphi q + f_e$ units of labour, where φ is the marginal and f is the fixed input requirement. In addition to transportation costs τ_{ij}, there are (potentially) installed institutional quality measures α, which, instead of $\varphi q + f_e$, require $\varphi q + \alpha f_e$ units of labour to produce one unit of variety, where $\alpha \geq 1$.

A firm from country j that remains in the industry will always serve its domestic market through domestic production. However, not all domestic firms engage in international trade. I fix a mass of firms in the differentiated sector in each domestic country,[24] however, a mass of importers remains to be determined. Then, each variety has one-to-one correspondence with firms, M_j denoting both the mass of firms in region j and the varieties in the region j.

The isoelastic demand gives rise to a constant markup over marginal cost. Therefore, a firm with productivity draw φ will set its price equal to $p_j = \varphi/\rho$, where $1/\rho$ is a constant markup over cost (recall that $1/\rho = \varepsilon/(\varepsilon - 1) > 1$). Thus, a full price for foreign consumer is equal to $p_{jk} = \tau_{jk}\varphi/\rho = \tau_{jk} p_j$. The resulting domestic profit $\pi_{jj}(\varphi) = r_j - c_j$, with r_j and c_j standing for the total revenue and total cost, respectively, for a generic firm in country j can be written as

$$\pi_{jj}(\varphi) = \frac{(1-\rho)\,\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon}\, d\omega} \left(\frac{\varphi}{\rho}\right)^{1-\varepsilon} - \alpha_j f_e. \tag{4.6}$$

[22] Though limited to trade costs, Bergstrand and Egger (2011) emphasise that existing trade frictions include natural and 'unnatural', the latter referring to both tariff and non-tariff barriers. They constitute an important part of fixed costs needed to start exporting, which play a crucial role in current trade models with heterogeneous firms (Behrens and Ottaviano, 2011).

[23] As in Melitz (2003), uncorrelatedness between firm exit and productivity ensures no effects on the equilibrium productivity distribution $\mu(\varphi)$

$$\mu(\varphi) = \begin{cases} \frac{g(\varphi)}{G(\varphi_c)} & \text{if } \varphi \leq \varphi_c \\ 0 & \text{otherwise} \end{cases} \tag{4.5}$$

and $\Pr(\text{in}) \equiv G(\varphi_c)$ is the ex-ante probability of successful entry or, equivalently, a probability of a draw of $\varphi \leq \varphi_c$, where φ_c is the cutoff level of productivity. Note that the smaller is φ, the higher is the productivity.

[24] This became a common feature in the trade models that take political economy into account, see Do and Levchenko (2009), Chaney (2008), Abel-Koch (2010), and Behrens, Ertur, and Koch (2012). This assumption makes changes in trade costs affecting aggregate profits, and in turn, total income in country j. Under a CES import demand system, however, this effect is necessarily absent: aggregate profits are independent of the value of trade costs. Hence, no free entry implies that total expected profits which can be positive due to monopolistic competition are not necessarily equal to fixed entry costs, and provide with the rationale to engage in lobbying.

Moreover, a firm based in j that is productive enough to export to country i abroad (and, similarly, a firm that exports to the market j is the importer from the j's perspective) will earn additional profits

$$\pi_{ji}(\varphi) = \frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega} \left(\frac{\tau_{ji}\varphi}{\rho}\right)^{1-\varepsilon} - \alpha_i f_x \text{ and } \pi_{ij}(\varphi) = \frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} \left(\frac{\tau_{ij}\varphi}{\rho}\right)^{1-\varepsilon} - \alpha_j f_x. \tag{4.7}$$

Note that I allow for the entry barriers to be imposed in country i, too. The explicit form of the cutoff productivity values for the domestic producer, exporter and importer are obtained for the firm that makes zero profits,

$$\varphi_c(\alpha_j) = \left(\frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{1}{1-\varepsilon}} (\alpha_j f_e)^{\frac{1}{1-\varepsilon}} \rho \tag{4.8}$$

and

$$\varphi_c^\star(\alpha_i) = \left(\frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{1}{1-\varepsilon}} (\alpha_i f_x)^{\frac{1}{1-\varepsilon}} \frac{\rho}{\tau_{ji}} \text{ and } \varphi_c^{im}(\alpha_j) = \left(\frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{1}{1-\varepsilon}} (\alpha_j f_x)^{\frac{1}{1-\varepsilon}} \frac{\rho}{\tau_{ij}}. \tag{4.9}$$

All else equal, higher transportation costs and higher fixed entry costs[25] require smaller φ or, equivalently, higher productivity. This again confirms our intuition that exporting firms, incurring additional entry and transportation costs, are more productive than domestically operating ones. The relationship between import and domestic cutoff productivities is $\varphi_c^{im} = (1/\tau_{ij})(f_x/f_e)^{\frac{1}{1-\varepsilon}} \varphi_c$. The higher trade frictions, τ_{ij}, between i and j, ceteris paribus, the more productive importer shall be compared to the domestic producer. Likewise, the higher 'natural' fixed costs to enter market j for the importer compared to domestic firm, the more productive the importer should be to enter the j's market.

The cutoff productivity of domestic firms and institutions are quite intricately related, as summarised in the following lemma.

Lemma 1. *Entry institutions affect cutoff domestic producer through three channels, namely elasticity of substitution between differentiated goods (intensive margin), and elasticities of α with respect to income and prices. Hence, the effect of worse institutions depends on the interaction between parameters of preferences and technology.*

The lemma follows very intuitively. Note that aggregates must be affected to generate firm reallocations (changes, stemming from any one, measure-zero, firm, are insufficient). Recall that cutoff productivity levels are determined by (4.8) and (4.9), thereby leading to

$$\epsilon_{\varphi_c, \alpha_j} = \left[\left(\frac{1}{1-\varepsilon}\right)\left(1 - \epsilon_{E_j, \alpha_l}\right) + \epsilon_{P_j, \alpha_l}\right]. \tag{4.10}$$

An increase/decrease in φ_c translates into a decrease/increase in productivity. The sign of the term $\epsilon_{P_j,\alpha_j} / \left(1 - \epsilon_{E_j,\alpha_l}\right) \lesseqgtr (1-\rho)/\rho$, determines the effect of a change in institutional quality on cutoff efficiency.[26] There are three channels. The first term in the brackets $(1/(1-\varepsilon))$ gives the direct

[25] Note that $\frac{1}{1-\varepsilon} = \frac{\rho}{\rho-1}$ and recall that $0 < \rho < 1$, hence $\left(\frac{1}{1-\varepsilon}\right) \in (0, -\infty)$. Therefore, the higher the costs are, the smaller the cutoff level is required to enter the market.

[26] To be more precise, observe that $\epsilon_{P_j,\alpha_j} = \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\left[\epsilon_{E_j,\alpha_j} - 1\right]$ (see Appendix A.4) which yields $\epsilon_{\varphi_c,\alpha_j} = \frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\left[\epsilon_{E_j,\alpha_l} - 1\right]$. However, this entails mixed effects and is less transparent.

effect of a change in α_j. As is obvious it is decreasing with α_j. Other two channels relate to the expenditure and prices. Hence, it is not straightforward to determine the total effect on the cutoff productivity level. A negative derivative of the cutoff level with respect to α_j may seem more intuitive. In this case, worse institutions (as summarised by higher α_j) require domestic firms to be more productive (lower φ_c). However, it is also feasible to get an opposite effect: this can be the case when an increase in α_j is related to an increase in total profits, thereby boosting demand for the differentiated goods and enabling less productive firms entering the market. The effect on prices, as will be demonstrated in Remark 2, is not straightforward either. The effect depends on the interaction between parameters of preferences (elasticity of substitution) and technology (heterogeneity of firms).

The aggregate profits of domestic firms in country j that serve only local market are defined as

$$\begin{aligned} \Pi_j &= m_j \int_0^{\varphi_c} \pi_{jj}(\varphi)\, dG_{jj}(\varphi) \\ &= m_j \left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c}{b_{jj}}\right)^k \alpha_j f_e \end{aligned} \tag{4.11}$$

and, similarly, firms that engage in foreign trade additionally earn

$$\begin{aligned} \Pi_j^\star &= \sum_{i\neq j}\left(m_j \int_0^{\varphi_c^\star} \pi_{ji}(\varphi)\, dG_{ji}(\varphi)\right) \\ &= \left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\sum_{i\neq j}\left[m_j\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k \alpha_i f_x\right]. \end{aligned} \tag{4.12}$$

Assumption 1. *Let's impose a symmetry constraint that all shape parameters of productivity are the same across countries, i.e.,* $G_{jj} = (\varphi/b_{jj})^k$, $G_{ij} = (\varphi/b_{ij})^k$ *for all* i *and* j*.*

Then the ideal price index, namely $P_j = \left(\int_0^{M_j} p_j(\omega)^{1-\varepsilon}\, d\omega\right)^{\frac{1}{1-\varepsilon}}$, can be expressed as

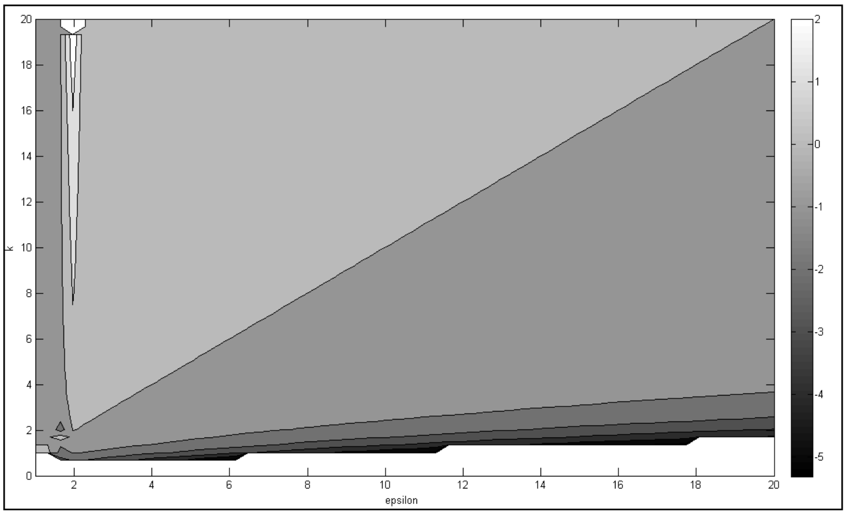
$$P_j = \Upsilon\left(\frac{E_j}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}\left[\frac{m_j}{b_{jj}^k} f_e^{\frac{k-\varepsilon+1}{1-\varepsilon}} + \sum_{i\neq j}\frac{m_j}{(\tau_{ij}b_{ij})^k} f_x^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right]^{-\frac{1}{k-\varepsilon}}, \tag{4.13}$$

where $\Upsilon = \left(\frac{\rho^k k}{k-\varepsilon+1}\right)^{-\frac{1}{k-\varepsilon}}\left((1-\rho)\beta\right)^{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}$ is composed of parameters.

Claim 2. The price index is increasing in α as demonstrated in (A.5), and thereby is reducing welfare, if certain conditions are satisfied. From (4.13), price index is increasing in α if k is small and ε is large. The regularity condition $k > \varepsilon - 1$,[27] however, constrains the values each variable can take. As is shown in the Figure 4.1, the result holds for all combinations of ε and k, except when k is very large and ε is around 2.

[27] This condition ensures no divisions by zero and convergence of respective integrals; Helpman, Melitz, and Yeaple (2004) use stronger condition though $k > \varepsilon - 1$ is sufficient.

Figure 4.1: The Contour Plot of Price Index as a Function of ε and k



A comment is in order. The shape parameter of the productivity is related to the heterogeneity.[28] The maximum value of the variance is related to a relatively low value of k above which firms get more closely clustered in terms of productivity. A maximum heterogeneity is consistent with a welfare-reducing effects when a decrease in institutional quality increases prices. Moreover, heterogeneity is a driving force for an increase in α in the first place. Intuitively, the more diverse firms are, the more preferences on firm entry and survival tend to vary. After all, only sufficiently productive firms can afford to engage in lobbying.

Notice that, though salient, the main mechanism that gives rise to selection is labour market adjustment.[29] Entry has encouraged labour demand which affected prices and wages. A decrease in price index has made sure that real wages have risen and driven least productive firms away from the market. In our setup we endogenise the choice of fixed costs which, through the effect on prices, imply changes in earnings.

4.2. Equilibrium

The equilibrium value of E_j is found by imposing the goods market-clearing condition that expenditure must equal income which consists of labour income and all profits accruing to firms from selling in the domestic and export markets:[30]

[28] Note the effect of k on the variance of productivities: $Var(\varphi) = \int_0^b (\varphi - \mu)^2 \psi(\varphi) d\varphi$ where $\psi(\varphi) = kb^{-k}\varphi^{k-1}$, $\mu = \int_0^b \varphi\psi(\varphi) d\varphi = \frac{k}{k+1}b$. Therefore, $Var(\varphi) = \int_0^b \left(\varphi - \frac{k}{k+1}b\right)^2 kb^{-k}\varphi^{k-1} d\varphi = b^2 \frac{k}{(k+1)^2(k+2)}$. Then, $\frac{\partial Var(\varphi)}{\partial k} = -b^2 \left(\frac{2k^2+2k-2}{k^5+7k^4+19k^3+25k^2+16k+4}\right)$ and $\left.\frac{\partial Var(\varphi)}{\partial k}\right|_{k=0} = \frac{b^2}{2}$. The limits of variances are $\lim_{k\to 0} Var(\varphi) = 0$ and $\lim_{k\to\infty} Var(\varphi) = 0$. Finally, the maximum is attained in-between for $k = \frac{\sqrt{5}-1}{2}$. Hence, an increase in k is related to a decrease in the variance for all $k \in \left(\frac{\sqrt{5}-1}{2}, \infty\right)$. However, the small enough values may be related with an opposite effect, i.e., an increase in k implies an increase in productivity variance for $k \in \left(0, \frac{\sqrt{5}-1}{2}\right)$.

[29] Trade literature has been using CES preference structure extensively which helped to aggregate in a very neat way. However, this shut the competition effect through demand. This is because firm sizes and profits are fixed by costs. Therefore, the real adjustment has taken place through the labour market.

[30] This may look different from other analyses, e.g. Helpman, Itskhoki, and Redding (2010), where total domestic expenditure on differentiated varieties equals the sum of the revenues of domestic and foreign firms that supply

$$
\begin{aligned}
E_j &\equiv m_j \int_0^{\varphi_c} r_{jj}(\varphi)\, dG(\varphi) + \sum_{i\neq j} m_j \int_0^{\varphi_c^\star} r_{ji}(\varphi)\, dG(\varphi) \\
&= L_j + m_j \int_0^{\varphi_c} \pi_{jj}(\varphi)\, dG(\varphi) + \sum_{i\neq j} m_j \int_0^{\varphi_c^\star} \pi_{ji}(\varphi)\, dG(\varphi)\,.
\end{aligned} \tag{4.14}
$$

Then, the trade equilibrium involves finding the domestic production cutoffs φ_c, and the exporting cutoffs $\varphi_c^\star$, for all the countries i.[31] The cutoff values for production and exporting are characterised by:

$$
\frac{(1-\rho)\,\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon}\, d\omega} \left(\frac{\varphi_c}{\rho}\right)^{1-\varepsilon} = \alpha_j f_e \tag{4.15}
$$

and

$$
\frac{(1-\rho)\,\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon}\, d\omega} \left(\frac{\tau_{ji}\varphi_c^\star}{\rho}\right)^{1-\varepsilon} = \alpha_i f_x \;\forall i \neq j. \tag{4.16}
$$

To simplify things, (4.14) can be re-written as

$$
\begin{aligned}
E_j &= L_j + m_j \left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\tfrac{\varphi_c}{b_{jj}}\right)^k \alpha_j f_e + \left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right) \sum_{i\neq j} \left[m_j \left(\tfrac{\varphi_c^\star}{b_{ji}}\right)^k \alpha_i f_x \right] \\
&= L_j + \left(\tfrac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{k}{1-\varepsilon}} (\alpha_j f_e)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \rho^k \left(m_j b_{jj}^{-k} \left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right) \\
&+ \sum_{i\neq j} \left(\tfrac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{k}{1-\varepsilon}} (\alpha_i f_x)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \left(\tfrac{\rho}{\tau_{ji}}\right)^k \left(m_j b_{ji}^{-k} \left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right).
\end{aligned} \tag{4.17}
$$

Then, the cutoff levels of φ_c and $\varphi_c^\star$ and the expenditure levels E_i are implicitly defined by (4.15)-(4.17).[32] Notice that the above definition yields

$$
\epsilon_{E_j,\alpha_l} = \frac{\Pi_j}{E_j}\left[1 + k\epsilon_{\varphi_c,\alpha_l}\right],
$$

which simplifies (4.10) to

$$
\begin{aligned}
\epsilon_{E_j,\alpha_l} &= \frac{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)} - \frac{1}{k}}{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)} - \frac{1}{k s_j}} \\
&= \frac{k^2-\varepsilon(\varepsilon-1)}{k^2-\left(\frac{\varepsilon}{s} - \frac{1-s}{s}k\right)(\varepsilon-1)},
\end{aligned} \tag{4.18}
$$

where $s_j \in (0,\, 1)$ is the domestic profit share in total expenditure (aggregate profitability). The behaviour of the elasticity is summarised in the lemma.

Lemma 2. *In autarky, $s_j = 1$, which implies unitary elasticity, $\epsilon_{E_j,\alpha_l} = 1$. For small and open economy, $s_j \to 0$, which yields perfectly inelastic outcome, $\epsilon_{E_j,\alpha_l} \to 0$ (see Figure 4.2).*

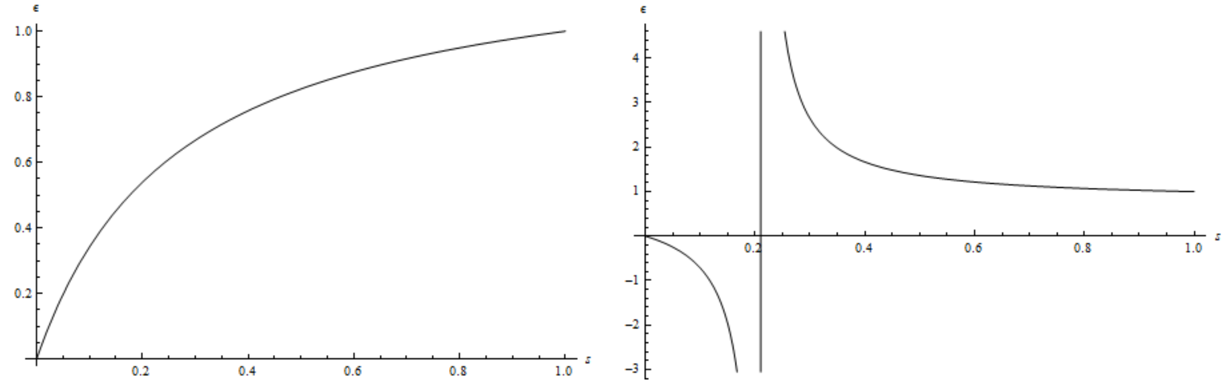
This result hints of relatively small changes to aggregate income when entry barriers increase in a highly open economy. The sign crucially depends on the relative size of taste and technology parameters (ε and k). In addition to these parameters, the model implies that entry barriers depend

varieties to the domestic market. The adopted approach equates total income to the total expenditure where the former is the sum of labour income and all profits accruing to firms from selling in the domestic and export markets. However, the latter is the sum of the revenues of all firms serving the domestic market.

[31] To ease notation, I use the cutoff productivity level $\varphi_c^\star$ that j's firms must have to enter i's market. It is implicitly assumed that $\varphi_c^\star$ may be different for different trading partners. This will be emphasised when needed.

[32] The derivations and further explanations can be found in (A.3).

Figure 4.2: Elasticity's ϵ_{E_j,α_l} dependence on domestic profitability s_j ($k > \varepsilon$ (left) and $k < \varepsilon$ (right))



on the size of domestic producers in any economy.[33] Further, the second line in (4.18) indicates that $\epsilon_{E_j,\alpha_l} = 1$ can be obtained for any s_j if $k = \varepsilon$, so that technology and tastes are restricted, with no interaction between the two.[34]

The income of consumers from country j and the total generated profits can be expressed as $E_j = \left(1 + \pi_j^c\right) L_j$, where π_j^c is profit per consumer in country j,

$$\pi_j^c(\alpha_j, \alpha_i) = \frac{1}{L_j}\left\{m_j \int_0^{\varphi_c} \pi_{jj}(\varphi, \alpha_j)\, dG(\varphi) + \sum_{i \neq j} m_j \int_0^{\varphi_c^\star} \pi_{ji}(\varphi, \alpha_i)\, dG(\varphi)\right\}.$$

The per capita profit gives several insights. First, there are direct effects that diminish profit per consumer, namely L_j, and indirect effects through E_j that magnify total profits. Under the assumption that fixed costs are absent, the maximum labour income can amount to $L_j = E_j$. This drives all profits to zero and redistributes entire surplus to labourers. However, with an introduction of the fixed costs, αf, some firms have to gain as it is exactly a reason to push such an institutional change. Only a share of firms survives with an increased profitability, and a redistribution from labour income to more powerful firms (recall that $L_j = E_j - L_j\pi_j^c$). To see a tension between profitability and labour earnings, notice that $L_j = (1 - \psi) E_j$, where $\psi \equiv L_j\pi_j^c/E_j$ is a share of total profits in aggregate income. This simple mechanism is consistent with data, confirming lower labour earnings under higher entry regulation.

Empirically, labour market flexibility does not affect earnings but does affect startup costs. The entry costs are covered by increased labour requirements which are deprived from a more productive side of economy. Though labour market is not explicitly modelled, it still plays a crucial role as all adjustments are through changes in prices. A decrease in price index has made sure that real wages have risen and driven least productive firms away from the market. Clearly, institutional measure α affects prices which, in turn, change real earnings. Indeed, the real wage is given by

[33] Return to the cutoff productivity in (4.10) and observe that $\epsilon_{\varphi_c,\alpha_j} = \frac{1}{k}\left[\frac{(1-s_j)}{\left(s_j - \frac{(k-\varepsilon)(1-\varepsilon)}{k(k-\varepsilon+1)}\right)}\right]$. It is positive if $s_j > -\frac{(k-\varepsilon)(\varepsilon-1)}{k(k-\varepsilon+1)}$ which is always a case if $k > \varepsilon$ and negative if $s_j < \frac{(k-\varepsilon)(1-\varepsilon)}{k(k-\varepsilon+1)}$ though $\varepsilon > k > \varepsilon - 1$ is not a sufficient condition (it also depends on the relative size of profitability).

[34] Notice that $\lim_{\varepsilon\to 0} \epsilon_{E_j,\alpha_l} = ks/\left((k+1)s - 1\right)$ and $\lim_{\varepsilon\to\infty} \epsilon_{E_j,\alpha_l} = s$. If products are highly differentiated, the effect of entry barriers is larger than unitary, since

$$\lim_{\varepsilon\to 0} \epsilon_{E_j,\alpha_l} = \frac{ks}{ks - (1-s)} > 1, \text{ provided } k > \frac{1-s}{s},$$

and perfectly substitutable goods imply no dependence on technology parameter.

$w_j/P_j(\alpha) = 1/P_j(\alpha)$ whose properties are determined by the price behaviour. Recall Claim 2, which establishes the conditions for the empirical regularity of reduced earnings when startup costs increase. An alternative route is to follow Felbermayr, Prat, and Schmerer (2011) and Felbermayr, Larch, and Lechthaler (2012) for explicit treatment of labour market and entry costs adjustments.[35]

5. Endogenous Firm Entry Institutions

However convincing micro or even macro (general equilibrium) evidence about the effects of a particular policy or institutional change on economic outcomes is, it is not in itself sufficient to gauge the implications of a policy implementation. Incorporation of general equilibrium and political economy effects are crucial as argued by Acemoglu (2010). Hence, I follow Magee (2002) to endogenise both lobby formation and institutional quality. This model is based on Grossman and Helpman (1994), and extended to consider a case in which firms contribute or defect from a cooperative lobby strategy. Essentially, the lobbying game can be interpreted as a menu auction. The imperfectly competitive nature of the economy provides scope for the rent seeking behaviour.

First, firms and the policy maker bargain over the contributions that will be paid to the policy maker in exchange for each level of institutional quality. I model domestic firms lobbying for entry costs which apply for both domestic and foreign firms. This is only one possible combination of political processes involved in changing institutional environment.[36] In the second stage, firms in the industry decide whether or not to contribute to the lobbying activities. A lobby is formed if the rents it generates are sufficient to cover costs of lobby formation. The theoretical explanation has a strong empirical backup. Bombardini and Trebbi (2009) evidence a widespread engagement in lobbying for trade policy in the USA.[37] The so-called tollbooth theory, overviewed by Djankov, Porta, de Silanes, and Shleifer (2002), holds that regulation is pursued for the benefit of politicians and bureaucrats. Politicians use regulation both to create rents and to extract them through campaign contributions. The mentioned authors confirm this claim empirically, even controlling for the level of economic development.

Grossman and Helpman (1994) proposed an elegant solution to the problem of how the government simultaneously considers the contributions of numerous lobbies, as well as consumer welfare, in determining trade-related policy. There is a subset of the industries $l \in J_O$ that are organised into lobbies, while the complementary set $l \in J_U$ are unorganised industries, with $J_O \cup J_U$. The purpose of each lobby is to provide contributions to the government in return for influencing the schedule of institutional quality measures. The government values campaign contributions, but

[35] Though monopolistic competition seems to be causing additional complications for the search-matching framework, Felbermayr, Prat, and Schmerer (2011) demonstrate that average productivity of traders is independent of labour market outcomes. Yet, my focus differs and I limit discussion to price adjustments.

[36] Alternatively, domestic firms may lobby for institutions that raise variable costs (tariffs) or fixed cost (standards) of foreign firms. Another option - foreign firms may exert political influence as well, and lobby for good institutions. Lastly, as in Rebeyrol and Vauday (2009), I could model sectoral rather than macro-level adjustments with industries where many small, low-productivity firms may be lobbying for low fixed entry costs. All these extensions are ignored and left for future research.

[37] Lobbying is also relevant for the EU. As reported by Directorate-General (2003), the European institutional set-up affects the potential for collective action, since the supranational institutions provide formal rules which structure the relationship with interest groups. There are several ways of lobbying, direct and indirect. For example, British firms attempted to build a complex dual lobbying strategy at the national and European levels. To the contrary, their Dutch and German counterparts saw their national associations and governments as a complementary and safe option to influence the EU. Notably, the cooperation with national governments is usually significant because national experts are appointed by their governments. Lobbyists therefore seek to maintain good contacts with them.

also weighs these against the consumer welfare of all individuals. The campaign contributions are optimally chosen taking as given the schedules of other groups, and knowing that α will be chosen to maximise a social welfare function.

The policy maker has a utility function G that increases in the total campaign contributions the policy maker receives from the industry and in the social welfare of the population,

$$G = \sum_{l} C_l(\alpha) + \kappa W(\alpha), \tag{5.1}$$

where $C_l \in \mathbb{R}_+$ represents the campaign contributions received from the industry lobby group l, W is aggregate social welfare, and κ is the weight that the policy maker places on social welfare.[38] Contributions and social welfare are functions of the institutional quality measures $\alpha \in [1, \bar{\alpha}]$,[39] which increase the fixed costs for foreign and domestic firms. It is assumed to affect fixed costs multiplicatively, i.e., $F = \alpha f$.[40] In other words, the Schengen area and other EU initiatives ensure that border measures have the least negative impact on members.[41] However, institutional quality measures are prevalent, as depicted in Section 3, and described by the restrictions mostly implemented on a selective basis in order to favour certain producers or branches within the domestic economy to the disadvantage of others.

As already mentioned, there is a numéraire sector in which output is produced using labour only and with constant returns to scale. Units are such that the wage in the numéraire sector equals one and workers can move freely between sectors. The policy maker maximises utility (5.1), while the lobby maximises profits Π_l.[42] The nature of a lobby (a measure of firms entering it) is to be discussed and its composition endogenised in terms of productivity level. With an agreement over a contribution schedule, the policy maker's utility is given by (5.1) and the l's lobby profits are $\Pi_l(\alpha) - C_l(\alpha)$. Then, for the contribution schedule resulting from the bargaining, a generalised version of the Nash bargaining solution[43] is adopted (see Maggi and Rodriguez-Clare, 1998):

$$C(\alpha) = \theta [\Pi_l(\alpha) - \Pi_l(1)] + (1-\theta)[\kappa W(1) - \kappa W(\alpha)], \tag{5.2}$$

where θ is the fraction of the lobby surplus that the policy maker receives. Hence, contributions are a weighted sum of the lobby's gain and the welfare loss from entry restrictions. When $\theta = 0$,

[38] The parameter κ closely relates to the quality of the institutions as it shows the resistance of the bureaucrats to trade social welfare for narrow interests of lobbies. Endogenising κ would be an interesting extension.

[39] When $\alpha = 1$, it is assumed that no prohibitive measures are present.

[40] Corcos, Del Gatto, Mion, and Ottaviano (2012) used a framework with both labour and capital which are geographically immobile. Under the assumption of the Cobb-Douglas composite input of capital and labour employment, $x_i(\varphi) = k_i(\varphi)^{\beta_K} l_i(\varphi)^{\beta_L}$, where φ is the firm's inverse productivity, the exact price index of the composite input would be $p_i \equiv (r_i)^{\beta_K}(w_i)^{\beta_L}$ with w and r denoting the wage and the rental price of capital, respectively. Then, assuming that fixed investment entails the same factor proportions as subsequent production, $F = \omega f$. Therefore, in this setting, ω and α essentially coincide, and capture the lack of convergence in factor prices. However, this is a valid interpretation if and only if the above assumption on factor proportions is satisfied.

[41] Head and Mayer (2000) document a gradual drop in European border barriers from 1976 to 1995, however, with no significant drop after the implementation of the Single European Act of 1986.

[42] I use the assumption that the only income for firms come from profits, and profits are entirely spent on the numéraire good. This ensures that firms' interest in lobbying stems from their role as producers, and not as consumers, thereby avoiding the so-called 'ice-cream clause' when rivalry between lobbies come from their consumer interests, which, in turn, imply that contribution schedule includes indirect utility function that involves prices in other sectors. Thus, the steel lobby is affected by ice-cream tariff. See Baldwin and Robert-Nicoud (2007).

[43] These results are derived generally without making any assumptions about the firms' production functions. The bargaining process is modelled as a Nash bargaining game, in which government and lobby have different bargaining powers. The threat point is assumed to be the *status quo* situation, i.e., no change in institutional quality.

the policy maker is indifferent, while $\theta = 1$ makes lobby indifferent between engaging in the lobby game and letting $\alpha = 1$.

Among the best responses to any combination of contribution schedules offered by the rest of lobbies, there is always a truthful contributions schedule (see Bernheim and Whinston, 1986). A strategy is said to be truthful relative to a given action if it reflects accurately the principals' willingness to pay for any other action relative to the given action. However, to deal with this concept, I have to introduce the basic welfare level, W^b, which determines the division of the surplus that arises due to lobbying. Then, the payment to the government equals the excess welfare (which coincides with the lobby's profit) relative to W^b,

$$C^{\text{truthful}}(\alpha) = \max\left[\Pi_l(\alpha) - W^b, 0\right]. \tag{5.3}$$

As is shown by Grossman and Helpman (1994), the equilibrium value of W^b is chosen by each lobby l so as to make the government indifferent between the equilibrium α_l when the lobby l is active and the level of α_{-l} if lobby l was not active. Thus, the government maximises its objective function (5.1) for each possible coalition of lobbies belonging to the subset L_{-l}.[44] What is more, Bernheim and Whinston (1986) show that Nash equilibria, that are supported by $C^{\text{truthful}}(\alpha)$, are not only truthful Nash, but also coalition-proof. This makes them focal among the set of Nash equilibria. The truthful Nash equilibria satisfy

$$\alpha^{\text{truthful}} = \arg\max\left[\kappa W(\alpha) + \sum_{l\in L}\Pi_l(\alpha)\right].$$

Then, the FOC for the equilibrium α yields

$$\kappa\frac{\partial W\left(\alpha^{\text{truthful}}\right)}{\partial\alpha} + \sum_{l\in L}\frac{\partial\Pi_l\left(\alpha^{\text{truthful}}\right)}{\partial\alpha} = 0, \tag{5.4}$$

thereby weighting lobbies more than unorganised groups ($1+\kappa$ versus κ). To ensure the truthfulness of the contribution schedule, let's impose a restriction on (5.2) that comes from (5.3),

$$\begin{aligned} C(\alpha) = \theta\left[\Pi_l(\alpha) - \Pi_l(1)\right] + (1-\theta)\left[\kappa W(1) - \kappa W(\alpha)\right] &= \Pi_l(\alpha) - W^b, \\ W(\alpha) = \tfrac{(1-\theta)\kappa W(1) - \Pi_l(\alpha) + \theta\left[\Pi_l(\alpha) - \Pi_l(1)\right] + W^b}{(1-\theta)\kappa}&. \end{aligned} \tag{5.5}$$

The trick proposed by Magee (2002) is to invert the contribution schedule to form an institutional quality schedule as a function of contributions. This is permissible because lobby's benefit and welfare loss are increasing in the institutional quality measure, so are the contributions in (5.2). Then, the endogenous institutional quality function is characterised as follows.

[44] Consider L active lobbies, then the highest utility is defined as follows,

$$G_L^{\max} = \arg\max_{\alpha} G_L(\alpha).$$

Following Rebeyrol and Vauday (2009), let's define $\bar{\psi}_l \equiv \{L_{-l} \subseteq L\}$, i.e., a subset of lobbies when l is unorganised. The result by Bernheim and Whinston (1986) hints that each lobby l chooses its W_l^b such that

$$G_L^{\max} = \max_{\alpha} G_{L_{-l}}(\alpha) \text{ for all } l \in L.$$

Therefore, contributions of the L lobbies must satisfy a system of L simultaneous equations with L unknowns, coined as the fundamental equations by Laussel and Breton (2001). See Supplementary Material (henceforth, SM) for the introduction to the Common Agency Games.

Proposition 1. *Under the assumption that the elasticity of the institutional quality and the cutoff productivity of a lobby,* $\epsilon_{\varphi_l^\star,\alpha} \equiv \frac{d\varphi_l^\star \alpha_l}{d\alpha \varphi_l^\star} > -\frac{1}{k}$, *the institutional quality function, when it is derived from bargaining between an industry and the policy maker, has the following properties:*

1. *The institutional quality measure is one when no contributions are given:* $\alpha(0) = 1$.
2. *The institutional quality measure is increasing in the contributions given:* $\alpha'(C) > 0$.

The proof is relegated to Appendix A.10 since the relevant expressions used in (5.2) are to be derived. I will only consider a case when the above requirement is satisfied. Intuitively, there are direct and indirect effects of an increase in α for the change in lobby's profit. The direct one increases lobby's profits by decreasing competition, lowering a measure of acting firms and varieties, and increasing price index. Indirectly, however, an increase in α changes the composition of a lobby since some firms might not afford paying increased contributions. This leads to the result that the average productivity of the lobby members increases and the measure of lobbyists decreases. A total effect combines the cutoff efficiency of the lobbyist, $\varphi_l^\star$, which makes the member with this productivity level indifferent between lobbying or not, also the equilibrium level of α_l, and the shape parameter k which relates to the heterogeneity of the firms. For the negative elasticity,[45] the requirement can be rewritten as $\left|\epsilon_{\varphi_l^\star,\alpha}\right| < 1/k$. This restriction is easier to satisfy for larger $1/k$ or smaller k. Recall from the footnote 28, the variance of productivities attains maximum between 0 and 1. Therefore, this requirement does not contradict the requirement for the price index to increase as α increases, and also does not eliminate a case with the maximum heterogeneity. More dispersed firms tend to engage in political action more actively as evidenced empirically (Bombardini, 2008).

To keep the argument as simple as possible, I will concentrate on the case with one lobby comprised of many heterogeneous firms. The extension to many lobbies will not add much to the main message of a paper. With one lobby, the agent receives no surplus. This is because the lobby moves before the policy maker, it sets contributions to leave the policy maker indifferent between unhampered entry with no contributions and the excessive regulations over entry with the associated contributions. More rigorously, competition between the principals stemming from the conflicting preferences affect their equilibrium contributions to the policy maker. The no-rent property is characteristic for the balanced game with fewer than two principals.[46] Convexity is needed for the games with more than two lobbies to ensure the no-rent property.[47] In the current framework, the agent gets no rent and there is only one objective of the lobby, an equilibrium value of α_l.

[45] The conditions for this result are given in Lemma 3.

[46] The balancedness is synonymous to the non-emptiness of a core.

[47] Note that convexity implies total balancedness. Then, the outcome will also be a full extraction of agent's rent. As proved by Laussel and Breton (2001), a common agency game Γ has the no-rent property regardless of the number of principals if W_Γ is convex. The existence of an equilibrium where the agent gets no rent is equivalent to the nonemptiness of the core of W_Γ or, equivalently, to the balancedness of W_Γ. In a subadditive game players always get better - or at least not worse - from merging two disjoint coalitions. This is the requirement for the uniqueness of the solution. As suggested by Sharkey (1982), there are no known conditions which guarantee subadditivity without at the same time guaranteeing the existence of a core. If we treat $C(\alpha)$ as the cost for the principle, then $C(\alpha)$ will be subadditive if

$$C_l(\alpha) + C_k(\alpha) \geq C_{l\cup k}(\alpha) \text{ for all } l,\, k. \tag{5.6}$$

In words, if firms prefer some level of α, it is at least not more expensive to contribute together towards that level, compared to separate actions. The subadditivity and convexity of W_Γ are reconciled as demonstrated by Lemma A1 in Martimort and Stole (2009). Using Shapley's definition of convexity one can show that W_Γ is superadditive, which also implies convexity in this lobbying game for the institutional quality. Therefore, under the outlined conditions, the game is fully characterised with the unique equilibrium, truthful contributions and no-rent property with the lobbies extracting entire surplus.

The no-rent property implies that $\theta = 0$, despite the number of principals. Therefore, (5.5) can be translated into

$$\begin{gathered} C(\alpha) = \kappa \left[W(1) - W(\alpha) \right] = \Pi_l(\alpha) - W^b, \\ W(\alpha) = \frac{\kappa W(1) - \Pi_l(\alpha) + W^b}{\kappa}, \\ W^b = \Pi_l(\alpha) - \kappa \left[W(1) - W(\alpha) \right]. \end{gathered} \tag{5.7}$$

The contributions are equal to the weighted difference of social welfare with and without entry impediments. This is the lowest possible compensation for a decrease in welfare which keeps a policy maker indifferent. The aggregate social welfare becomes a difference between an unregulated situation with $W(1)$ and weighted contributions made by the lobby. Finally, the basic welfare level is simply a net gain that remains for the lobby after paying a contribution. The lower the weight κ on a social welfare, the higher the lobby's gain.

5.1. Lobbying Game

The division of rents is insufficient to fully characterise a game.[48] I extend an approach of Magee (2002) to determine the selection into lobbies. The solution is to work backwards. The firms decide whether to join a lobby or remain unorganised. At a coalition-proof Nash equilibrium, i.e., stable when nonbinding communication between the principals is possible, a lobby is formed if and only if the aggregate expected net benefits of its formation are positive. To ensure uniqueness of the determination of costs and benefits, I employ the result by Laussel and Breton (2001) on the structure of equilibrium payoffs. This introduces the third stage in the model proposed by Magee (2002). In the first stage, each member decides whether or not to contribute towards forming a lobby. It is a best-response to the decisions simultaneously made by the members of a lobby. Lobby comes into existence if and only if the aggregate benefit to its members outweighs the contributions. In the second stage, the lobby chooses the schedule of institutional quality to maximise its gain. In the third and last stage, government sets the equilibrium level of institutional quality by maximising its objective function.

Following the argument proposed by Mitra (1999), I can specify the conditions under which the lobby is formed.[49] Hence, the lobby will be formed if the benefits exceed the costs for every lobby member. If, however, the benefits exceed the cost for the lobby as a whole, but not necessarily for each and every firm, two Nash equilibrium outcomes arise: there will be no contribution to the provision of the lobby or it will be fully covered. The latter choice satisfies the conditions for the three communication-based refinements, namely coalition-proof Nash, strong Nash and the Pareto-dominance refinement. Then, the group coordination becomes the likely outcome. Finally, when the costs exceed the benefits, no lobby will be formed.

From the discussion above, I can conclude that the difference between the profits when lobby is organised compared to when it is unorganised should at least cover the contributions to the government. In every country j there is a mass of firms that are organised, $m_j \int_0^{\varphi_l^\star} dG(\varphi)$, and

[48] The commitment problem between a lobby and a policy maker, as well as inside a lobby, must also be taken into account. Yet, this needlessly complicates the analysis and I simplify to one lobby group. See SM for further discussion.

[49] Mitra (1999) assumes that once lobby is formed a perfect coordination among the members of that group in the collection of political contributions can be enforced. Instead, I am using sustainable cooperation arguments.

whose payments are equal to $C_j(\alpha_l)$,[50]

$$m_j \int_0^{\varphi_l^\star} dG(\varphi)\left[\pi_j(\varphi, \alpha_l) - \pi_j(\varphi, \alpha = 1)\right] \geq C(\alpha_l) = \kappa_j\left(W(1) - W(\alpha_l)\right). \tag{5.8}$$

Then, there exists a critical level of productivity for each active lobby, $\varphi_l^\star$, which coincides with the lobby member's efficiency level, making that member indifferent between paying a share of the contributions and not belonging to a lobby. This critical level indicates the composition of the lobby and is given by

$$\begin{gathered} \Pi_j(\varphi_l^\star, \alpha_l) - \Pi_j(\varphi_l^\star, \alpha = 1) = \kappa_j\left(W(1) - W(\alpha_l)\right), \\ \pi_j(\varphi_l^\star, \alpha_l) - \pi_j(\varphi_l^\star, \alpha = 1) = \frac{\kappa_j(W(1) - W(\alpha_l))}{m_j \int_0^{\varphi_l^\star} dG(\varphi)}. \end{gathered} \tag{5.9}$$

The condition (5.9) states that, given an entry barrier level α_l, there exists a productivity level which makes total difference in profits of the lobby members to be equal to the total contributions paid.[51] Each member of the lobby contributes an equal share of the lobby's total contributions. However, it is only the least efficient firm in the lobby that makes no profits and which contribution to a lobby happens to be a full profit gain - it is the second condition in (5.9). Combination of (5.9) with (5.7) and (4.6) yields

$$\begin{gathered} \Pi_j(\varphi_l^\star, \alpha_l) - \Pi_j(\varphi_l^\star, \alpha = 1) \\ = m_j\left(\frac{\varepsilon - 1}{k - \varepsilon + 1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e(\alpha_l - 1) \\ = m_j\left[(1-\rho)\beta\left(\frac{\varphi_l^\star}{\rho}\right)^{1-\varepsilon}\left(\frac{E_j(\alpha_l)}{P_j^{1-\varepsilon}(\alpha_l)} - \frac{E_j(1)}{P_j^{1-\varepsilon}(1)}\right) - f_e(\alpha_j - 1)\right]\left(\frac{b_{jj}}{\varphi_l^\star}\right)^k \\ = \kappa_j\left(W(1) - W(\alpha_l)\right). \end{gathered} \tag{5.10}$$

Implicitly, it is assumed that domestic institutional measures do not affect foreign values and profits from exporting cancel out. Hence, two constraints in (5.4) and (5.9) are to be used for computing $\varphi_l^\star$ and α_l. This leads to similar conditions as were used to derive cutoff productivities in (4.15) and (4.16), namely

$$\begin{gathered} (1-\rho)\beta\left(\frac{\varphi_l^\star}{\rho}\right)^{1-\varepsilon}\left(\frac{E_j(\alpha_l)}{P_j^{1-\varepsilon}(\alpha_l)} - \frac{E_j(1)}{P_j^{1-\varepsilon}(1)}\right) \\ = \left(\frac{k}{k-\varepsilon+1}\right) f_e(\alpha_l - 1) \end{gathered} \tag{5.11}$$

The cutoff level of a lobby is defined in terms of expenditure and prices. The productivity can be also expressed in terms of cutoff productivities for domestic producers using (4.15),

$$\varphi_l^\star = \left[\frac{\left(\frac{k}{k-\varepsilon+1}\right)(\alpha_l - 1)}{\alpha_l(\varphi_c(\alpha_l))^{\varepsilon-1} - (\varphi_c(1))^{\varepsilon-1}}\right]^{\frac{1}{1-\varepsilon}}, \tag{5.12}$$

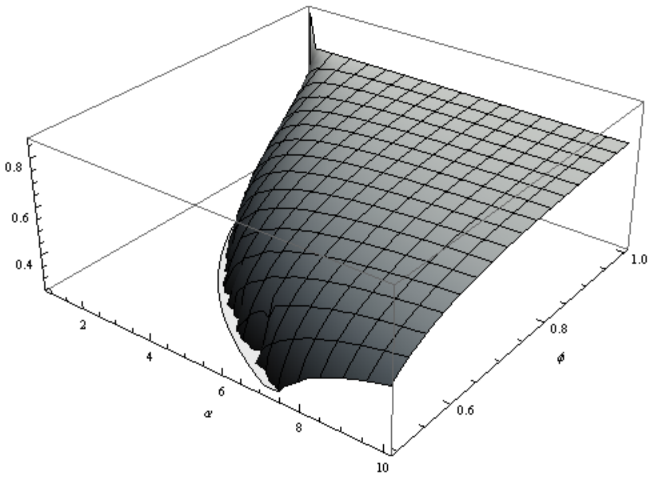
which leads to the elasticity

$$\epsilon_{\varphi_l^\star, \alpha_l} = \frac{1}{1-\varepsilon}(\varphi_l^\star)^{-1-\varepsilon}\left(\frac{\alpha_l}{\alpha_l - 1}\right)\left[1 - \left(1 + (\varepsilon - 1)\epsilon_{\varphi_c, \alpha_l}\right)\frac{\alpha_l - 1}{\alpha_l - \left(\frac{\varphi_c(1)}{\varphi_c(\alpha_l)}\right)^{\varepsilon-1}}\right]. \tag{5.13}$$

[50] Each firm in the lobby pays $C(\alpha_l) / \left(m_j \int_0^{\varphi_l^\star} dG(\varphi)\right)$ whereas lobbying separately involves differential cost and provides the policy maker more power to extract the rent because of the competition between firms. This is not explicitly modelled here (see separate SM for the related discussion on commitment issues).

[51] Note that we can use an aggregate profit as it is an increasing function of φ, ceteris paribus. Hence, given α_l and monotonic change in profits in the interval, $[1\,\alpha_l]$ (the third derivative test yields a conclusion of no change in concavity of a function), we will end up with the equilibrium productivity $\varphi_l^\star$. The last participating firm makes no profits, however, the others will (up to the point when the aggregate contributions are equal to the gains in profits).

Figure 5.1: Distance between cutoff productivities as a function of α_l and $\varphi_c(\alpha_l)/\varphi_c(1)$



Note: The distance between cutoff productivities for domestic production and lobby's participation is obtained from (5.12). After a few modifications, one can show it is equal to $\varphi_l^\star/\varphi_c(\alpha_l) = \left[\left(\frac{k}{k-\varepsilon+1}\right)(\alpha_l - 1)/\left(\alpha_l - (\varphi_c(\alpha_l)/\varphi_c(1))^{1-\varepsilon}\right)\right]^{1/(1-\varepsilon)}$.

Notice that elasticity crucially depends on the effects of entry barriers on domestic producer, distance between observed and barrier-less cutoffs, and productivity of a marginal lobby's participant. Provided $\epsilon_{\varphi_c,\alpha_l} = 0$, lobby's composition is also unaffected as locally $\varphi_c(1) = \varphi_c(\alpha_l)$. Given $\epsilon_{\varphi_c,\alpha_l} = 1/(1-\varepsilon)$ (equivalently, $\epsilon_{E_j,\alpha_l} = \frac{2(k-\varepsilon)+1}{k-\varepsilon+1}$), which is a reciprocal of pure intensive margin or Armington elasticity (see Head and Mayer, 2013), therefore $\epsilon_{\varphi_l^\star,\alpha_l} = 1/(1-\varepsilon)\left[(\varphi_l^\star)^{-1-\varepsilon}(\alpha_l/(\alpha_l-1))\right]$. Hence, given an elasticity of substitution ε and a relative weight on the differentiated goods, β, a requirement is easier to satisfy for higher lobby's profits, higher measure of lobbies, and lower weight on aggregate social welfare (to see this, refer to partial effects of a derivative as provided in (A.28)).

In Figure 5.1, I plot lobby's productivity distance from a marginal domestic producer $(\varphi_l^\star/\varphi_c(\alpha_l))$ as a function of entry barrier α and distance between barrier-full and barrier-less productivities $(\varphi_c(\alpha_l)/\varphi_c(1))$. Clearly, the larger the distance is, the higher the barrier level can be sustainable. Hence, low barrier is only attainable when the observed threshold productivity $\varphi_c(\alpha_l)$ is relatively close to the barrier-less counterfactual level $\varphi_c(1)$. The share of lobbyists is most sensitive to the barrier level when productivities under α and 1 differ substantially. Intuitively, lobby's composition is most affected when firms' preferences towards larger barriers start differing rather than when barrier is so small as it is beneficial for majority of firms to adopt it.

Given the additional assumption, another constraint on the elasticity of the lobby's cutoff productivity is obtainable.

Assumption 2. *The lobby's total profit function* $\Pi_l \equiv \Pi_j(\varphi_l^\star, \alpha_l)$ *is continuously differentiable around the point* $(\alpha_l, \varphi_l^\star)$ *and* $\frac{\partial \Pi_l(\cdot)}{\partial \varphi_l} \neq 0$.

Given the assumption is satisfied, the cutoff productivity level of a lobby, $\varphi_l^\star(\alpha_l)$, is continuously differentiable on an open ball about α_l such that

$$\frac{d\varphi_l^\star(\alpha_l)}{d\alpha} = -\frac{\frac{\partial \Pi_l(\varphi_l^\star,\alpha_l)}{\partial \alpha}}{\frac{\partial \Pi_l(\varphi_l^\star,\alpha_l)}{\partial \varphi_l}}.$$

Implicit differentiation under constraints leads to the following lemma.

Lemma 3. *Given assumption 2, the cutoff level of efficiency to participate in the lobby is decreasing with α.*

Proof. Note that the elasticity is simply an inverse of a heterogeneity measure k, since

$$\frac{d\varphi_l^{\star}(\alpha_l)}{d\alpha} = -\frac{\varphi_l^{\star}}{k\alpha_l}\left[1 + k\epsilon_{\varphi_l^{\star},\alpha_l}\right],$$

leading to

$$\epsilon_{\varphi_l^{\star},\alpha_l} \equiv \frac{d\varphi_l^{\star}(\alpha_l)}{d\alpha}\frac{\alpha_l}{\varphi_l^{\star}} = -\frac{1}{2k} < 0. \tag{5.14}$$

□

Hence, when a change in the cutoff productivity and entry barriers on a lobby's profit do not spur any further changes, the shape parameter fully characterises the elasticity. Since smaller k is associated with the larger heterogeneity, this also means that lobby's cutoff productivity reacts stronger to a change in institutional barriers. With more heterogeneously distributed firms, there is a smaller number of firms around a threshold level. Thus, a change in institutional entry barriers must yield a sizeable effect on the threshold productivity for a lobby's composition to be affected.

5.2. Equilibrium with Endogenously Determined Entry Institutions

I now briefly discuss the connection between the endogenous institutional quality and equilibrium as defined in (4.2). Since α is endogenous in my model, all equilibrium values are functions of α: $\varphi_c(\alpha)$, $\varphi_c^{\star}(\alpha)$ and $E_j(\alpha)$ for all i and j. Hence, the timing now is such, that after learning efficiency index, firms decide on both, entry and lobbying activity. Firms that engage in lobbying, propose contingent contributions to the government for each possible level of α. Then, derived from this bargaining procedure, α schedule is taken as given, and firms decide on continuing lobbying or defecting.

The social welfare is comprised of income, and the consumer and producer surpluses. They are all affected by the institutional quality prevailing at the domestic economy. Having defined profits in (4.11) and (4.12), calculate the last missing element, that is the consumer surplus,[52]

$$CS = E_j\left[\beta^{\beta}(1-\beta)^{1-\beta}P_j^{-\beta} - 1\right]. \tag{5.15}$$

Thus, the social welfare in country j is defined as follows,

$$\begin{aligned} W_j(\alpha_l) = L_j + E_j(\alpha_l)\left[\beta^{\beta}(1-\beta)^{1-\beta}P_j(\alpha_l)^{-\beta} - 1\right] \\ + \left(\tfrac{(1-\rho)\beta E_j(\alpha_l)}{P_j(\alpha_l)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}}(\alpha_l f_e)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\rho^k\left(\tfrac{m_j}{b_{jj}^k}\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right) \\ + \textstyle\sum_{i\neq j}\left(\left(\tfrac{(1-\rho)\beta E_i(\alpha_i)}{P_i(\alpha_i)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}}(\alpha_i f_x)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\left(\tfrac{\rho}{\tau_{ji}}\right)^k\left(\tfrac{m_{ji}}{b_{ji}^k}\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right)\right). \end{aligned} \tag{5.16}$$

Observe that country's social welfare is dependent on all other countries' endogenous parameters, i.e., productivities and institutional quality, which are incorporated through expenditure and price

[52] The derivations can be found in Appendix (A.5).

levels. If trade were unrestricted by the institutional quality measures in j, we would have had[53]

$$\begin{aligned} W_j(1) = L_j + E_j(1)\left[\beta^{\beta}(1-\beta)^{1-\beta} P_j(1)^{-\beta} - 1\right] \\ + \left(\tfrac{(1-\rho)\beta E_j(1)}{P_j(1)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}} (f_e)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \rho^k \left(\tfrac{m_j}{b_{jj}^k}\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right) \\ + \textstyle\sum_{i\neq j}\left(\left(\tfrac{(1-\rho)\beta E_i(\alpha_i)}{P_i(\alpha_i)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}} (\alpha_i f_x)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \left(\tfrac{\rho}{\tau_{ji}}\right)^k \left(\tfrac{m_{ji}}{b_{ji}^k}\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\right)\right). \end{aligned} \tag{5.17}$$

The difference between (5.17) and (5.16) is

$$\begin{aligned} \triangle W_j \equiv W_j(1) - W_j(\alpha_l) \\ = \beta^{\beta}(1-\beta)^{1-\beta}\left[\tfrac{E_j(1)}{P_j(1)^{\beta}} - \tfrac{E_j(\alpha_l)}{P_j(\alpha_l)^{\beta}}\right] - \left[E_j(1) - E_j(\alpha_l)\right] \\ + \tfrac{m_j}{b_{jj}^k}\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right) f_e\left((\varphi_c(1))^k - (\varphi_c(\alpha_j))^k \alpha_j\right) \\ = \beta^{\beta}(1-\beta)^{1-\beta}\left[\tfrac{E_j(1)}{P_j(1)^{\beta}} - \tfrac{E_j(\alpha_l)}{P_j(\alpha_l)^{\beta}}\right]. \end{aligned} \tag{5.18}$$

The last equality follows from the fact that labour endowment is fixed and the profits from exporting are not affected by the domestic value of α_j. Having defined the changes in welfare and profits, I apply (5.7) combined with (5.18),

$$m_j\left(\tfrac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\tfrac{\varphi_l^{\star}}{b_{jj}}\right)^k f_e(\alpha_l - 1) = \triangle\Pi_l = \kappa_j\beta^{\beta}(1-\beta)^{1-\beta}\left[\tfrac{E_j(1)}{P_j(1)^{\beta}} - \tfrac{E_j(\alpha_l)}{P_j(\alpha_l)^{\beta}}\right]. \tag{5.19}$$

Dividing the last expression by $\triangle\alpha_l$ and allowing the difference of the institutional quality to approach zero, $\triangle\alpha_l \to 0$, I obtain a limit

$$\epsilon_{\Pi_l,\alpha_l} = \epsilon_{E_j,\alpha_l} - \beta\epsilon_{P_j,\alpha_l}. \tag{5.20}$$

Note that the FOC in (5.4) ensures truthfulness, and is imposed on equilibrium α_l:

$$\frac{\partial\Pi_l\left(\alpha^{\text{truthful}}\right)}{\partial\alpha} = -\kappa\frac{\partial W\left(\alpha^{\text{truthful}}\right)}{\partial\alpha}. \tag{5.21}$$

This requirement is trivially fulfilled in (5.19) with no further restrictions as the total contribution is shown in (5.8) to be equal to the lobby's profit. Therefore, any equilibrium α_l is always truthful. Hence, I can get a relationship between contributions and institutional quality measures. This provides with the full system that endogenises both the firm heterogeneity in productivity and institutional quality (three equations in three unknowns, $\varphi_l^{\star}$, α_l, $C_j(\alpha)$).

The real power of endogenised structure of lobbying, however, lies in the inference of the counterfactual values. Combining lobbying threshold with a notation $(1/\alpha_l)(\varphi_c(\alpha_l)/\varphi_c(1))^{1-\varepsilon} = Z(\alpha_l)/Z(1)$, leads to the following lemma.[54]

Lemma 4. *If all domestically active firms participated in a lobby, that is, $\varphi_l^{\star} = \varphi_c(\alpha_l)$, the cutoff level of a domestic producer should decrease with entry barriers. In that case the size of entry barrier would be*

$$\alpha_l = \frac{k}{(\varepsilon-1)+(k-\varepsilon+1)(Z(\alpha_l)/Z(1))}. \tag{5.22}$$

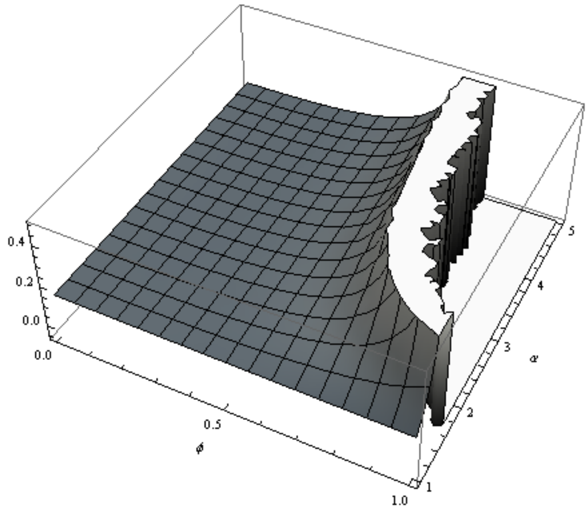
Otherwise,

$$\alpha_l = \frac{k}{k-(k-\varepsilon+1)\left(\frac{\varphi_l^{\star}}{\varphi_c(\alpha_l)}\right)^{1-\varepsilon}(1-Z(\alpha_l)/Z(1))}. \tag{5.23}$$

[53]Observe that α enters not only directly, but also affects the productivity levels, which, in turn, affect other variables. See (A.5) for details.

[54]Normalisation is without loss of generality because $\varphi_l^{\star}$ is just a function of $\varphi_c(\alpha_l)$ and, hence, their ratio $(\varphi_l^{\star}/\varphi_c(\alpha_l))^{1-\varepsilon}$ is a constant.

Figure 5.2: Counterfactual measure of exporters in a 2-country world



Proof. Investigation of (5.22) tells that the existence of $\alpha_l > 1$ requires $Z(1) > Z(\alpha_l)$ which can be translated into $\varphi_c(\alpha_l) > \varphi_c(1)$. Hence, the statement that a cutoff productivity decreases (marginal costs increase). This happens if total earnings and prices increase. Intuitively, for all firms to desire higher entry barriers, income must increase for all of them. Recalling the relationship between cutoff productivity and entry barriers in (4.10), this demonstrates that the effect on aggregates must be positive and larger than a direct effect on the intensive margin. □

Therefore, selection is crucial - once $k = \varepsilon - 1$, there is no way to impose entry barriers, leading to an optimal $\alpha_l = 1$ (see (5.22) and (5.23)).The counterfactual $Z(1)$ is unobservable. However, notice that

$$Z(\alpha_l) = \alpha_l \left(\frac{\varphi_l^\star(\alpha_l)}{\varphi_l^\star(1)}\right)^{\varepsilon-1} Z(1)$$
$$= \frac{\alpha_l-1}{\alpha_l}\left[\frac{(\varepsilon-1)\left[\epsilon_{E_j,1}+\epsilon_{P_j,1}\right]}{\left(\frac{E_j(\alpha_j)}{P_j^{1-\varepsilon}(\alpha_j)}\frac{P_j^{1-\varepsilon}(1)}{E_j(1)}\right)-1}\right] Z(1).$$

Hence, the observed share is decomposed into an inverse of impediment level, ratio of cutoff productivities, and unobservable component $Z(1)$. This can be solved for once entry impediments in the form of α are uncovered. Using the results from Section 5.2, the straightforward algebra gives

$$\epsilon_{Z(\alpha_1),\alpha_1} \equiv \frac{dZ(\alpha_1)}{d\alpha_1}\frac{\alpha_1}{Z(\alpha_1)}$$
$$= -\frac{Z(\alpha_2)}{Z(\alpha_1)}\left[\left(\frac{\alpha_2}{\alpha_1}\right)\frac{k-\alpha_1(\varepsilon-1)}{k-\alpha_2(\varepsilon-1)} + \frac{\alpha_2(\varepsilon-1)}{k-\alpha_2(\varepsilon-1)}\right] < 0.$$

Transforming a regularity condition into $k > \alpha(\varepsilon-1)$, the elasticity of the firm share is always negative with respect to entry barrier measure α. Further, the counterfactual $Z(1)$ is expressed in observables and institutional measures. Using it, I can calculate counterfactual levels of trade and other variables of interest. Figure 5.2 illustrates the counterfactual share of exporters when the level of barriers α and the distance between productivities $\varphi_l^\star/\varphi_c(\alpha_l)$ vary. The removal of entry barriers would increase the share of exporters most substantially when the lobbyists' share is the largest, and the barrier level, already adopted, is also high. Intuitively, there is less to gain when firms are barely organised to start with or the entry is not too much impeded. I further explore and provide detailed values for quantification used in this example in Section 7.

6. International Competition

The import penetration ratio in this model could be found after making several assumptions. First, export from j to i is equivalent to import for i from j. The total value of domestically produced goods is equal to the accrued revenues of firms that engage in production for local market only. This assumption captures the argument that exports is to a large degree a means to finance imports which are essential for economic development (see Fried (1971) and Samen (2010), among others). The total value of imports for j is, then, given by[55]

$$IM_j = \sum_{i \neq j} m_i \int_0^{\varphi_c^\star} r_{ij}\left(\varphi\right) dG\left(\varphi\right). \tag{6.1}$$

The import penetration ratio is defined as

$$\begin{aligned} IPR_j &= \frac{\sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}{E_j - \sum_{i\neq j} m_j \int_0^{\varphi_c^\star} r_{ji}(\varphi) dG(\varphi) + \sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)} \\ \frac{\sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}{m_j \int_0^{\varphi_c} r_{jj}(\varphi) dG(\varphi) + \sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)} &= \frac{\sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}{E_j}, \end{aligned} \tag{6.2}$$

where the last equality follows under balanced trade. However, this is not required and the model may be closed under multilateral (EU-wide) trade. Summing over all exports to j, I get the total imports of country j,

$$\begin{aligned} IM_j &= \sum_{j\neq i} m_i \int_0^{\varphi_{ij}^\star} \left(\frac{\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} \left(\frac{\tau_{ij}\varphi_{ij}}{\rho}\right)^{1-\varepsilon} \right) dG\left(\varphi\right) \\ &= \frac{\varepsilon k}{k-\varepsilon+1} \alpha_j f_x \sum_{i\neq j} m_i \left(\frac{\varphi_{ij}^\star}{b_{ij}}\right)^k = \frac{\varepsilon k}{k-\varepsilon+1} \alpha_j f_x \sum_{i\neq j} m_i \left(\frac{\varphi_c}{\tau_{ij} b_{ij}}\right)^k \left(\frac{f_x}{f_e}\right)^{\frac{k}{1-\varepsilon}}. \end{aligned} \tag{6.3}$$

The change in IPR, caused by entry barriers, can be accounted for by

$$\epsilon_{IPR_j,\alpha_j} = 1 + k\epsilon_{\varphi_c,\alpha_j} - \epsilon_{E_j,\alpha_j},$$

which, using (4.10), can be further simplified to

$$\epsilon_{IPR_j,\alpha_j} = \left(k \left(\frac{k\left(\varepsilon - 2\right) - \left(\varepsilon - 1\right)^2}{\left(k - \varepsilon\right)\left(\varepsilon - 1\right)} \right) - 1 \right) \epsilon_{E_j,\alpha_j} - \frac{k - \varepsilon + 1}{1 - \varepsilon} \left(\frac{\varepsilon}{k - \varepsilon} \right).$$

This expression clearly demonstrates the opposing effects embedded in the model. The institutional quality affects IPR directly and through the cutoff efficiency levels which, in turn, affect prices and expenditure levels. This version of IPR has two endogenous variables, α_j and φ_c. The negative effect realises if[56]

$$\epsilon_{E_j,\alpha_j} < \frac{\left(k - \varepsilon + 1\right)\varepsilon}{\left(\left(\varepsilon - 1\right)^2 - k\left(\varepsilon - 2\right)\right) k - \left(1 - \varepsilon\right)\left(k - \varepsilon\right)},$$

and the opposite result exists if the sign is reversed. Having exogenous E_j (this assumption is equivalent to using results in Lemma 2, since $\epsilon_{E_j,\alpha_j} \to 0$ for the small and very open economy, therefore, domestic profit in total expenditure approaches zero), one obtains the following result.

[55] In general, imports could vary from 0 to E_j, i.e., all economy's income is spent on imports. However, as evidenced in Subsection 3.1, IPR concentrates around .35.

[56] Notice that under the constraint $k = \varepsilon$, this is equivalent to $\epsilon_{E_j,\alpha_j} < 1$ whereas $k = \varepsilon - 1$ yields $\epsilon_{E_j,\alpha_j} < 0$.

Lemma 5. *The change in import penetration ratio due to changes in entry barriers, absent changes in total earnings, is negative if $\varepsilon > k > \varepsilon - 1$. The effect is positive if, however, $k > \varepsilon$.*

Notice that $\epsilon_{IPR_j,\alpha_j} = \frac{k-\varepsilon+1}{\varepsilon-1}\left(\frac{\varepsilon}{k-\varepsilon}\right)$; it decreases if $0 > k - \varepsilon > -1$. Using a mapping between income and prices (recall equation (4.13)), I can establish a theoretical IPR as a function of entry barriers, extensive margin, and prices.

This result shares some similarities to that of Chaney (2008). First, $\epsilon_{IPR_j,\alpha_j} = \frac{k-\varepsilon+1}{\varepsilon-1}$ if $k = 2\varepsilon$ which, combined with $k = \varepsilon - 1$, yields $\varepsilon = -1$. He finds that the elasticity of trade flows with respect to exogenously given fixed costs is negatively related to the elasticity of substitution. I am interested in import competition, measured by the IPR,

$$-\frac{\partial\epsilon_{IPR_j,\alpha_j}}{\partial\varepsilon} = \frac{k\,(k-2\varepsilon+1)}{\left[(k-\varepsilon)\,(\varepsilon-1)\right]^2}.$$

If $k - 2\varepsilon + 1 < 0$, then $-\partial\epsilon_{IPR_j,\alpha_j}/\partial\varepsilon < 0$, and given $k > 2\varepsilon - 1 > 0$, the sign changes to $-\partial\epsilon_{IPR_j,\alpha_j}/\partial\varepsilon > 0$. The heterogeneity affects IPR non-ambiguously absent aggregate effects on earnings:

$$-\frac{\partial\epsilon_{IPR_j,\alpha_j}}{\partial k} = \frac{\varepsilon}{(\varepsilon-1)\,(k-\varepsilon)^2} > 0.$$

Notice that in our setting, however, endogenised barriers can bear positive or negative effects. More dispersed firms (lower k) or higher elasticity of substitution (more competitive market) lead to the decreased IPR. Indeed, Chaney (2008) shows that intensive margin reacts stronger to increased ε (more homogeneous goods). The main difference arises from an endogenous determination of lobbying which introduces a more complex interaction between ε and k.

6.1. EU IPR

Note that the EU-wide IPR is derivable once the whole system is closed, i.e., intra-EU does not run trade imbalances. This is not only a technical requirement required for steady-state analysis (where only cross-sectional dimension is addressed without a possibility of transition) but also a good first approximation.[57] This leads to

$$IPR^{EU} = \frac{\sum_j \sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi)dG(\varphi)}{\sum_j E_j - \sum_j \sum_{i\neq j} m_j \int_0^{\varphi_c^\star} r_{ji}(\varphi)dG(\varphi) + \sum_j \sum_{i\neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi)dG(\varphi)} = \frac{\varepsilon k}{\varepsilon-1}\frac{\sum_j \Pi_j^{IM}}{E^{EU}}, \tag{6.4}$$

where $E^{EU} = \sum_j E_j$ is the total EU's income. Hence, the α^{EU} affects IPR^{EU} negatively:

$$\frac{dIPR^{EU}}{d\alpha^{EU}} = \frac{\varepsilon k}{\varepsilon-1}\frac{\sum_j \Pi_j^{IM}\frac{dE^{EU}}{d\alpha^{EU}} - E^W \frac{d\sum_j \Pi_j^{IM}}{d\alpha^{EU}}}{(E^{EU})^2} < 0$$

as the requirement is equivalent to

$$\epsilon_{E^{EU},\alpha^{EU}} \equiv \frac{dE^{EU}}{d\alpha^{EU}}\frac{\alpha^{EU}}{E^{EU}} < \epsilon_{\sum_j \Pi_j^{IM},\alpha^{EU}} \equiv \frac{d\sum_j \Pi_j^{IM}}{d\alpha^{EU}}\frac{\alpha^{EU}}{\sum_j \Pi_j^{IM}}\ .$$

[57] Regarding intra-euro-area balances, Ahearne, von Hagen, and Schmitz (2007) find that capital flows from high- to low-income euro area economies with large trade imbalances. However, intra EU-15 trade balance ranged from -1.5 to +1.5 per cent of GDP from 1981 to 2005. Eurostat (2011) reports that the difference between dispatches and arrivals inside the EU from the EU-27 was positive but small: 77,473 (2006), 65,492 (2007), 73,842 (2008), 68,487 (2009), and 75,446 (2010), all expressed in Mio ECU/Euro.

Recalling that profits are proportional to revenues, we observe that $\epsilon_{E^{EU},\alpha^{EU}} = \epsilon_{\sum_j \Pi_j,\alpha^{EU}} + \epsilon_{\sum_j \Pi_j^{IM},\alpha^{EU}}$. Clearly, to keep income levels constant, we need opposing effects on domestic and foreign profits (which, in aggregate, yield an equality between export and import profits). Hence, the sensitivity of import profits is always larger than that in aggregate income which includes the same import component but also has an aggregate sum of domestic profits. This result is in line with the fact of a strong negative relationship of startup costs and IPR at the most aggregate, i.e., EU, level.

7. Quantitative Exercise

To illustrate the main mechanisms of the model and uncover the latent entry barriers, I will exploit a theoretical structure. Notice that there is an alternative route exploiting zero trade flows which directly relate to large entry barriers. European context restricts the use of such an approach as all links are already established.[58]

7.1. Role of Profitability

Alternatively, I use information of the intensive margin summarised in the profit functions. Observe that average profitability is given by

$$\tilde{\pi}\left(\varphi_l^\star,\, \alpha_l\right) = \frac{\Pi_j\left(\varphi_l^\star,\, \alpha_l\right)}{m_j} = \left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star\left(\alpha_l\right)}{b_{jj}}\right)^k f_e\alpha_l,$$

and I obtain that

$$IPR_j\left(\boldsymbol{\alpha}\right) = \frac{\sum_{i\neq j} m_i \left(\frac{\varphi_{ij}^\star}{b_{ij}}\right)^k \alpha_j f_x}{\sum_i \left[m_j \left(\frac{\varphi_{ji}^\star}{b_{ji}}\right)^k \alpha_i \left(f_x(1+(f_e-f_x)\Im_{i=j})\right)\right]} = \frac{\Pi_j^\star(\alpha_j)}{\Pi_j(\alpha_j)+\Pi_j^\star(\alpha_i)}.$$

Profitability is driving the main result and yields $dIPR_j\left(\boldsymbol{\alpha}\right)/d\alpha_j < 0$ if and only if

$$\frac{\epsilon_{\Pi_j^\star\left(\alpha_j\right),\alpha_j}}{\epsilon_{\Pi_j\left(\alpha_j\right),\alpha_j}} = \epsilon_{\Pi_j^\star(\alpha_j),\Pi_j(\alpha_j)} < \frac{\Pi_j(\alpha_j)}{\Pi_j(\alpha_j)+\Pi_j^\star(\alpha_i)} = 1 - IPR_j\left(\boldsymbol{\alpha}\right) < 1$$

or

$$\frac{d\Pi_j^\star\left(\alpha_j\right)}{d\Pi_j\left(\alpha_j\right)} < \frac{\Pi_j^\star\left(\alpha_j\right)}{\Pi_j\left(\alpha_j\right)+\Pi_j^\star\left(\alpha_i\right)} = IPR_j\left(\boldsymbol{\alpha}\right).$$

Hence, a negative impact on IPR realises if and only if the profits of importers is less sensitive to changes in domestic profits than import penetration ratio. Otherwise, IPR increases with a relative reallocation towards importers.

[58] Following Helpman, Melitz, and Rubinstein (2008), introduce three latent variables, $Z \equiv \frac{1}{\alpha_l}\left(\varphi_l^\star/b\right)^{1-\varepsilon}$, $Z_{ji} \equiv \frac{1}{\alpha_i}\left(\varphi_{ji}^\star/b\right)^{1-\varepsilon}$, $Z_{ij} \equiv \frac{1}{\alpha_j}\left(\varphi_{ij}^\star/b\right)^{1-\varepsilon}$. Existence of extensive margin can be addressed resorting to the Heckman (1979) correction for sample selection. Positive trades are observed if and only if $Z > 1$ since it tells that there is a positive measure of firms drawing productivities above the minimum level b (recall that $\varepsilon > 1$ and $\varphi < b$). Otherwise, there is no partitioning - yet, this condition is not identical to that of Helpman, Melitz, and Rubinstein (2008) which used truncated Pareto. In a version with balanced trade we have $IPR_j = \sum_{i\neq j} m_i Z_{ij}^{\frac{k}{1-\varepsilon}} \alpha_j f_x / \left[\sum_i \left[m_j Z_{ji}^{\frac{k}{1-\varepsilon}} \alpha_i \left(f_x\left(1+\left(f_e-f_x\right)\Im_{i=j}\right)\right)\right]\right]$ and expressed in matrix form: $\boldsymbol{I\hat{P}R} = \mathcal{Z}\mathrm{diag}\left(\mathcal{Z}\alpha\right)^{-1}\alpha$ where $\boldsymbol{I\hat{P}R}$ denotes a vector of observed import penetration rates, and $\mathcal{Z} \equiv \left(Z_{ij}\right)$ and $\alpha \equiv \left(\alpha_i\right)$. This boils down to a fixed point problem. One needs to generate $Z\left(\alpha\right)$ and match the observed averages of $\boldsymbol{I\hat{P}R}$.

7.2. Spatial Dimension

To connect multi-country measures of entry barriers, I proceed as follows (see Appendix A.8 for details). First, take the definition of domestic profits, and employ that expression to be used as an input into import profits. This yields a useful relationship between import profits and profits accrued by domestic producers. Eventually, the relationship between cutoffs of exporters and domestic producers leads to

$$\sum_{i\neq j}\left[\frac{m_j\left(\frac{1}{b_{ji}}\left(\frac{P_i}{P_j}\right)\left(\frac{E_i}{E_j}\right)^{\frac{1}{\varepsilon-1}}\frac{1}{\tau_{ji}}\right)^k\left(\frac{\alpha_i}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}}{\sum_{i\neq j} m_i\left(\frac{1}{\tau_{ij}}\right)^k\left(\frac{1}{b_{ij}}\right)^k}\right]=1. \tag{7.1}$$

It can be more conveniently expressed as

$$\sum_{i\neq j}\left[\omega_i^j\alpha_i^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right]=\alpha_j^{\frac{k-\varepsilon+1}{1-\varepsilon}},$$

where $\omega_i^j=m_j\left(\frac{1}{b_{ji}}P_iE_i^{\frac{1}{\varepsilon-1}}\frac{1}{\tau_{ji}}\right)^k/\left(\left(P_j\Pi_j\right)^kE_j^{\frac{k}{\varepsilon-1}}\right)$ and a multilateral resistance term $\Pi_j^k=\sum_{i\neq j}m_i\left(\tau_{ij}b_{ij}\right)^{-k}$. Stacking for all countries j one obtains $\boldsymbol{W\alpha}=\mathbf{0}$, subject to $\sum_{i\neq j}\left[\omega_i^j\left(\frac{\alpha_i}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right]=1$ for all j.[59] Recall that α is a relative measure, normalised for barrier-less economy to be equal to 1. Without loss of generality, suppose that $\alpha_1=\min\{\alpha_1,\alpha_2,\ldots,\alpha_I\}$, then one obtains

$$\begin{pmatrix}\omega_2^1 & \cdots & \omega_I^1\\ -1 & \cdots & \omega_I^2\\ \vdots & \ddots & \vdots\\ \omega_2^I & \cdots & -1\end{pmatrix}\begin{pmatrix}\alpha_2^{\frac{k-\varepsilon+1}{1-\varepsilon}}\\ \vdots\\ \alpha_I^{\frac{k-\varepsilon+1}{1-\varepsilon}}\end{pmatrix}=\begin{pmatrix}1\\ -\omega_1^2\\ \vdots\\ -\omega_1^I\end{pmatrix}.$$

This means that the system is overdetermined, with I equations for $I-1$ unknowns.[60] Resorting to approximation methods, I calculate the vector of estimates of entry barriers.

Above reveals that the more important the trading partner in terms of earnings, the larger is the weight. Also, the closer it is, the more important in forming entry barriers trading partner is (refer to Figure 3.4 for clear spatial tendencies in the data). Notice that symmetry conditions in terms of $b_{ji}=b_{ij}$, $\tau_{ji}=\tau_{ij}$ $m_i=m_j$ yield an outcome of $\tilde{\omega}_i^j=\left(\frac{P_i}{P_j}\right)^k\left(\frac{E_i}{E_j}\right)^{\frac{k}{\varepsilon-1}}/\left(I-1\right)$. These observations are summarised in one of the main results below.

Lemma 6. *Institutional measures can be implemented if and only if an extensive margin (firm selection) is active and countries are technologically and/or trade cost-wise asymmetric.*

Proof. Proof follows immediately by examining the weighting scheme. Notice that $\sum_{i\neq j}\left[\omega_i^j\left(\frac{\alpha_i}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right]=\left(P_j\Pi_j\right)^kE_j^{\frac{k}{\varepsilon-1}}$ demonstrates that for α_i/α_j to play a role, $k\neq\varepsilon-1$ (also refer to Lemma 4). Given

[59] To obtain a non-trivial solution, one has to consider a null space (kernel): $\text{NullSpace}\left(\boldsymbol{W}\right)=\left\{\boldsymbol{\alpha}\in\mathbb{R}^N:\boldsymbol{W\alpha}=\mathbf{0}\right\}$. In other words, I require linear dependence between columns. If the null-space is nontrivial, then we need normalisation to deal with free parameters whose number equals the nullity of $\boldsymbol{W}$.

[60] Notice that in an overdetermined system, an approximate solution is obtained from a problem $\min_{\boldsymbol{\alpha}}\|\boldsymbol{W\alpha}-\boldsymbol{b}\|$, which yields a least squares solution $\boldsymbol{\alpha}=\left(\boldsymbol{W}'\boldsymbol{W}\right)^{-1}\boldsymbol{W}'\boldsymbol{b}$. To see this, either pre-multiply an original equation by $\boldsymbol{W}'$ or set an error minimisation problem.

Table 3: Summary of Main External Parameters and Variables

Parameter/Variable	Chosen value	Matched Moment	Source
ε	3.79	Trade Elasticity	Bernard, Eaton, Jensen, and Kortum (2003)[62]
k	4.6	Pareto Shape Parameter	Balistreri, Hillberry, and Rutherford (2011)
β	0.33	Differentiated Sector Share	Do and Levchenko (2009)
$Z(\alpha_i)$	0.15	Share of exporters	Eaton, Kortum, and Kramarz (2011)
IPR^*	Mean of Observed IPR		Own Calculations/Eurostat
P^*	Prices of Tradeables		International Comparison Programme
P	Price Index (Home and Imported)		Eurostat
E	Value Added		Eurostat

$k \to \varepsilon - 1$, Melitz-gravity equation collapses to the Krugman (1980) formulation where firm selection is absent.[61] Therefore, extensive margin is necessary (otherwise $\sum_{i\neq j} \omega_i^j = (P_j \Pi_j)^{\varepsilon-1} E_j$ and any change in $\alpha_i \neq \alpha_j$ is immaterial). Yet, it is not sufficient. The factors generating asymmetries must be active for the result $\alpha_i/\alpha_j \neq 1$, in other words $b_{ij} \neq b_{ji}$ and/or $\tau_{ij} \neq \tau_{ji}$ such that $b_{ij}\tau_{ij} \neq b_{ji}\tau_{ji}$. □

Intuitively, in a fully trading world and/or fully symmetric or 'flat' world, one cannot have different entry conditions than in the remaining trading partners. Otherwise, such a global economy would not be able to equilibrate. Selection is crucial here since $k = \varepsilon - 1$ implies we are back in Krugman (1980) environment. As mentioned, this approach uncovers spatial dimension: the larger the entry impediments in the trading partners, the larger are the barriers to enter at home, too.

To connect to the current literature, we express the equilibrium condition in (7.1) in terms of multilateral resistance terms which underlie the general equilibrium structure of the model. Let's rewrite

$$\tilde{\Pi}_j^k = \sum_{i\neq j} m_j \left(\frac{b_{ji}\tau_{ji}}{P_i}\right)^{-k} E_i^{\frac{k}{\varepsilon-1}} \alpha_i^{\frac{k-\varepsilon+1}{1-\varepsilon}}.$$

Hence, the incidence of importing to j must be equal to the average barrier to export to all trade partners i, as seen from j's perspective. Absent firm selection, $k = \varepsilon - 1$, the above expression becomes

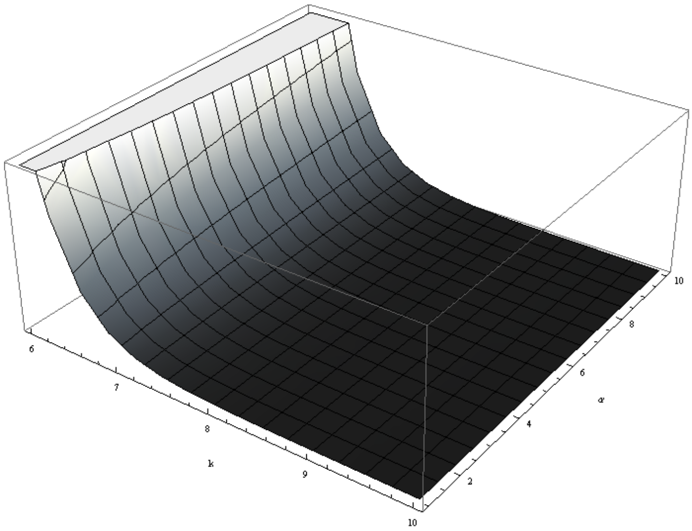
$$\tilde{\Pi}_j^k = \sum_{i\neq j} m_j \left(\frac{b_{ji}\tau_{ji}}{P_i}\right)^{1-\varepsilon} E_i,$$

which is a familiar result from Anderson and van Wincoop (2003). Observe that there are three main channels which alter the entire trading system. These include firm heterogeneity and elasticity of substitution, such that $k \neq \varepsilon - 1$, aggregate expenditure which reacts to changes in entry barriers, and entry barriers themselves. In Figure 7.1, I plot the equilibrium levels of multilateral resistance terms with changing parameter k, governing firm heterogeneity, also entry measure α while keeping E fixed. Intuitively, the larger the terms, the more impeded the trade is. As graphically depicted, the larger the barrier and the lower k (more heterogeneous firms), the larger is the multilateral (or general equilibrium) resistance term is. This conforms to the evidence of higher impediments under dispersed firms whose different preferences pave path to political action.

Certainly, I need external parameters to finalise the exercise. The required data are reported in Table 3. Since asymmetric trade costs are required, I extend the approach due to Chen and Novy

[61] See Felbermayr, Jung, and Larch (2013) for a different application with import tariffs with a similar result.

Figure 7.1: Equilibrium levels of Multilateral Resistance Terms



(2011) which solve for multilateral resistance terms analytically as a function of observable trade flows. Yet, the method still produces symmetry (very similarly, Novy (2013) “inverts” the problem; he derives trade costs from trade flows using gravity equation, which shows the difference between domestic and bilateral trade flows).[63] Conceptually similar but keeping an important aspect of asymmetry is an approach employed by Waugh (2010) which uses the gravity relationship:

$$\frac{IM_{ij}}{IM_{jj}} = \left(\frac{P_i}{P_j}\right)^{\varepsilon-1} \tau_{ij}^{1-\varepsilon}. \tag{7.2}$$

Division of (7.2) by the expression relating country j and i and rearranging yields:

$$\frac{\tau_{ij}}{\tau_{ji}} = \left(\frac{IM_{ij}/IM_{jj}}{IM_{ji}/IM_{ii}}\right)^{\frac{1}{1-\varepsilon}} \left(\frac{P_i}{P_j}\right)^2.$$

Plugging into the main relationship gives

$$\begin{aligned} &\tfrac{1}{I-1}\textstyle\sum_{i\neq j}\left[\left(\tfrac{E_i}{E_j}\right)^{\frac{k}{\varepsilon-1}}\left(\tfrac{IM_{ij}/IM_{jj}}{IM_{ji}/IM_{ii}}\right)^{\frac{k}{1-\varepsilon}}\left(\tfrac{P_i}{P_j}\right)^{3k}\left(\tfrac{\alpha_i}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right] \\ &= \tfrac{1}{I-1}\textstyle\sum_{i\neq j}\left[\left(\tfrac{\alpha_j(1-IPR_j)}{\alpha_i(1-IPR_i)}\tfrac{IM_{ji}}{IM_{ij}}\right)^{\frac{k}{\varepsilon-1}}\left(\tfrac{P_i}{P_j}\right)^{3k}\left(\tfrac{\alpha_i}{\alpha_j}\right)^{\frac{1}{1-\varepsilon}}\right] = 1, \end{aligned}$$

where $IPR_j = 1 - IM_{jj}/E_j$ for all j. Obviously, the change in IPR is constrained by trade imbalances between two countries, price levels, entry barriers, and technology and preference parameters.

[63] As noted by Novy (2013), the multilateral resistance is related to the amount of trade a country conducts with itself, yielding $\left[\frac{\tau_{ij}\tau_{ji}}{\tau_{ii}\tau_{jj}}\right]^{1-\varepsilon} = \frac{IM_{ij}IM_{ji}}{IM_{ii}IM_{jj}}$. Yet, it is difficult to infer the degree of trade barrier asymmetry from trade data because there are multiple combinations of trade costs that can give rise to the same trade flows. The average and symmetric solution due to Chen and Novy (2011) is to take the square root to get an expression for the average bilateral relative trade barrier ϖ_{ij}, $\varpi_{ij} \equiv \left[\frac{\tau_{ij}\tau_{ji}}{\tau_{ii}\tau_{jj}}\right]^{\frac{1}{2}} = \left[\frac{IM_{ii}IM_{jj}}{IM_{ij}IM_{ji}}\right]^{\frac{1}{2(\varepsilon-1)}}$. Along similar lines, Kee, Nicita, and Olarreaga (2009) develop a trade restrictiveness index that is based on observable tariff and nontariff barriers. Importantly, it is difficult to infer the degree of trade barrier asymmetry from trade data because there are multiple combinations of trade costs that can give rise to the same trade flows.

Table 4: Estimated Entry Barriers*

Country	Entry Barrier, $\alpha^{\frac{k-\varepsilon+1}{1-\varepsilon}}$	Calibrated α
Germany	0.52	3.08
Denmark	0.46	3.77
Greece	0.41	4.49
Spain	0.60	2.36
France	0.57	2.58
Netherlands	1	1
Finland	0.25	10.71
Sweden	0.89	1.22

*Relative to the Dutch Entry Barrier

Since it is all expressed in observables, we can deduct relative fractions of entry barriers. The observable relative income, import share in domestic absorption, and price differences are responsible for generating measure of market entry. Waugh (2010) recovers asymmetric trade costs as a residual without any restriction on the form of them. Indeed, he finds that costs to trade are not symmetric and they deviate from symmetry systematically given a country's level of development.[64] I report results for illustration purposes from a simple exercise with eight European countries in Table 4. I normalise with respect to the Netherlands, and recover the relative measures of barriers. Notice that a particular level of α crucially depends on elasticity of substitution and heterogeneity parameter.[65] Trade weights used to generate results are relegated to the Appendix, Table 6. In the particular set of countries, Greece and Finland seem to be most restrictive to access their markets whereas Sweden is close to the Netherlands, constituting the least restrictive markets.

Since the level of barrier entails income, imports, domestic absorption, and prices, I cover a simple quantitative exercise to explore the main channels for a hypothetical economy in a two-country world. Table 5 summarises the results. I can uncover counterfactual measure of firms but cannot infer values under different realisations of α. Therefore, I change entry barriers and keep extensive margin fixed. This is the lower bound of the effect as the main channel is purported to be an extensive margin, which is shut in our context with European countries. As seen, IPR with increasing entry barriers tends to decrease. This diminishes consumer surplus but barely affects welfare through profit redistribution (results are not reported). Given there was a change in variable trade costs, one can employ results due to Arkolakis, Costinot, and Rodriguez-Clare (2012). In that case, a change would depend on the realisation of α, too.[66] Note that prices and expenditure (income) are both increasing but real income tends to decrease. Therefore, there are gainers but an average agent is worse off. The results hinge on parameter values in Table 3 and the absence of third-country effects. Notice that consumer surplus suffers remarkably more if we shut expenditure channel (see Table 7 in Supplementary Material).

[64] Though for a critical approach, see Egger and Nigai (2012) which criticise implementation of the structural model, particularly general equilibrium constraints and counterfactual exercises.

[65] Note that in calculating the weights, I have calculated absorption from value added data rather than using the already calculated IPR values.

[66] To be precise, a change in welfare due to trade liberalisation is $d\ln W = d\ln\left(1 - IPR\left(\alpha\right)\right) / \left(1-\varepsilon\right)$.

Table 5: Summary of Quantitative Exercise for Main Variables in a 2-Country World

$\triangle\alpha$	$\triangle IPR\,(\alpha)$	$\triangle CS\,(\alpha)$	$\triangle P\,(\alpha)$	$\triangle E\,(\alpha)$	$\triangle$Real $E\,(\alpha)$	$W\,(\tau \to \tau')$
0	0	0	0	0	0	0
1	-0.30	-0.14	0.59	0.30	-0.28	-0.10
5	-1.45	-0.70	2.90	1.47	-1.39	-0.51
10	-2.83	-1.40	5.75	2.90	-2.69	-0.98
15	-4.14	-2.09	8.54	4.28	-3.92	-1.42
18	-4.90	-2.51	10.19	5.09	-4.63	-1.68

In Percentage Points. Firm Share is Kept Fixed

8. Conclusion

Economic institutions are believed to influence economic, political, and social outcomes. However, institutional trajectories and their endogenous change remain open questions, both theoretically and empirically. Though their relevance has been recently triggered by the EU attempts to export its institutions, together with international spying and other scandals, putting international trade and politics at the forefront of debate. This paper proposes a model to deal with firm entry institutions defined in relation to firm startup costs to operate in a foreign market.

The entry conditions affect foreign competition even inside a political union in a complicated way. First, it affects the productivity level of entrants. It also changes profits and has impact on country's expenditure levels. Moreover, the general price index also changes. However, the direction is difficult to state, and it largely depends on the heterogeneity of domestic firms and consumers' preferences. A change in the fixed costs on the import penetration ratio is easier to track within this model for EU-wide rather than country-level case. This is in line with the empirical evidence.

The results of the paper indicate that good institutions tend to increase competition for domestic firms as more foreign firms can enter the market. However, the existence of many highly productive firms pave the path for bargaining to reduce entry and, therefore, decrease institutional quality. Heterogeneity together with the weight of domestic producers in the national economy also play significant roles and are crucial to understand institutional and trade dynamics. Changes in institutional setting are then mapped into labour market adjustments: entry encourages labour demand which, in turn, affects prices and wages. These result are robust (and bear welfare implications) to all trade models which yield gravity specification (as recently demonstrated in Arkolakis, Costinot, and Rodriguez-Clare, 2012).

As shown, firm selection is crucial to dig into endogenously generated entry barriers. Indeed, my model provides a neat mapping between unobservable structure of an economy and observables. The main mechanism relies on the active firms' share in the domestic market. However, for this to be at work, the world has to be asymmetric. The point emphasised by Waugh (2010) is that asymmetric trade frictions are not only crucial to reconcile price and quantity data in a standard trade model but are of utmost importance to understanding cross-country income differences. Similarly, institutional barriers to enter a foreign market rest on cross-country asymmetries in terms of technology and trade costs. This calls for further analysis, incorporating a role of dynamic process to describe interactions between income growth, foreign competition, and institutional change in terms of business environment. A more complex interdependence between entry barriers, stemming from strategic linkages in a game-theoretic environment is also desirable. An extension to developing countries is particularly interesting, as it allows accounting for changes in extensive margin, too. All this is left for future research.

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A. Technical Appendices

A.1. Consumer's Problem

Consumer in country j solves the following problem

$$\begin{array}{c}\max U_j \equiv \max_{\{z_{ij}\}\geq 0,\, \{q_{ij}(\omega)\}_i\geq 0} \sum_i \left[\int_{\omega\in\Omega_j} q_{ij}\left(\omega\right)^{\rho} d\omega\right]^{\frac{\beta}{\rho}} z_{ij}^{(1-\beta)} \\ \text{s.t. } \sum_i p_{z,ij} z_{ij} + \sum_i \int_{\omega\in\Omega_i} p_{ij}\left(\omega\right) q_{ij}\left(\omega\right) d\omega = E_j,\end{array}$$

i.e., she wants to maximise her utility consuming homogeneous good z_{ij} and a bundle of varieties that come from all j's trade partners $i = 1, \ldots, I$. For simplicity, it is assumed that z is freely traded, and as long as all countries produce some z, its price will get equal. Hence, I can normalise the price of z to $p_z = 1$.

However, to simplify things, take logarithm monotone transformation which yields the same optimum

$$\max_{\{z_j\}\geq 0,\, \{q_{ij}(\omega)\}_i\geq 0} \sum_i \left[(1-\beta)\ln z_{ij} + \frac{\beta}{\rho}\ln\left[\int_{\omega\in\Omega_i} q_{ij}\left(\omega\right)^{\rho} d\omega\right]\right].$$

Then, I set a Lagrangian

$$\mathcal{L}_j = \sum_i \left[(1-\beta)\ln z_{ij} + \frac{\beta}{\rho}\ln\left[\int_{\omega\in\Omega_i} q_{ij}\left(\omega\right)^{\rho} d\omega\right]\right] + \lambda_j\left[E_j - \sum_i z_{ij} - \sum_i \int_{\omega\in\Omega_i} p_{ij}\left(\omega\right) q_{ij}\left(\omega\right) d\omega\right]$$

and find the first-order conditions

$$\begin{array}{r}\frac{\partial\mathcal{L}}{\partial z_{kj}} = 0 \Rightarrow (1-\beta)\, z_{kj}^{-1} - \lambda_j = 0 \\ \frac{\partial\mathcal{L}}{\partial q_{kj}(\omega)} = \frac{\beta}{\left[\int_{\omega\in\Omega_i} q_{ij}(\omega)^{\rho} d\omega\right]} q_{kj}^{\rho-1} - \lambda_j p_{kj} = 0 \\ \frac{\partial\mathcal{L}}{\partial\lambda_j} = E_j - \sum_i z_{ij} - \sum_i \int_{\omega\in\Omega_i} p_{ij}\left(\omega\right) q_{ij}\left(\omega\right) d\omega = 0\end{array}. \tag{A.1}$$

Introduce expenditure level Z_j such that for $Q_{ij} = \left[\int_{\omega\in\Omega} q_{ij}\left(\omega\right)^{\rho} d\omega\right]^{\frac{1}{\rho}}$ and $P_{ij} = \left[\int_0^m p_{ij}\left(\omega\right)^{\frac{\rho}{\rho-1}} d\omega\right]^{\frac{\rho-1}{\rho}}$, $Z_{ij} = \int_{\omega\in\Omega} p_{ij}\left(\omega\right) q_{ij}\left(\omega\right) d\omega = P_{ij}Q_{ij}$ and $Z_j = \sum_i \int_{\omega\in\Omega} p_{ij}\left(\omega\right) q_{ij}\left(\omega\right) d\omega$. Observing that there are I conditions $k = 1, \ldots, I$ for $\frac{\partial\mathcal{L}}{\partial q_{ij}(\omega)}$, i.e., one for each trade partner, we can express them as follows: $\beta\left(Q_{ij}^{\beta-1}\right) q_{ij}\left(\omega\right)^{\rho-1} = \lambda p_{ij}\left(\omega\right)$. Since this must hold for all varieties that originate from trade partners, $\omega,\, \omega' \in \Omega_j$,

$$\left(\frac{q_{ij}\left(\omega\right)}{q_{ij}\left(\omega'\right)}\right)^{\rho-1} = \frac{p_{ij}\left(\omega\right)}{p_{ij}\left(\omega'\right)},$$

which can be re-written as

$$q_{ij}\left(\omega\right) = \left(\frac{p_{ij}\left(\omega\right)}{p_{ij}\left(\omega'\right)}\right)^{\frac{1}{\rho-1}} q_{ij}\left(\omega'\right)$$

and substituted into the expression for the expenditures of differentiated traded goods to yield

$$Z_{ij} = \int_{\omega\in\Omega} p_{ij}\left(\omega\right)\left(\frac{p_{ij}(\omega)}{p_{ij}(\omega')}\right)^{\frac{1}{\rho-1}} q_{ij}\left(\omega'\right) d\omega = q_{ij}\left(\omega'\right) p_{ij}\left(\omega'\right)^{\frac{1}{1-\rho}} \int_{\omega\in\Omega} p_{ij}\left(\omega\right)^{\frac{\rho}{\rho-1}} d\omega.$$

Then, the application of the definition of Z leads to

$$q_{ij}\left(\omega\right) = \left(\frac{p_{ij}\left(\omega\right)}{P_{ij}}\right)^{-\varepsilon} Q_{ij}. \tag{A.2}$$

Recall the equivalence between a measure of firms and goods. All goods available at country j can be described either by a set Ω_j or firms that produce domestically and import goods to country j, namely,

$M_j = m_j G(\varphi) + \sum_{i \neq j} m_i G(\varphi)$, aggregate $q_j = \sum_{i \neq j} Q_{ij}$ and recall that prices are equal in all countries, φ/ρ, hence,

$$q_j = \beta \frac{p_{ij}^{-\varepsilon}}{\left[\int_0^{M_j} p_{ij}(\omega)^{1-\varepsilon} d\omega\right]} \sum_{i \neq j} e_{ij} = \frac{\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} p_j^{-\varepsilon}.$$

Finally, dividing $\frac{\partial \mathcal{L}}{\partial z_{kj}}$ by $\frac{\partial \mathcal{L}}{\partial q_{kj}(\omega)}$ in (A.1), and inserting budget constraint, I obtain $z_j = (1-\beta) E_j$.

A.2. Producer's Problem

The total profits of the firm are simply the summation of profits flowing from all destinations it sells to

$$\pi_j = \sum_k (p_{jk}(\omega) - \varphi \tau_{jk}) q_{jk}^T - \alpha f_e, \tag{A.3}$$

where $\alpha = 1$ for $j = k$, and $\alpha \geq 1$ otherwise. I denote by q_{jk}^T a total demand for variety ω which originates from country i by consumers in country j

$$q_{jk}^T = L_j q_{jk}.$$

Recalling the demand function, $q_j(\omega) = \frac{\beta E_j}{\int_0^{M_j} p(\omega)^{1-\varepsilon} d\omega} p_j^{-\varepsilon}$, revenues follow immediately, $r_j(\omega) = p_j(\omega) q_j(\omega) = \frac{\beta E_j}{\int_0^{M_j} p(\omega)^{1-\varepsilon} d\omega} p_j^{1-\varepsilon}$. Cost is defined as $c_j(\omega) = \rho \frac{\beta E_j}{\int_0^{M_j} p(\omega)^{1-\varepsilon} d\omega} p_j^{1-\varepsilon}$. Then, the resulting domestic profit $\pi_{jj}(\varphi) = r_j(\omega) - c_j(\omega)$ for a generic firm in country j can be written as

$$\pi_{jj}(\varphi) = \frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} \left(\frac{\varphi}{\rho}\right)^{1-\varepsilon} - \alpha_j f_e. \tag{A.4}$$

Moreover, a firm that is productive enough to export abroad will earn additional profits

$$\pi_{ji}(\varphi) = \frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega} \left(\frac{\tau_{ji}\varphi}{\rho}\right)^{1-\varepsilon} - \alpha_i f_x. \tag{A.5}$$

The distribution of φ across firms is characterised by the cumulative distribution function $G(\varphi)$. It is assumed that φ follows the Pareto distribution. This implies that the distribution of marginal cost is given by $G(\varphi) = \left(\frac{\varphi}{b}\right)^k$, for $0 < \varphi < b$. Then, all firms with productivity levels below φ_c, which is the cutoff at which operating profits from domestic sales equal zero, will exit. There also exists the productivity level at which exporters just break even, i.e., $\varphi_c^\star$.

A.3. Equilibrium

The equilibrium value of E_j is found by imposing the goods market-clearing condition that expenditure must equal income that consists of labour income and all profits accruing to firms from selling in the domestic and export markets:

$$E_j = L_j + m_j \int_0^{\varphi_c} \pi_{jj}(\varphi) \, dG(\varphi) + \sum_{i \neq j} m_j \int_0^{\varphi_c^\star} \pi_{ji}(\varphi) \, dG(\varphi), \tag{A.6}$$

where domestic and foreign profits are given by (A.4) and (A.5) Then, the trade equilibrium involves finding the domestic production cutoffs φ_c, and the exporting cutoffs $\varphi_c^\star$, for all the countries i, j. The cutoff values for production and exporting are characterised by:

$$\frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} \left(\frac{\varphi_c}{\rho}\right)^{1-\varepsilon} = \alpha_j f_e \tag{A.7}$$

and

$$\frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega} \left(\frac{\tau_{ji}\varphi_c^\star}{\rho}\right)^{1-\varepsilon} = \alpha_i f_x \; \forall i \neq j. \tag{A.8}$$

A.4. Profits and Price Indices

The expression for the total profits for all active firms domestically is the following,

$$\begin{aligned}\Pi_j &= m_j \int_b^{\varphi_c} \pi_{jj}(\varphi)(-k)\, b_{jj}^k \varphi^{-k-1} d\varphi \\ &= m_j(-k)\, b_{jj}^k \frac{(1-\rho)\beta E_j (\rho)^{\varepsilon-1}}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega} \int_b^{\varphi_c} (\varphi)^{-k-\varepsilon} d\varphi - m_j(-k)\, b_{jj}^k \alpha_j f_e \int_b^{\varphi_c} \varphi^{-k-1} d\varphi.\end{aligned} \tag{A.9}$$

Then, the definite integrals[67] are computed as follows,

$$\begin{aligned}\int_b^{\varphi_c} (\varphi)^{-k-\varepsilon} d\varphi &= \left.\frac{\varphi^{-k-\varepsilon+1}}{-k-\varepsilon+1}\right|_b^{\varphi_c} = \left[\frac{(\varphi_c)^{k-\varepsilon+1}}{k-\varepsilon+1}\right] - \left[\frac{(0)^{k-\varepsilon+1}}{k-\varepsilon+1}\right] \\ &= \frac{1}{k-\varepsilon+1}\left(\frac{(1-\rho)\beta E_j}{\int_0^{m_j} p_j(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{k-\varepsilon+1}{1-\varepsilon}} (\alpha_j f_e)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \rho^{k-\varepsilon+1}.\end{aligned} \tag{A.10}$$

We could use the notation of Helpman, Melitz, and Rubinstein (2008) and note that $V = \int_b^{\varphi_c} \varphi^{1-\varepsilon} dG(\varphi) = \frac{k}{k-\varepsilon+1} b_{jj}^{1-\varepsilon} \left(\frac{\varphi_c}{b}\right)^{k-\varepsilon+1}$ and $W = \frac{k b_{jj}^{1-\varepsilon}}{k-\varepsilon+1} \max\left\{\left(\frac{\varphi_c}{b}\right)^{k-\varepsilon+1}, 0\right\}$. Similarly with another integral,

$$\int_0^{\varphi_c} \varphi^{k-1} d\varphi = \frac{1}{k}\left(\frac{(1-\rho)\beta E_j}{\int_0^{m_j} p_j(\omega)^{1-\varepsilon} d\omega}\right)^{-\frac{k}{1-\varepsilon}} (\alpha_j f_e)^{\frac{k}{1-\varepsilon}} \rho^k \ , \tag{A.11}$$

and the final expression is

$$\begin{aligned}\Pi_j(\alpha_j) &= \left(\underbrace{\frac{(1-\rho)\beta E_j}{\int_0^{M_j} p_j(\omega)^{1-\varepsilon} d\omega}\left(\frac{\varphi_c}{\rho}\right)^{1-\varepsilon}}_{\alpha_j f_e}\right)^{-\frac{k}{1-\varepsilon}} \varphi_c^k (\alpha_j f_e)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \left(m_j b_{jj}^{-k}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\right) \\ &= m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c}{b_{jj}}\right)^k \alpha_j f_e.\end{aligned} \tag{A.12}$$

This is exactly as it appears in (4.11). It is easy to separate costs from revenue in total profits: $\Pi_j = (1-\rho)\, p_j q_j - \alpha_j f_e$. Hence, revenue is $p_j q_j = \frac{\Pi_j + \alpha_j f_e}{(1-\rho)} = \varepsilon(\Pi_j + \alpha_j f_e) = \alpha_j f_e \varepsilon\left(1 + m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c}{b_{jj}}\right)^k\right)$. Labour cost is defined as

$$\rho p_j q_j = \frac{\varepsilon-1}{\varepsilon}\alpha_j f_e \varepsilon\left(1 + m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c}{b_{jj}}\right)^k\right) = \alpha_j f_e\left(\varepsilon - 1 + \frac{m_j}{k-\varepsilon+1}\left(\frac{\varphi_c}{b_{jj}}\right)^k\right), \tag{A.13}$$

recalling that $\varepsilon = 1/(1-\rho)$. Then, the additional profits for exporting firms are as follows,

$$\begin{aligned}\Pi_{ji}^\star &= m_j \int_0^{\varphi_c^\star} \pi_{ji}(\varphi)\, b^{-k} k \varphi^{k-1} d\varphi \\ &= \left(\underbrace{\frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon} d\omega}\left(\frac{\tau_{ji}\varphi_c^\star}{\rho}\right)^{(1-\varepsilon)}}_{\alpha_i f_x}\right)^{-\frac{k}{1-\varepsilon}} (\varphi_c^\star)^k (\alpha_i f_x)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \left(m_j b_{ji}^{-k}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\right) \\ &= m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k \alpha_i f_x,\end{aligned} \tag{A.14}$$

[67] In integration exercises, it is implicitly assumed that functions are continuous on relevant intervals, as here the interval is $(b, \varphi_c]$, and antiderivatives $F(\cdot)$ over the said interval exist. Then, the Fundamental Theorem of Calculus can be applied: $\int_a^b f(x)\,dx = F(b) - F(a)$. Note that the regularity condition, $k > \varepsilon - 1$, ensures that the integral converges.

where $\int_0^{\varphi_c^\star}\left(\varphi^{k-\varepsilon}\right)d\varphi = \frac{\varphi^{k-\varepsilon+1}}{k-\varepsilon+1}\Big|_0^{\varphi_c^\star} = \frac{1}{k-\varepsilon+1}\left[\left(\frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon}d\omega}\right)^{-\frac{k-\varepsilon+1}{1-\varepsilon}}(\alpha_i f_x)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\left(\frac{\rho}{\tau_{ji}}\right)^{k-\varepsilon+1}\right]$ and $\int_0^{\varphi_c^\star}\left(\varphi^{k-1}\right)d\varphi = \frac{\varphi^k}{k}\Big|_0^{\varphi_c^\star} = \frac{1}{k}\left(\frac{(1-\rho)\beta E_i}{\int_0^{M_i} p_i(\omega)^{1-\varepsilon}d\omega}\right)^{-\frac{k}{1-\varepsilon}}(\alpha_i f_x)^{\frac{k}{1-\varepsilon}}\left(\frac{\rho}{\tau_{ji}}\right)^k$. Additional profits from all trade partners obtain from above,

$$\Pi_j^\star(\alpha_i) = \sum_{i\neq j}\Pi_{ji}^\star(\alpha_i) = \left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\sum_{i\neq j}\left[m_j\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k\alpha_i f_x\right]. \tag{A.15}$$

Again, the exporters to country i earn profits $\Pi_{ji}^\star$ which can be used to find out a share devoted for labour, $\alpha_i f_x\left(\varepsilon-1+\frac{m_j}{k-\varepsilon+1}\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k\right)$, and summing over all trade partners,

$$(\varepsilon-1)\sum_{i\neq j}[\alpha_i f_x] + \frac{1}{k-\varepsilon+1}\sum_{i\neq j}\left[m_j\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k\alpha_i f_x\right]. \tag{A.16}$$

Moreover, total labour income coming from exporter making business in country i, devoted for both labourers at differentiated and homogeneous goods sectors, is defined as $m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k\alpha_i f_x - \alpha_i f_x = \left(m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k-1\right)\alpha_i f_x$. Labour income stemming from all exporters is $\sum_{i\neq j}\left(m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_c^\star}{b_{ji}}\right)^k-1\right)\alpha_i f_x$.

The price index under the symmetry assumptions, namely the shape parameters of productivity, k, are the same in all countries, is derived as follows,

$$\begin{aligned} P_j &= m_j\int_0^{\varphi_c}\left(\frac{\varphi}{\rho}\right)^{1-\varepsilon}dG_{jj}(\varphi) + \textstyle\sum_{i\neq j} m_j\int_0^{\varphi_c^{im}}\left(\tau_{ij}\frac{\varphi}{\rho}\right)^{1-\varepsilon}dG_{ij}(\varphi) \\ &= \frac{k}{k-\varepsilon+1}\rho^{\varepsilon-1}\varphi_c^{k-\varepsilon+1}\left(\frac{m_j}{b_{jj}^k} + \left(\frac{f_x}{f_e}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\textstyle\sum_{i\neq j}\frac{m_j}{(b_{ij}\tau_{ij})^k}\right). \end{aligned} \tag{A.17}$$

Insert (4.8) and (4.9) to get

$$P_j = \frac{k}{k-\varepsilon+1}((1-\rho)\beta)^{-\frac{k-\varepsilon+1}{1-\varepsilon}}\rho^k E_j^{-\frac{k-\varepsilon+1}{1-\varepsilon}}P_j^{k-\varepsilon+1}\alpha_j^{\frac{k-\varepsilon+1}{1-\varepsilon}}\left[m_j b_{jj}^{-k}f_e^{\frac{k-\varepsilon+1}{1-\varepsilon}} + \textstyle\sum_{i\neq j} m_j\tau_{ij}^{-k}b_{ij}^{-k}f_x^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right].$$

Divide both sides by $P_j^{k-\varepsilon+1}$ and obtain

$$P_j = \Upsilon\left(\frac{E_j}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}\left[\frac{m_j}{b_{jj}^k}f_e^{\frac{k-\varepsilon+1}{1-\varepsilon}} + \textstyle\sum_{i\neq j}\frac{m_j}{(\tau_{ij}b_{ij})^k}f_x^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right]^{-\frac{1}{k-\varepsilon}}, \tag{A.18}$$

where $\Upsilon = \left(\frac{k}{k-\varepsilon+1}\right)^{-\frac{1}{k-\varepsilon}}((1-\rho)\beta)^{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}\rho^{-\frac{k}{k-\varepsilon}}$. I used the fact that the measure of firms exporting to j can be found as the measure of importers, i.e., $m_j\left(\frac{\varphi_c^{im}}{b_{ij}}\right)^k$ where φ_c^{im} is derived from (4.9), using (4.8), $\varphi_c^{im}(\alpha_j) = \frac{1}{\tau_{ij}}\left(\frac{f_x}{f_e}\right)^{\frac{1}{1-\varepsilon}}\varphi_c(\alpha_j)$.

$$\begin{aligned} \frac{\partial P_j}{\partial \alpha_j} &= \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\Upsilon\mathcal{H}^{-\frac{1}{k-\varepsilon}}E_j^{\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}\alpha_j^{-\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}}\left[\frac{\partial E_j}{\partial \alpha_j}E_j^{-1} - \alpha_j^{-1}\right] \\ &= \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\frac{P_j}{\alpha_j}\left[\epsilon_{E_j,\alpha_j}-1\right], \end{aligned} \tag{A.19}$$

where $\mathcal{H} = \left[\frac{m_j}{b_{jj}^k}f_e^{\frac{k-\varepsilon+1}{1-\varepsilon}} + \sum_{i\neq j}\frac{m_j}{(\tau_{ij}b_{ij})^k}f_x^{\frac{k-\varepsilon+1}{1-\varepsilon}}\right] > 0$, $\epsilon_{i,j}$ denotes an elasticity of i's variable with respect to j variable, and the regularity condition is always satisfied to ensure a finite variance, $k > \varepsilon - 1$. Further, this relationship will prove useful to obtain expenditure, $E_j = \left[P_j\mathcal{H}^{\frac{1}{k-\varepsilon}}\Upsilon^{-1}\right]^{\frac{(k-\varepsilon)(1-\varepsilon)}{k-\varepsilon+1}}\alpha_j$.

Notice that

$$\frac{d\varphi_c}{d\alpha} = \left(\left(1-\rho\right)\beta\right)^{-\frac{1}{1-\varepsilon}} f_e^{\frac{1}{1-\varepsilon}} \rho \frac{\partial\left(E_j^{-\frac{1}{1-\varepsilon}} P_j \alpha_j^{\frac{1}{1-\varepsilon}}\right)}{\partial\alpha_j}$$
$$= \frac{\varphi_c(\alpha_j)}{\alpha_j}\left[\frac{\partial P_j}{\partial\alpha_j}\frac{\alpha_j}{P_j} + \left(\frac{1}{1-\varepsilon}\right)\left(1-\frac{\alpha_j}{E_j}\frac{\partial E_j}{\partial\alpha_j}\right)\right],$$

where $\varphi_c = \left(\frac{(1-\rho)\beta E_j}{P_j^{1-\varepsilon}}\right)^{-\frac{1}{1-\varepsilon}} (\alpha_j f_e)^{\frac{1}{1-\varepsilon}} \rho > 0$ and

$$\epsilon_{\varphi_c,\alpha_j} \equiv \frac{d\varphi_c(\alpha_j)}{d\alpha}\frac{\alpha_j}{\varphi_c(\alpha_j)} = \epsilon_{P_j,\alpha_j} + \left(\frac{1}{1-\varepsilon}\right)\left(1-\epsilon_{E_j,\alpha_j}\right).$$

Further,

$$\frac{\partial E_j}{\partial\alpha_j} = m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right) f_e\left(\frac{\varphi_c}{b_{jj}}\right)^k\left(k\varphi_c^{-1}\alpha_j\frac{\partial\varphi_c}{\partial\alpha_j}+1\right) = \frac{\Pi_j}{\alpha_j}\left(k\epsilon_{\varphi_c,\alpha_j}+1\right), \tag{A.20}$$

while the elasticity is

$$\epsilon_{E_j,\alpha_j} \equiv \frac{\partial E_j}{\partial\alpha_j}\frac{\alpha_j}{E_j} = \frac{\Pi_j}{E_j}\left(k\epsilon_{\varphi_c,\alpha_j}+1\right) = s_j\left(k\epsilon_{\varphi_c,\alpha_j}+1\right), \tag{A.21}$$

where $s_j \equiv \Pi_j/E_j$.

Thus,

$$\epsilon_{P_j,\alpha_j} \equiv \frac{\partial P_j}{\partial\alpha_j}\frac{\alpha_j}{E_j} = \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\left[\epsilon_{E_j,\alpha_j}-1\right]$$
$$= \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\left[s_j k\epsilon_{\varphi_c,\alpha_j}-(1-s_j)\right] = \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\left[s_j k\left[\epsilon_{P_j,\alpha_j}+\left(\frac{1}{1-\varepsilon}\right)\left(1-\epsilon_{E_j,\alpha_j}\right)\right]-(1-s_j)\right]$$
$$= \frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)-s_j k(k-\varepsilon+1)}\left[s_j\left(1-\left(\frac{k}{\varepsilon-1}\right)\left(1-\epsilon_{E_j,\alpha_j}\right)\right)-1\right], \tag{A.22}$$

and a positive sign is easier to sustain if k is small and ε is large. See Figure 4.1 for the contour plot.

The equation (5.12) is derived as follows:

$$(1-\rho)\beta\left(\frac{\varphi_c(\alpha_l)}{\rho}\right)^{1-\varepsilon}\frac{E_j(\alpha_l)}{P_j^{1-\varepsilon}(\alpha_l)}\left(\frac{\varphi_l^\star}{\varphi_c(\alpha_l)}\right)^{1-\varepsilon} - (1-\rho)\beta\left(\frac{\varphi_c(1)}{\rho}\right)^{1-\varepsilon}\frac{E_j(1)}{P_j^{1-\varepsilon}(1)}\left(\frac{\varphi_l^\star}{\varphi_c(1)}\right)^{1-\varepsilon}$$
$$= \alpha_l f_e\left(\frac{\varphi_l^\star}{\varphi_c(\alpha_l)}\right)^{1-\varepsilon} - f_e\left(\frac{\varphi_l^\star}{\varphi_c(1)}\right)^{1-\varepsilon} = \left(\frac{k}{k-\varepsilon+1}\right) f_e\left(\alpha_l-1\right),$$

and leads to $\varphi_l^\star = \left[\frac{\left(\frac{k}{k-\varepsilon+1}\right)(\alpha_l-1)}{\alpha_l(\varphi_c(\alpha_l))^{\varepsilon-1}-(\varphi_c(1))^{\varepsilon-1}}\right]^{\frac{1}{1-\varepsilon}}$. From this expression, equation (5.13) is

$$\epsilon_{\varphi_l^\star,\alpha_l} \equiv \frac{d\varphi_l^\star(\alpha_l)}{d\alpha}\frac{\alpha_l}{\varphi_l^\star} = \frac{\alpha_l}{1-\varepsilon}\left(\varphi_l^\star\right)^{-2}$$
$$\times\left[\frac{\left(\frac{k}{k-\varepsilon+1}\right)}{\alpha_l(\varphi_c(\alpha_l))^{\varepsilon-1}-(\varphi_c(1))^{\varepsilon-1}} + \frac{\left(\frac{k}{k-\varepsilon+1}\right)(\alpha_l-1)}{\left[\alpha_l(\varphi_c(\alpha_l))^{\varepsilon-1}-(\varphi_c(1))^{\varepsilon-1}\right]^2}\left(-\left(\left(\varphi_c\left(\alpha_l\right)\right)^{\varepsilon-1}+\alpha_l\left(\varepsilon-1\right)\left(\varphi_c\left(\alpha_l\right)\right)^{\varepsilon-2}\frac{d\varphi_c(\alpha_l)}{d\alpha}\right)\right)\right]$$
$$= \frac{1}{1-\varepsilon}\left(\varphi_l^\star\right)^{-1-\varepsilon}\frac{\alpha_l}{\alpha_l-1}\left[1-\left(1+(\varepsilon-1)\,\epsilon_{\varphi_c,\alpha_l}\right)\frac{(\alpha_l-1)(\varphi_c(\alpha_l))^{\varepsilon-1}}{\alpha_l(\varphi_c(\alpha_l))^{\varepsilon-1}-(\varphi_c(1))^{\varepsilon-1}}\right].$$

A.5. Social welfare

I start with computing consumer surplus,

$$CS = \int\left(u_j\left(q_j\left(p_j\left(\omega\right)\right)\right) - p_i q_i\left(p_j\left(\omega\right)\right) - z_j\right)d\omega$$
$$= \int\left(\sum_{i\neq j}\left[\int_{\omega\in\Omega_j}\left(\frac{\beta e_{ij}}{\int_0^{M_j}p_j(\omega)^{1-\varepsilon}d\omega}p_j^{-\varepsilon}\right)^\rho d\omega\right]^{\frac{\beta}{\rho}} z_{ij}^{(1-\beta)} - p_j\frac{\beta E_j}{\int_{\omega\in\Omega_i}p_{ij}(\omega)^{1-\varepsilon}d\omega}p_j\left(\omega\right)^{-\varepsilon} - (1-\beta)E_j\right)d\omega$$
$$= \int\left(\sum_i\left[\beta\frac{e_{ij}}{P_j}\right]^\beta z_{ij}^{1-\beta}\right)d\omega - \frac{\beta E_j}{P_j^{1-\varepsilon}}P_j^{1-\varepsilon} - (1-\beta)E_j$$
$$= \int\left(\sum_i\left[\beta\frac{e_{ij}}{P_j}\right]^\beta z_{ij}^{1-\beta}\right)d\omega - E_j = E_j\left[\beta^\beta\left(1-\beta\right)^{1-\beta}P_j^{-\beta}-1\right], \tag{A.23}$$

where the use was made of $\left[\int_{\omega\in\Omega_j}\left(p_j^{-\varepsilon}\right)^{\rho}d\omega\right]^{\frac{\beta}{\rho}}=\left(\left[\int_{\omega\in\Omega_j}p_j^{1-\varepsilon}d\omega\right]^{\frac{1}{1-\varepsilon}}\right)^{-\varepsilon\beta}=P_j^{-\varepsilon\beta}$. Then, for comparison, I need to calculate social welfare under the assumption of no distortions in institutional quality or $\alpha_i=\alpha_j=1\,\forall i,\,j$. Therefore,

$$\Pi_l\left(1\right)=m_j\int_0^{\varphi_l^{\star}(1)}\pi_{jj}\left(\varphi\right)dG_{jj}\left(\varphi\right) \tag{A.24}$$

and

$$\Pi_l^{\star}\left(1\right)=\sum_{i\neq j}\left(m_j\int_0^{\varphi_l^{\star}(1)}\pi_{ji}\left(\varphi\right)dG_{ji}\left(\varphi\right)\right), \tag{A.25}$$

where $\varphi_l^{\star}\leq\varphi_c^{\star}$, and is allowed to be equal to $\varphi_l^{\star}$ if all lobby members are exporters. Finally,

$$\begin{aligned}\Pi_l\left(1\right)=&\left(\frac{(1-\rho)\beta E_j\left(\varphi_l^{\star},\alpha=1\right)}{\left(P_j\left(\varphi_l^{\star},\alpha=1\right)\right)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}}\left(f_e\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\rho^k\left(m_j\left(b_{jj}^{lobby}\right)^{-k}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\right)\\+\sum\nolimits_{j\neq i}&\left(\left(\frac{(1-\rho)\beta E_i\left(\varphi_l^{\star},\alpha=1\right)}{\left(P_i\left(\varphi_l^{\star},\alpha=1\right)\right)^{1-\varepsilon}}\right)^{-\frac{k}{1-\varepsilon}}\left(f_x\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\left(\frac{\rho}{\tau_{ji}}\right)^k\left[m_j\left(b_{ji}^{lobby}\right)^{-k}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\right]\right).\end{aligned} \tag{A.26}$$

Then, the consumer surplus is of the same form,

$$CS=E_j\left[\beta^{\beta}\left(1-\beta\right)^{1-\beta}P_j^{-\beta}-1\right]. \tag{A.27}$$

However, observe that the difference is due to price and expenditure level, since

$$P_j\left(1\right)=m_j\int_0^{\varphi_c(1)}\left(\frac{\varphi}{\rho}\right)^{1-\varepsilon}dG_{jj}\left(\varphi\right)+\sum\nolimits_{i\neq j}m_{ij}\int_0^{\varphi_c^{\star}(1)}\left(\tau_{ji}\frac{\varphi}{\rho}\right)^{1-\varepsilon}dG_{ji}\left(\varphi\right)$$

is unequal to $P_j\left(\alpha\right)$ whenever $\exists\alpha>1$. Observe that $P_j\left(1\right)<P_j\left(\alpha\right)\,\forall\alpha>1$, when restrictions for (A.22) to hold are satisfied. Hence, consumer surplus is diminished due to worse institutional quality (recall (A.19) result).

A.6. Entry Barriers

Using the endogenous cutoff level for the lobby membership

$$\left(\varphi_l^{\star}\right)^{\varepsilon-1}=\frac{\alpha_l\left(\varphi_c\left(\alpha_l\right)\right)^{\varepsilon-1}-\left(\varphi_c\left(1\right)\right)^{\varepsilon-1}}{\left(\frac{k}{k-\varepsilon+1}\right)\left(\alpha_l-1\right)},$$

I rearrange to obtain

$$\frac{\frac{k}{k-\varepsilon+1}\left(\frac{\varphi_l^{\star}}{\varphi_c(\alpha_l)}\right)^{\varepsilon-1}-(1-Z(\alpha_l)/Z(1))}{\frac{k}{k-\varepsilon+1}\left(\frac{\varphi_l^{\star}}{\varphi_c(\alpha_l)}\right)^{\varepsilon-1}}=\frac{1}{\alpha_l}\ ,$$

which leads to

$$\alpha_l=\frac{k}{k-\left(k-\varepsilon+1\right)\left(\frac{\varphi_l^{\star}}{\varphi_c(\alpha_l)}\right)^{1-\varepsilon}\left(1-Z\left(\alpha_l\right)/Z\left(1\right)\right)}.$$

A.7. IPR

The effect on a country-wide IPR

$$\frac{dIPR_j}{d\alpha_j}$$

$$= \frac{\frac{\varepsilon k}{k-\varepsilon+1} f_x \sum_{i \neq j} m_i \left(\frac{\varphi_c}{\tau_{ij} b_{ij}}\right)^k \left(\frac{f_x}{f_e}\right)^{\frac{k}{1-\varepsilon}} + \frac{\varepsilon k}{k-\varepsilon+1} f_x \sum_{i \neq j} m_i \left(\frac{\varphi_c}{\tau_{ij} b_{ij}}\right)^k \left(\frac{f_x}{f_e}\right)^{\frac{k}{1-\varepsilon}} k \epsilon_{\varphi_c, \alpha_j} - \frac{\varepsilon k}{k-\varepsilon+1} f_x \sum_{i \neq j} m_i \left(\frac{\varphi_c}{\tau_{ij} b_{ij}}\right)^k \left(\frac{f_x}{f_e}\right)^{\frac{k}{1-\varepsilon}} \epsilon_{E_j, \alpha_j}}{E_j}$$

$$= \frac{IPR_j}{\alpha_j} + \frac{IPR_j}{\alpha_j} k \epsilon_{\varphi_c, \alpha_j} - \frac{IPR_j}{\alpha_j} \epsilon_{E_j, \alpha_j},$$

which, more conveniently written,

$$\begin{aligned} \epsilon_{IPR_j, \alpha_j} &= 1 + k \epsilon_{\varphi_c, \alpha_j} - \epsilon_{E_j, \alpha_j} = 1 + k \left(\epsilon_{E_j, \alpha_j} + \epsilon_{P_j, \alpha_j} + \left(\frac{1}{1-\varepsilon}\right)\right) - \epsilon_{E_j, \alpha_j} \\ &= \left((k-1) + k \left(\frac{k-\varepsilon+1}{(k-\varepsilon)(1-\varepsilon)}\right)\right) \epsilon_{E_j, \alpha_j} - \left(\frac{k-\varepsilon+1}{1-\varepsilon}\right) \left(\frac{\varepsilon}{k-\varepsilon}\right) < 0. \end{aligned}$$

Finally, the IPR for aggregate EU data is obtainable as follows (refers to equation (6.4) in the text):

$$IPR^{EU} = \frac{\sum_j \sum_{i \neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}{\sum_j E_j - \sum_j \sum_{i \neq j} m_j \int_0^{\varphi_c^\star} r_{ji}(\varphi) dG(\varphi) + \sum_j \sum_{i \neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}$$

$$= \frac{\sum_j \sum_{i \neq j} m_i \int_0^{\varphi_c^\star} r_{ij}(\varphi) dG(\varphi)}{\sum_j E_j} = \frac{\frac{\varepsilon k}{\varepsilon-1} \sum_j \left[\frac{\varepsilon-1}{k-\varepsilon+1} \sum_{i \neq j} m_i \left(\frac{\varphi_{ij}^\star}{b_{ij}}\right)^k (\alpha_j f_x)\right]}{\sum_j E_j} = \frac{\varepsilon k}{\varepsilon-1} \frac{\sum_j \Pi_j^{IM}}{E^{EU}}.$$

A.8. Quantitative Exercise

Use information about intensive margin and observe that average profitability is given by

$$\tilde{\pi}\left(\varphi_l^\star, \alpha_l\right) = \frac{\Pi_j\left(\varphi_l^\star, \alpha_l\right)}{m_j} = \left(\frac{\varepsilon-1}{k-\varepsilon+1}\right) \left(\frac{\varphi_l^\star\left(\alpha_l\right)}{b_{jj}}\right)^k f_e \alpha_l,$$

hence, I obtain that

$$IPR_j\left(\boldsymbol{\alpha}\right) = \frac{\sum_{i \neq j} m_i \left(\frac{\varphi_{ij}^\star}{b_{ij}}\right)^k \alpha_j f_x}{\sum_i \left[m_j \left(\frac{\varphi_{ji}^\star}{b_{ji}}\right)^k \frac{\alpha_i f_x}{(f_x/f_e)^{\Im_{i=j}}}\right]} = \frac{\Pi_j^\star(\alpha_j)}{\Pi_j(\alpha_j) + \Pi_j^\star(\alpha_i)},$$

giving $dIPR_j\left(\boldsymbol{\alpha}\right)/d\alpha_j < 0$ if and only if

$$\frac{\epsilon_{\Pi_j^\star(\alpha_j), \alpha_j}}{\epsilon_{\Pi_j(\alpha_j), \alpha_j}} = \epsilon_{\Pi_j^\star(\alpha_j), \Pi_j(\alpha_j)} < \frac{\Pi_j(\alpha_j)}{\Pi_j(\alpha_j) + \Pi_j^\star(\alpha_i)} = 1 - IPR_j\left(\boldsymbol{\alpha}\right) < 1$$

or

$$\frac{d\Pi_j^\star\left(\alpha_j\right)}{d\Pi_j\left(\alpha_j\right)} < \frac{\Pi_j^\star\left(\alpha_j\right)}{\Pi_j\left(\alpha_j\right) + \Pi_j^\star\left(\alpha_i\right)} = IPR_j\left(\boldsymbol{\alpha}\right).$$

To connect multi-country measures of entry barriers, I proceed as follows. First, take the definition of domestic profits, which give us

$$\left(\frac{\Pi_j\left(\alpha_j\right)}{m_j}\right) \left(\frac{k-\varepsilon+1}{\varepsilon-1}\right) = \left(\frac{\varphi_c\left(\alpha_j\right)}{b_{jj}}\right)^k \alpha_j f_e$$

and this expression can be used as an input into import profits:

$$\begin{aligned} \Pi_j^\star\left(\alpha_j\right) &= \frac{\varepsilon-1}{k-\varepsilon+1} \sum_{i \neq j} m_i \left(\frac{\varphi_{ij}^\star(\alpha_j)}{b_{ij}}\right)^k \alpha_j f_x = \frac{\varepsilon-1}{k-\varepsilon+1} \sum_{i \neq j} m_i \left(\frac{1}{b_{ij}} \frac{1}{\tau_{ij}} \left(\frac{f_x}{f_e}\right)^{\frac{1}{1-\varepsilon}} \varphi_c\right)^k \alpha_j f_x \\ &= \sum_{i \neq j} m_i \left(\frac{1}{\tau_{ij}}\right)^k \left(\frac{f_x}{f_e}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}} \left(\frac{b_{jj}}{b_{ij}}\right)^k \left(\frac{\Pi_j(\alpha_j)}{m_j}\right) \end{aligned}.$$

Table 6: Asymmetric weights of imports

	DEU	DEN	GRE	ESP	FRA	NET	FIN	SWE
DEU		0.13	0.09	0.11	0.10	0.05	0.19	0.10
DEN	0.15		0.12	0.11	0.11	0.09	0.41	0.08
GRE	0.23	0.17		0.06	0.07	0.06	0.20	0.08
ESP	0.19	0.19	0.33		0.20	0.13	0.15	0.07
FRA	0.20	0.18	0.28	0.10		0.08	0.27	0.11
NET	0.38	0.22	0.37	0.16	0.25		0.24	0.10
FIN	0.11	0.05	0.10	0.13	0.08	0.09		0.04
SWE	0.20	0.25	0.24	0.29	0.18	0.21	0.52	

Weights correspond to $\omega_i^j = \frac{1}{N-1}\left(\frac{E_i}{E_j}\right)^{\frac{k}{\varepsilon-1}}\left(\frac{IM_{ij}/IM_{jj}}{IM_{ji}/IM_{ii}}\right)^{\frac{k}{1-\varepsilon}}\left(\frac{P_i}{P_j}\right)^{3k}$.

This yields

$$\frac{\Pi_j^\star(\alpha_j)/\sum_{i\neq j} m_i}{\left(\frac{\Pi_j(\alpha_j)}{m_j}\right)} = \frac{\sum_{i\neq j} m_i\left(\frac{1}{\tau_{ij}}\right)^k\left(\frac{f_x}{f_e}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}\left(\frac{b_{jj}}{b_{ij}}\right)^k}{\sum_{i\neq j} m_i}.$$

Noting the relationship between cutoffs of exporters and domestic producers, we end up with

$$\sum_{i\neq j}\left[\frac{m_j\left(\frac{1}{b_{ji}}\left(\frac{P_i}{P_j}\right)\left(\frac{E_i}{E_j}\right)^{\frac{1}{\varepsilon-1}}\frac{1}{\tau_{ji}}\right)^k\left(\frac{\alpha_i}{\alpha_j}\right)^{\frac{k-\varepsilon+1}{1-\varepsilon}}}{\sum_{i\neq j} m_i\left(\frac{1}{\tau_{ij}}\right)^k\left(\frac{1}{b_{ij}}\right)^k}\right] = 1,$$

as given in the main text.

A.9. Weighting Scheme

A.10. Proposition 1

Proof. Examine (5.2) and establish the following:

1. $C(1) = \theta[\Pi(1) - \Pi(1)] + (1-\theta)[\kappa W(1) - \kappa W(1)] = 0$ and without contributions policy maker maximises her utility which coincides with the aggregate welfare (see (5.1) and recall that prices are increasing whereas welfare is decreasing in α). Hence, $\alpha(0) = 1$.

2. Differentiate (5.2) with respect to α: $\frac{\partial C}{\partial\alpha} = \theta\frac{\partial\Pi}{\partial\alpha} - (1-\theta)\kappa\frac{\partial W}{\partial\alpha}$. The profits of lobbyists are increasing in α (as there would be no reason to lobby otherwise), whereas welfare is decreasing in α. Use the result from (5.9) and note that $\frac{\partial\Pi}{\partial\alpha} = \lim_{\Delta\alpha\to 0}\frac{\Delta\Pi}{\Delta\alpha}$ where $\Delta\Pi = \Pi(\alpha_l) - \Pi(1)$ and $\Delta\alpha = \alpha_l - 1$. A difference quotient $\frac{\Delta\Pi}{\Delta\alpha}$ shows the average rate of change of Π over the interval $[1, \alpha_l]$. It is positive by definition of (5.8).

Its limit as $\alpha_l \to 1$ is the instantaneous rate of change of Π at $\alpha = 1$. The result follows from the definition of a difference in profits in (5.10). Use the result in (5.7) to obtain $\frac{\partial C}{\partial\alpha} = \frac{\partial\Pi(\alpha)}{\partial\alpha}$. The partial derivative of the lobby's profit can be found from (5.9), evaluated at $\varphi_l^\star$. Recall that $C = \triangle\Pi = m_j\int_0^{\varphi_l^\star} dG(\varphi)\triangle\pi_{jj}^{total}$. The difference quotient is derived from (A.12),

$$\left.\frac{\triangle\Pi}{\triangle\alpha}\right|_{\varphi=\varphi_l^\star} = \frac{m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e(\alpha_l-1)}{\Delta\alpha} = m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e > 0$$

because all terms are positive. Then, recalling that whenever limits exist, their product is the product of limits,

$$\lim_{\triangle\alpha\to 0} \frac{\triangle\Pi}{\triangle\alpha}\Big|_{\varphi=\varphi_l^\star} = \frac{\partial\Pi}{\partial\alpha}\Big|_{\varphi=\varphi_l^\star} = m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e = \frac{\Pi}{\alpha_l} > 0.$$

To account for all effects, I establish a full derivative

$$\frac{d\Pi}{d\alpha} = \frac{\partial\Pi}{\partial\alpha}\Big|_{\varphi=\varphi_l^\star}\frac{d\alpha}{d\alpha} + \frac{\partial\Pi}{\partial\varphi_l^\star}\frac{d\varphi_l^\star}{d\alpha}.$$

Hence,

$$\frac{\partial\Pi}{\partial\varphi_l^\star} = km_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)b_{jj}^{-k}\left(\varphi_l^\star\right)^{k-1}\alpha_l f_e = \frac{k\Pi}{\varphi_l^\star}.$$

To obtain a full derivative of $\frac{d\varphi_l^\star}{d\alpha}$, I apply an implicit differentiation, thus incorporating constraints in (5.10). The intermediate step is to find a difference in social welfares,

$$\begin{aligned} m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e\left(\alpha_l-1\right) &= \kappa_j\left(W(1)-W(\alpha_l)\right) \\ &= \kappa_j\beta^\beta\left(1-\beta\right)^{1-\beta}\left[\frac{E_j(\alpha_l)}{P_j(1)^\beta} - \frac{E_j(1)}{P_j(\alpha_l)^\beta}\right]. \end{aligned}$$

Note that, by definition, expenditure and price levels contain a different measure α but the same cutoff productivity level fixed at $\varphi_l^\star$. This leads to another intermediate step that helps simplifying a ratio of real expenditures. Equate a cutoff productivity for the lobbyist,

$$\begin{aligned} &\kappa\beta^\beta\left(1-\beta\right)^{1-\beta}\left[\frac{E_j(\alpha_l)}{P_j(1)^\beta} - \frac{E_j(1)}{P_j(\alpha_l)^\beta}\right] \\ &= \left(1-\rho\right)\beta\left(\frac{\varphi_l^\star}{\rho}\right)^{1-\varepsilon}\left(\frac{E_j(\alpha_l)}{P_j^{1-\varepsilon}(\alpha_l)} - \frac{E_j(1)}{P_j^{1-\varepsilon}(1)}\right) \\ &= \left(\frac{k}{k-\varepsilon+1}\right)f_e\left(\alpha_l-1\right), \end{aligned}$$

yielding

$$\frac{\left(\frac{E_j\left(\varphi_l^\star,\alpha_l\right)}{P_j\left(\varphi_l^\star,\alpha_l\right)}\right)}{\left(\frac{E_j\left(\varphi_l^\star,\alpha=1\right)}{P_j\left(\varphi_l^\star,\alpha=1\right)}\right)} = \alpha_j\left(\frac{P_j\left(\varphi_l^\star,\alpha=1\right)}{P_j\left(\varphi_l^\star,\alpha_l\right)}\right)^\varepsilon.$$

The ratio of real expenditure with and without impediments shall be equal to a price ratio adjusted by an elasticity of substitution between any pair of differentiated goods and weighted by the impediment level α_j. The implicit differentiation yields

$$\begin{aligned} &m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_l}\right)^k f_e\left[1+\frac{k(\alpha_l-1)}{\varphi^l}\frac{\partial\varphi_l^\star}{\partial\alpha}\right] \\ &= \frac{\left(-\kappa\left[\left(\alpha_l^{-1}\left(1-\varepsilon\epsilon_{P_j,\alpha}\right)\right)+(1-\beta)m_j\left(\frac{\varepsilon-1}{k-\varepsilon+1}\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e\left[1+\frac{k\left(\alpha^l-1\right)}{\varphi^l}\frac{\partial\varphi_l^\star}{\partial\alpha}\right]\right]\right)m_j\left(\frac{\varphi_l^\star}{b_l}\right)^k - \kappa\left(W(1)-W\left(\alpha^l\right)\right)km_j\left(\frac{\varphi_l^\star}{b_l}\right)^k\left(\varphi_l^\star\right)^{-1}\frac{\partial\varphi_l^\star}{\partial\alpha}}{\left[m_j\int_0^{\varphi_l^\star}dG(\varphi)\right]^2}, \end{aligned}$$

where $\epsilon_{P_j,\alpha} = \frac{\partial P_j\left(\varphi_l^\star,\alpha_l\right)}{\partial\alpha}\frac{\alpha_l}{P_j\left(\varphi_l^\star,\alpha_l\right)}$ is the elasticity of the price index and institutional quality. Further simplifications yield

$$\frac{d\varphi_l^\star}{d\alpha} = \frac{-\kappa\left(1-\varepsilon\epsilon_{P_j,\alpha}\right)-\left[\kappa(1-\beta)+m_j^l\right]\Pi}{\frac{k\alpha_l}{\varphi_l^\star}\left[\triangle\Pi\left[\kappa(1-\beta)+m_j^l\right]+\kappa\triangle W\right]}, \tag{A.28}$$

where $\Delta\alpha = \alpha_l - 1$, $\triangle W = W(1) - W\left(\alpha^l\right)$, $k\left(k-\varepsilon+1\right)\triangle\Pi = km_j\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k\left(\varepsilon-1\right)f_e\left(\alpha^l-1\right)$, $\left(k-\varepsilon+1\right)\Pi\alpha_l^{-1}\varphi_l^\star = m_j\left(\varepsilon-1\right)\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k f_e\varphi_l^\star$, and $m_j^l = m_j\left(\frac{\varphi_l^\star}{b_{jj}}\right)^k$ is the measure of firms that engage in lobbying in a country j. An increase in α is always related to a decrease in a cutoff productivity $\varphi_l^\star$ if the price elasticity of α is $\epsilon_{P_j,\alpha} < \frac{1}{\varepsilon} = 1-\rho$. A less stringent requirement which still ensures a negative derivative is $\epsilon_{P_j,\alpha} < \frac{1}{\varepsilon} + \frac{\kappa(1-\beta)+m_j^l\Pi}{\kappa\varepsilon} = \frac{1}{\varepsilon}\left[1+(1-\beta)+\frac{m_j^l}{\kappa}\Pi\right]$. Hence, given an elasticity of substitution ε and a relative weight on the differentiated goods, β, a requirement is easier to satisfy for higher lobby's profits, higher measure of lobbies, and lower weight on aggregate social welfare.

To finalise, a total derivative is

$$\begin{aligned}\frac{d\Pi}{d\alpha} &= \frac{\Pi}{\alpha_l} + \frac{k\Pi}{\varphi_l^\star}\left[\frac{-\kappa\left(1-\varepsilon\epsilon_{P_j,\alpha}\right)-\left[\kappa(1-\beta)+m_j^l\right]\Pi}{\frac{k\alpha_l}{\varphi_l^\star}\left[\triangle\Pi\left[\kappa(1-\beta)+m_j^l\right]+\kappa\triangle W\right]}\right] \\ &= \Pi\left[\frac{1}{\alpha_l}+k\frac{d\varphi_l^\star\alpha_l}{\varphi_l^\star d\alpha}\frac{1}{\alpha_l}\right] = \frac{\Pi}{\alpha_l}\left[1+k\epsilon_{\varphi_l^\star,\alpha}\right],\end{aligned}$$

where $\epsilon_{\varphi_l^\star,\alpha} = \frac{d\varphi_l^\star\alpha_l}{d\alpha\varphi_l^\star}$ is the elasticity of the institutional quality and the cutoff productivity of a lobby. Hence, total lobbies profits are increasing in α if $\epsilon_{\varphi_l^\star,\alpha} > -\frac{1}{k}$. This requirement can be translated into

$$\epsilon_{P_j,\alpha} > \frac{1}{\varepsilon}\left[1-\left(\triangle W-\left[(1-\beta)+\frac{m_j^l}{\kappa}\right][\Pi-\triangle\Pi]\right)\right].$$

Combining together the requirement to yield an increase in prices with the requirement to yield higher profits when α is increasing, I obtain

$$\frac{1}{\varepsilon}\left[1+(1-\beta)+\frac{m_j^l}{\kappa}\Pi\right] > \epsilon_{P_j,\alpha} > \frac{1}{\varepsilon}\left[1-\left(\triangle W-\left[(1-\beta)+\frac{m_j^l}{\kappa}\right][\Pi-\triangle\Pi]\right)\right].$$

These requirements are satisfied whenever

$$(1-\beta)\left[1-(\Pi-\triangle\Pi)\right]+\frac{m_j^l}{\kappa}\triangle\Pi > -\triangle W.$$

For given measure of firms in country j and the weight on the differentiated goods β, both requirements are easier to satisfy when policy maker puts a small weight on the aggregate social welfare and there is a sizeable gain from changing institutional quality measure. The latter is measured by additional profits $\triangle\Pi$ of a lobby that are obtained whenever there are changes from $\alpha=1$ to α_l. Hence, a there is a clear tradeoff between a gain for the lobbyists and the loss for the society.

Having satisfied above requirements, contributions are increasing in α. Inverting the contribution schedule will result in an institutional measure such that it increases with the contribution given to the policy maker. Hence, $\alpha'(C) > 0$ given $\epsilon_{\varphi_l^\star,\alpha} > -\frac{1}{k}$.

□

B. Supplementary Material

B.1. Additional Tables and Graphs

Table 7: Summary of Quantitative Exercise for Main Variables in a 2-Country World: Expenditure Channel Shut

$\triangle\alpha$	$\triangle IPR\,(\alpha)$	$\triangle CS\,(\alpha)$	$\triangle P\,(\alpha)$	$\triangle E\,(\alpha)$	$\triangle$Real $E\,(\alpha)$	$W\,(\tau \to \tau')$
0	0	0	0	0	0	0
1	-0.30	-0.44	0.59	0	-0.58	-0.10
5	-1.45	-2.18	2.90	0	-2.82	-0.51
10	-2.83	-4.34	5.75	0	-5.43	-0.98
15	-4.14	-6.46	8.54	0	-7.87	-1.42
18	-4.90	-7.72	10.19	0	-9.25	-1.68

In Percentage Points. Firm Share is Kept Fixed

B.2. Commitment

The commitment problem between a lobby and a policy maker, as well as inside a lobby, must also be taken into account. To endogenise the participation in the lobbying game, the second stage is introduced, where the firms take the schedule of institutional quality as given and decide whether to contribute to the lobbying effort or to defect. Then, a necessary condition for cooperation by firm j is:

$$\pi_{j,d} \leq \frac{1}{1-\delta}\left[\left(\pi_{j,c} - \frac{C\,(\alpha_l)}{m_j \int_0^{\varphi_l^\star} dG\,(\varphi)}\right) - \delta\,(\pi_{j,n} - c_{j,n})\right] \tag{B.1}$$

where $\pi_{j,d}$ is the one-period profit of firm j when the firm defects, $\pi_{j,n} - c_{j,n}$ is the profit when firms are not cooperating in their lobbying efforts, $\pi_{j,c} - \frac{C(\alpha_l)}{m_j \int_0^{\varphi_l^\star} dG(\varphi)}$ shows the profit when firms cooperate, and δ is the discount factor. Cooperation is sustainable if the present discounted value of defecting and suffering the punishment is not greater than the value of cooperating each period. The cooperation constraint (B.1) can be rewritten as

$$\begin{gathered}(1-\delta)\,\pi_{j,d} + \delta\,(\pi_{j,n} - c_{j,n}) \leq \left(\pi_{j,c} - \frac{C(\alpha_l)}{m_j \int_0^{\varphi_l^\star} dG(\varphi)}\right) \\ D \leq Z,\end{gathered} \tag{B.2}$$

where $D = m_j \int_0^{\varphi_l^\star} dG\,(\varphi)\,[(1-\delta)\,\pi_{j,d} + \delta\,(\pi_{j,n} - c_{j,n})]$ is the temptation to defect, and the benefits of cooperation are represented by $Z = m_j \int_0^{\varphi_l^\star} dG\,(\varphi)\left[\left(\pi_{j,c} - \frac{C(\alpha_l)}{m_j \int_0^{\varphi_l^\star} dG(\varphi)}\right)\right] = m_j \int_0^{\varphi_l^\star} dG\,(\varphi)\,[\pi_{j,c}] - C\,(\alpha_l)$. These requirements introduce a discount factor δ into analysis and, for the paper purposes, makes it unnecessarily complex.

B.3. Common Agency Games

By common agency game, the following strategic situation is meant: an individual (the agent) decides upon an action affecting his or her well-being as well as the well-being of n other individuals (the principals), each of them offering a menu of payments contingent on the action chosen. The primitives of the common agency game are simply the set of feasible actions for the agent and the utilities derived by the agent and the principals for the different actions.

Bernheim and Whinston (1986) argue that among the Nash equilibria, there is a subset of 'truthful Nash equilibria' inducing efficient actions which are focal in many respects. Among other things, they prove that the best response correspondence of every principal always contains a truthful strategy and that the truthful Nash equilibria are essentially the only equilibria which are coalition-proof, i.e., stable when nonbinding communication between the principals is possible.

In this paper I am working within the complete information framework, which rules out informational considerations and permits me to isolate the effect on the outcome of the game of the competition between the principals from the effect of the existence of some private information. The agent's rent in this framework is the pure result of conflicting preferences among principals.

To a common agency game an object W is associated which is mathematically a transferable utility (TU) cooperative game with the set of players being the set of principals: specifically, for each group S of principals I calculate the highest joint payoff $W(S)$ of the agent and principals in the group S. Laussel and Breton (2001) demonstrate that an n-dimensional vector u is a vector of equilibrium payoffs for the principals if and only if u is a Pareto optimum of the polyhedron defined by the set of linear inequalities: $\sum_{i \in S} u_i \leq W(N) - W(N \setminus S)$ for all S. The polyhedron has a direct interpretation: it means that the total payoff of group S can never exceed the contribution of group S to the total surplus. Laussel and Breton (2001) show that there is a one-to-one relationship between the Pareto optima of this convex polyhedron and the solutions to a system of n simultaneous equations that are called the fundamental equations.

$$W_\Gamma(N) - \sum_{i \in N} u_i = \max_{S \in \bar{\Psi}_i} \left(W_\Gamma(S) - \sum_{i \in S} u_i \right) \ \forall i \in N \tag{B.3}$$

This is exactly a fundamental system of n simultaneous equations with n unknowns. The left-hand side is the equilibrium payoff of the agent and the right-hand side of the ith equation is the highest payoff that the agent would get if he or she disregarded the offer from principal i. In equilibrium, the left-hand side must be greater than or equal to any of the right-hand sides. But a strict inequality for, say, the ith equation is not possible since otherwise, principal i could raise his or her u_i by a small enough ε, and thereby be better off, without changing the choice of the agent.